

# EFFECT OF MOTHER-TONGUE ON PERFORMANCE IN MATHEMATICS AMONG PRIMARY SCHOOL PUPILS OF BEROM SPEAKING DIALET, PLATEAU STATE: IMPLICATION FOR TECHNOLOGICAL DEVELOPMENT

by

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## Abstract

*The aim of this study was to investigate the effect of mother-tongue on performance of mathematics, among primary school pupils. The researcher investigated whether any difference existed in the performance of primary six pupils, using Berom language and English language. The researcher also, examined which one was more effective and whether there was any gender difference in performance in mathematics. The study adopted a pre-test, post-test control group quasi experimental design. Two hundred and eighty eight (288) pupils were drawn from twelve primary schools in Fan district of Barkin Ladi L.G.A. of Plateau State, Nigeria were used as sampled schools. A population of 689 was used. Two trained NCE teachers were used for the study. One teacher handled the experimental group, while the other mathematics teacher handled the control group. The instruction lasted for five weeks, using a unified class six mathematics syllabus, designed by the Federal Ministry of Education 9 year basic education curriculum. Mathematics Performance Test (MPT) was used as the instrument to collect data from the pupils. The scores were collected from the research assistants marked and scored over 20. Mean and standard deviation were used to answer the research questions. While t-test and analysis of variance (ANOVA) were used on the pre-test and post-test scores of experimental and control groups. Findings revealed a significant difference in performance. Based on findings among others, it was recommended that mother-tongue is an important ingredient to teaching and learning of mathematics in primary schools and a necessity to acquire technological development in Nigeria.*

**Key Words:** *Mother tongue, performance, mathematics.*

## INTRODUCTION

Berom is one of the major languages spoken in Plateau State. The people are predominantly farmers and hunters, with a population of over 2.5 million people scattered across the globe (Jacobs & Nyam, 2004). The Berom are found in four local government areas of Plateau State, which include: Jos North, Jos South, Barkin Ladi (Gwol) and Riyom. The Beroms are also found in southern Kaduna in Kaduna State. The Berom language is used for communication in speech and writing. So many of Berom children are marginalized, without going to school.

Berom language is one of the few languages on the Plateau that can perform some Arithmetic by using numbers, especially using addition in (wuna), division (Gas), multiplication (Gwese) and so on. Berom people are able to count from One (1) to one million (1,000,000). The counting in one in Berom is *gunning*, 2 is *beba*, 3 is *betad*, 4 is *benas*, 5 is *betu-ong*, 6 is *besiming*, 7 is *betamar*, 8 is *Rwit*, 9 is *shabetad*, 10 is *ku-ruo*, 20 is *be kuru-beba*, 30 is *kuru betad*, 40 is *kuru benas*, and so on. 100 is *Naga*, 1000 is *gunning*, 1,000,000 is *gu-begu*. The counting in Berom is on basis of base ten (10).

Globally, there are 50 – 75 million, ‘marginalized’ children who are not enrolled in school. Children whose primary language is not the language of instruction in school are

more likely to drop out of school or fail in early grades, a research has shown that children's first language is the optional language for literacy and learning throughout primary school (UNESCO, 2008a). In spite of growing evidence and parent demand, many educational systems around the world insist on exclusive use of one or sometimes several privileged languages. This means excluding other languages and with them, the children who speak them (Anold, Bvarlett, Gowani, & Merali, 2006). Children learning foreign language of instruction stands the risks, such as children are not able to engage successfully in learning tasks, teachers feeling overwhelmed by children's inability to participate, early experiences of school failures, and so on. Some children do succeed through a language transition program that helps them to acquire the language of instruction. In learning a foreign language, there is a risk of children failing to become linguistically competent members of their families and communities and lose the ability to connect with their cultural heritage. While some children continue to develop proficiency in their first language with success in their school academics, this is not the case of children learning mathematics using English or second language as a medium of instruction. There is an increasing rate of language depletion of the dialect and cultural values of the people. Preservation of mother tongues. Researchers have shown that many linguistic groups are becoming vocal about the need to ensure that the youngest members of their communities keep their linguistic heritage. Some countries like China, Japan, India, Philippines and so on have recently established language -in - education policies that embrace children's first languages. So many compendium have been produced by UNESCO (2008b) attests to growing interest in promoting mother-tongue-based education, and to wide variety of models, tools, and resources now being used developed and piloted to promote learning programs in the mother tongue.

