THE IMPACT OF LANGUAGE IN THE TEACHING AND LEARNING OF MATHEMATICS AT JUNIOR SECONDARY SCHOOL IN KATSINA

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Abstract
The purpose of this research was to determine the effect of Language on Junior Secondary students' academic performance in mathematics. Participants were 120 students, purposefully sampled among Junior Secondary one (JSSI) students of Government Science Secondary School Dutsin-Ma, Katsina in Nigeria. Data collection occurred before and after proper teaching(in Hausa) for 12 weeks. two research question were formulated to guide this study. The statistical analysis showed there was a significant difference before and after the teaching in Hausa on students Performance in Mathematics ($p \leq 0.05$). Based on the findings, it was recommended among the other things that home Language (mother-tongue) should be adopted in our school system particularly at Junior secondary schools in Nigeria as it will improve students' performance in Mathematic towards sustainable development in Nigeria
Keywords: Mathematics, English, Hausa, Junior, Achievement, Performance

Introduction

The development and the growth of the society largely depend on the language which links the people together.[1], defines language as a vehicles for conveying the culture and traditions of the people that owns it. 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 vehicle of a people's culture, is the most distinctive of all the traits which separates human being conceivable. In other words, it is that tool which differentiates the human from other animals; language forms the basis for translating taught, discoveries and inventions to reality from one generation to another, [2], stressing on the importance and central role of language has this to say.

It is language that defined human's humanity". Also [3] has this to say" it can also be added that human language makes survival, social cohesion and interaction possible through communications and it has been found out that there is a mutual connection between language and culture such as when we talk about one, the other is indirectly being referred to". Man and language are in separable and life without language is non-human. This shows that man language are so inseparable and for man to live and survives in life ,he must use language not only in education but also in other fields of human existence.[4] supported this assertion when he observed that; "it is impossible to conceive of a rational being or a society without implying the existence of language' [5], defines language as a system of arbitrary vocal symbols by means of which a social group co-operated and communicates.[6] claimed that language is an institution through which human communicate and interact with each other by means of arbitrary used of oral and auditory symbols. Language Education explained.

Language education is defined by Hamidus as the study of Art of language which in effect involves the understanding of the nature and importance of language as vehicle of communication.

[4]stated that while education generally, and especially the classroom education involves imparting knowledge to people (students) the vehicle of this imparting or the means of imparting knowledge is mainly through the use of language. Language education strictly in its meaning means the study of all the rudiments of language. The art, the component parts of language especially grammar and literature for the purpose of acquiring more skill and knowledge. The methodology of teaching each particular language, the grammatical and literacy peculiarities are generally involved in language education. Also similarities and dissimilarities are also an integral part of language education.
[7] has this to say on what language education means: "The study of language education derives from the general importance of language as a vital instrument for mart's activities on the planet and is built on the rationale that language is the chief means of inculcating knowledge, skills and competencies, there is the need for teachers, and all those who employ the use of language in helping others