Children learn better in their mother tongue. UNESCO has encouraged mother tongue instruction in primary education since 1953 (UNESCO, 1953) and UNESCO highlights the advantages of mother tongue education right from the start: children are more likely to enroll, succeed and perform in school (Kosonen, 2005). Parents are more likely to communicate with teachers and participate in their children's learning (Benson, 2002). This is because some parents in the rural areas cannot communicate well in English, but only their first language. Girls and rural children with less exposure to a dominant language stay in school longer and repeat grades less often. (Hovens, 2002; UNESCO Bangkok, 2005). Some educators argue that only those countries where the pupils first language is the language of instruction are likely to perform and achieve the goals of education. Research also suggests that engaging marginalized children in school through mother tongue based is a successful story rather than using a multilingual education.

Similarly, research has shown that human beings use language to grasp things intellectually, which forms the basis of social cohesion, we can attain and language defines humanity (Kolawole, and Oginni, 2013). Zhang H. (1997) stated that language is the key to the heart of people, if we lost the key, we lose the people. The language of communication and instruction in all our primary schools in Plateau State is English language. There is the risk of negative effects. David (2006), opined that language is undoubtedly, one of the most important areas of the curriculum, because most of our children are in the rural areas, born and brought up in their mother tongue language.

Unfortunately, the use of mother tongue in teaching and learning mathematics in our primary schools have not been encouraging. Formal education was introduced to Nigeria with little or no attention devoted to the teaching and learning of mathematics using the

indigenous language of the people, rather than using a foreign language English. It is always true that charity begins from home and the child learns better from known to unknown of his or her mother tongue.

Ajayi (2005) stated that the native language were de-emphasized and every child thinks and dreams in his mother tongue. Fafunwa (1998) attributed the continued attention of English as our official language to colonial mentality. Fafunwa stressed that children should be given early education in mother tongue, because it will last longer in their memory of the child than any other language. It is in this vein, that the National Policy on Education (NPE) affirmed that government recognizes the importance of mother tongue, as a means of promoting social, interaction, national cohesion, unity, faster understanding and preservation of our culture. The policy encourages every child to learn the language of his immediate environment. For this reason pupils/students are made to learn any of the Nigerian languages; Hausa, Igbo and Yoruba. Unfortunately so many pupils and students are not from any of these languages and they are still being forced to learn it as a second language in the community just as English is taught to them. Though, some researchers argue out that teaching the child's mother tongue may encounter problems, because there some terms in mathematics that so many mother tongues do not have meanings and illustrations for some signs: (- + x ÷); terms such as x, y, roman numerals and so on. Fortunately, borrowing of these terms from English is not prohibited, since English language borrowed some terms and abbreviations from Arabs using the Arabic numerals and all these terms have been in vogue in teaching and learning mathematics at both primary, secondary and tertiary institutions.

According to the information from the desk officer in charge of mathematics in Plateau State Basic Education Board (SUBEB) on the number of mathematics teachers teaching in primary schools. It revealed that during 2017, SUBEB had 315 mathematics teachers with NCE. The Board has a total number of 617, 200 pupils across the State, with teacher-pupil ratio of 1:1,758. This means that one mathematics teacher handles 1,758 pupils. It was also affirmed that failure of the mathematics teachers to teach in the mother tongue contributed to poor performance in mathematics as most pupils who are in the rural areas cannot understand mathematics language, Chollom, (2016). In a paper presentation at the end of 2016 Plateau State primary schools mathematics quiz competition organized by Plateau State Universal Basic Education Board (SUBEB) lamented the sorry state of mathematics in the primary schools, and the poor performance of pupils at previous mathematics Olympiad organized by Mathematics Association of Nigeria (MAN) and National Mathematical Centre (NMC), Abuja Olympiads.

The Federal Government introduced the Universal Basic Education (UBE) programme in 1999 as a reform programmes aimed at providing greater access to, and ensuring quality of basic education throughout primary schools in Nigeria. The UBE programme objectives include; reducing school drop out and improving relevance, quality and efficiency and acquisition of literacy, numeracy, life skills and values for life long education and useful living. Similarly, National Council of Teachers of Mathematics (NCTM), (2014) recommended for access and equity. It calls for mathematics programmes which require that all pupils have access to a high quality mathematics curriculum, effective teaching and learning, high expectations, the support and resources needed to maximize pupils'/learners potentials.

The objectives of mathematics curriculum for primary school pupils as revised in 2012 is as follows:

- i. Acquire mathematics literacy necessary to function in an information age.
- ii. Cultivate the understanding and application of mathematics skills and concepts necessary to thrive in the ever changing technological world.
- iii. Develop the essential elements of problem solving, communication, reasoning and connection within the study of mathematics.
- iv. Take advantage of the numerous career opportunities provided by mathematics.
- v. Become prepared for further studies in mathematics and other related fields.

Since this investigation involves primary school pupils, the researcher needs to look at findings of other researchers on gender differences in mathematics performance. The differences between the performance of males and females in mathematics have been an issue in education arena for so many years. In most of the researchers on gender differences in mathematics performance, a variable phenomena emerges, boys out perform girls in the area of mathematics Paret, & Fenner (2006) and Joseph & Lubienski (2011). However, Hyde, Else-Quest and Linn (2010) said girls around the world are not worse at mathematics than boys, even though boys are more confident in mathematics ability. In the same vein, the study of Thompson & Daniel (2007) showed that fear of negatively impact female performance in mathematics, such fear has shown to affect females negatively and putting less effort in studying mathematics. Agwangah, (2013), opined that using a variety of pedagogical strategies that address different learning styles within instructional environments has been shown to encourage female performance in mathematics classrooms. The use of mother tongue in teaching mathematics at the primary school level can be used to bridge the gap existing between males and female pupils.

#### **STATEMENT OF THE PROBLEM**

The importance of mathematics in the life of an individual and technological development of Nigeria cannot be overemphasized. However, the foundation for teaching and learning mathematics at the primary schools across Plateau State is still shaking. So many people have lamented on the poor foundation of primary school pupils in mathematics performance due to the following acute shortage of qualified professional mathematics teachers who are teaching in the primary schools, overcrowded classrooms, exhibition of poor knowledge of mathematics content by many unqualified teachers in the primary schools, pupils negative attitude towards learning, lack of learning support by some parents, inadequate instructional resources for the teaching of mathematics in so many primary schools, lack of translating mathematics language to the mother tongue of the children, environmental factors and socio-economic status of some families, poor motivation of the professional mathematics teachers, problem of dyscalculia and so on.

The persistence of the problem of poor performance in mathematics at the primary schools in Plateau State tends to create problems for pupils, students, teachers, parents and the government. When the foundation is very poor in the primary schools, learning mathematics in the secondary and tertiary institutions will be very difficult for such children, who will be aspiring to be future leaders, doctors, engineers, pilots, lawyers and so on will be at stake.

Many ways are suggested by teachers, SUBEB, STAN, MAN, NMC and so on, on how to improve the performance of learners in primary and secondary school levels. Edukugho, (2010) stated that the government recognized the importance of mathematics in Science and Technology and in fact in all areas of human knowledge. Hence, government

established the National Mathematical Centre, Abuja and has been funding it as one of its parastatals. MAN also is doing a lot of contribution in the area of promoting effective mathematics teaching and learning through research in the primary, secondary and tertiary levels.

Mbuqua, Kobet, Muthea and Nkonke (2012), were of the view that mathematics performance of learners can be improved by provision of proper staffing, teaching and learning materials, curriculum, motivation of pupils, students and teachers. However, Gitaan, Nyaga, Muthea and Becue (2013) were of the opinion that ways of improving pupils and students performance in mathematics include: creation of positive attitude towards mathematics, administration of more examinations and quizzes, provision of adequate teaching and learning materials, motivation, completion of syllabus in time, provision of adequate trained mathematics teachers, using variety of teaching methods as well as monitoring of lesson by the school administrators.

Ojimba (2012), suggested for strategies for improving the performance of learners in mathematics as follows: grouping of pupils/Students ability during teaching of mathematics in the classroom, the strategy of constructivism should be imbibed in teaching mathematics, he also added the use of instructional aids and games as well as using computer – aided instruction.

The researcher is of the opinion that performance is to be improved in the primary schools. The following are to be imbibed: teaching and learning in primary schools should be inculcated by using mother tongue, sufficient instructional materials, library, laboratory and other physical facilities, developing good rapport between parents, teachers and head teachers, reducing pupils and teachers ratio to manageable size, organizing of extra lessons, providing sufficient textbooks in mathematics, paying attention to pupils and caring for them, providing adequate primary and secondary needs to the pupils these are some of the ways of improving performance of primary school pupils in mathematics.

### **PURPOSE OF THE STUDY**

The purpose of the study was to determine the effect of mother tongue on performance in mathematics among primary six pupils of Berom speaking dialect, Plateau State. Specifically, the objectives of the study were to:

1. Compare the performance in mathematics of primary six pupils within Fan District of Berom land, who were taught mathematics using Berom language as a mother tongue and taught mathematics using English language as a foreign language.
2. To determine the mean difference and standard deviation of performance based on gender, using the two languages.
3. To find out the extent of significant differences among the means of all the groups in the experimental and control.

### **RESEARCH QUESTIONS**

The following research questions raised and answered in the research:

1. What is the difference between mean performance scores of pupils in mathematics in the experimental (using Berom language) and control group (using English language)?
2. To what extent does gender influence the mean scores of pupils with Berom language taught and English language taught?

### **RESEARCH HYPOTHESES**

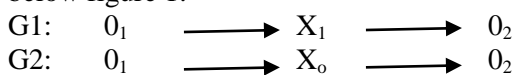
The following research hypothesis were formulated and tested at 0.05 level of significance.

1. There is no significant difference between mean performance scores of pupils in mathematics at the experimental group (Berom language) and control group (English language).
2. There is no significant difference between mean performance scores of pupils in mathematics based on gender for experimental and control groups.
3. There is no significant difference among the means of all the groups in the experimental and control at pre-test and post-test stage.

### **MATERIALS AND METHODS**

The pre-test, post-test control group research design which is the quasi-experimental research design was adopted in conducting the research. This was taken into consideration, because it was possible to carry out a random assignment of subjects of groups, the use of intact classes was embarked upon and there was non-equivalence of classes.

In the design notation, non-equivalent selection with pre-test and post-test is shown below figure 1:



Key:  $o_1$

G1: Experimental Group one (1) received pre-test  $0_1$  and treatment  $X_1$  (Berom Language mathematics lesson), which later administered post – test  $0_2$ .

G2: Control group two (2), received the same pre-test  $0_1$  and treatment  $X_0$  (English Language Mathematics Lesson), which after administered the same post-test ( $0_2$ ) as in G1.

X1: Experimental treatment, X0: No treatment in control group.

$0_1$ : Pre-test,

$0_2$ : Post test.

### **POPULATION, SAMPLE AND SAMPLING TECHNIQUE**

The population of this study consisted of six hundred and eighty nine (689); female 323 and male 366; primary six pupils from the twelve (12) public primary Schools in Fan District of Barkin Ladi Local Government Area (LGA) of Plateau State. Purposive sampling technique was adopted in selecting Fan District, because of the fear of insecurity in other districts of the local government area and Fan is the only district that almost all the primary school pupils speak and hear Berom language very well. The sample size for the research study was one hundred and eighty eight (188) class six pupils from the twelve (12) sampled primary schools. The sampling technique used for the study, was the cluster sampling technique. The cluster sampling technique was adopted, because of its advantage. The cluster form of selection from the primary schools is not only heterogeneous, but also are small enough to reduce the cost of obtaining necessary information and hence the adoption of the single stage cluster.

### **RESEARCH INSTRUMENT**

The instrument used for this study was the Mathematics Performance Test (MPT) for the primary six pupils. The section of the instrument consisted of Bio-data, while second part consisted of the test items; which consisted of twenty adapted multiple choice objective questions with options A – D. Each correct question was awarded one mark. The instrument was validated

by two qualified NCE mathematics teachers, teaching in the primary schools. The instrument was also given to the Mathematics Desk Officer in SUBEB for face and content validity. The reliability of the instrument was ascertained through test-retest, using pearson product moment correlation coefficient, and the reliability of the instrument was found to be 0.71.

### **ADMINISTRATION OF THE INSTRUMENT**

Administration of the instrument was supervised by the researcher, with the help of two research assistants, who are NCE holders. Who have been teaching in primary schools for over twenty years. All the research assistants can speak Berom. The twenty (20) multiple choice questions were prepared based on what they have been taught using some randomly selected class six mathematics topics. The conduct of the administration of the instrument lasted two weeks.

### **CONDUCT OF TREATMENT IN EXPERIMENTAL GROUP**

Before the experiment commenced, the research assistants administered the pre-test multiple choice objective questions to the pupils. Each pupil was allowed 40 minutes to attempt the questions. After the pre-test administration, the randomly selected topics from class six mathematics curriculum was taught using Berom Language, teaching mathematics in Berom language which the teacher was advised to borrow some items in English language where there is no term in Berom. At the end of five weeks mathematics instruction in Berom Language, the same mathematics performance test was still administered to the pupils. After 40 minutes, the scripts were collected and marked by the research assistants and scored over twenty (20). This treatment was done in twelve randomly selected cluster primary schools.

### **CONDUCT OF TREATMENT IN CONTROL GROUP**

Similarly, just like in the experimental group, before mathematics instruction in English language, another research assistant administered the pre-test multiple choice objective questions to the control group. The questions are the same like the questions administered in the experimental group. After the pre-test administration, this was followed by treatment stage, in which English language was used as a medium of instruction in six control primary schools. This equally lasted five weeks.

Similarly, the same test was administered to the six primary schools and after 40 minutes, the scripts were collected and marked by the research assistant. Each question was awarded one mark and scored over twenty (20.).

The mean, and standard deviation were used to answer the research questions, while the t-test for independent samples and analysis of variance (ANOVA) were used to test the hypotheses at 0.05 level of significance.

## **RESULTS**

### **Research Question One (1)**

1. What is the difference between mean performance scores (mean difference within group and mean difference between the group) of pupils in mathematics in experimental and control group.

**Table 1:** Mean and Standard deviation of performance in experimental group

Group	Pre-Test		Post-Test		Mean Difference within Group
	$\bar{X}$	SD	$\bar{X}$	SD	
Experimental (n = 98)	6.56	5.84	8.17	9.38	1.61
Control (n = 90)	5.63	3.68	6.51	5.28	0.88
Mean difference between group	0.93	2.16	1.66	4.1	

From the table above, it was observed that the pre-test of experimental group, obtained a mean score of 6.56 with standard deviation of 5.84, while the control group, obtained a mean score of 5.63 with a mean difference of 0.93.

Similarly, it was also observed that post-test of the experimental group who received instruction in Berom language, obtained a mean score of 8.17 with a mean difference within group of 1.61 sampling post test. Mean difference within group was 0.88. This means that the performance score favoured instruction in Berom language. The mean of experimental group was 8.17 and mean of control group was 6.51 at post-test stage. The mean difference between group was 1.66.

### Research Question Two

2. To what extent does gender influence the mean scores of pupils with Berom language taught and English language taught?

Table 2: Mean and standard deviation of male and female pupils scores who received instruction in Berom language and English language at pre-test and post-test.

Gender	Pre-Test		Post-Test		Mean Difference within Group
	$\bar{X}$	SD	$\bar{X}$	SD	
Male (97)	6.02	5.7	7.42	8.75	1.4
Female (90)	6.59	4.20	7.31	6.71	0.72
Mean difference between group	-0.57		0.11		

In table 2 above. It is clearly shown that in pre-test male had a mean score of 6.02 and female counter part had a mean score of 6.59, slightly higher than that of male pupils with 0.59. In the post-test, male pupils had a score of 7.42 while female students had 7.31, showing that males are higher by 0.11. The mean difference within the male scores in the pre-test and post-test is 1.4. This shows that; at the post-test, male perform better than the pre-test. Similarly, the mean difference within the female scores in the pre-test and post-test was 0.72, this shows that the variation is only 0.72, with higher performance at the post-test.

Table 3: Summary of t-test computation of experimental and control groups

Group	Mean	SD	N	DF	tcal.	ttab.	Decision
Experimental	8.17	7.38	98		1.51	1.28	Sig.
Control	6.51	5.28	90	196			

$P < 0.05$

Table 3 revealed that the mean score of experimental group was 8.17 and standard (SD) deviation of 7.38, while, in the control group, the mean score was 6.51, with standard deviation (SD) of 5.28. The calculation t-test values was 1.51 and the table value being 1.28 at 0.05 level of significance. Therefore, the null hypothesis is being rejected, implying that there is significant difference between the means of the performance scores in the experimental and control groups in favour of the experimental group. This means that the



treatment really helped the pupils in the experimental group to perform better than pupils in the control group.

**Table 4:** Summary of t-test computation of male and female pupils in the experimental and control groups.

Gender	Mean	SD	N	DF	tcal.	ttab.	Decision
Male	7.42	6.75	97	196	0.09	1.28	Not Sig.
Female	7.31	6.71	91				

Table 4 revealed that the mean score of male pupils for the whole research was 7.42 with SD of 6.75. While the female pupils had a mean of 7.31 with SD of 6.71. The tcal. Value was 0.09 and critical table value was 1.28 at 0.05 level of significant difference between the means of the performance scores of male and female pupils. This means the treatment really helped to bridge the gap there is normally existing between females and males.

**Table 5: Summary of ANOVA  
Computation of performance**

Mean scores of all the groups in the experimental and control.

Source of variation	Sum of square (SS)	Degree of freedom (DF)	Mean Squares	Fcal.	Ftab.	Decision
Between Treatment	319.81	3	106.60	7.36	2.60	Sig.
Error or Residual	2174.37	185	13.56			
<b>Total</b>	<b>2494.13</b>	<b>188</b>				

Table 5 revealed that the calculated F-value was 7.36 at 0.05 level of significance, while F-critical value was 2.60, this means the calculation F-value was greater than the f-critical value (table value). Thus, the null hypothesis is rejected and this shows that there is difference in the performance in mathematics among all the two groups in the research was significant.

## DISCUSSION

The study was aimed at finding out the effect of mother tongue on performance of primary school pupils in mathematics among Berom primary school children in Plateau State. It was discovered that the use of the mother tongue in teaching and learning, help pupils to perform better when test was administered as compared with the use of conventional English language. In terms of gender, there was no much significant difference in performance in both experimental and control groups. The findings from the study concurred with the findings and encouragement of UNESCO (2005, 2008 & 2008b) on mother tongue instruction in the early childhood education.

## CONCLUSION AND RECOMMENDATION

Based on the findings, mother tongue as a strategy of teaching mathematics fostered pupils' performance more positively than the conventional method (English Language) was used. The quality of being child-centered made the learning grassroot and the use of the child's first mother tongue, gave room for more understanding of mathematics and hence more performance. The gap that used to exist between males and females is now shortening because of the use of mother tongue as a means of instruction. When pupils in primary

schools are properly educated in mathematics, using the mother tongue, the following advantages will be realized for technological development to thrive.

- i. Acquisition of mathematical literacy at the foundation level of the child.
- ii. Better understanding and application of mathematics skills and concepts, necessary to drive in the ever changing technological world, based on the fact that the importance of mathematics is seen in our human daily activities, in science and medicine, engineering and technical fields and so on.
- iii. Develop the essential element of problem solving, communication and reasoning.
- iv. Proper learning of the child, prepares him further studies in which mathematics plays a great role.

The researcher finally recommend that:

1. Mother tongue teachers at the primary level, should adopt mother tongue instruction.
2. Since the results, using mother tongue is better than the conventional method, all stakeholders, governmental and non government, key curriculum planners and so on, should enforce its usage in the primary schools, especially in communities.
3. Authors of mathematics textbooks should write their textbooks with so many illustrations using some localized instructional materials in the community.
4. Parents and guardians can assist their children to teach them at home using the mother tongue for better understanding.
5. The use of mother tongue is a priority, if Nigeria wants to acquire technological development, since Kolawole and Oginni (2013) affirmed that neglect of mathematics teaching by any nation is injurious to knowledge and leads to backwardness and poverty.

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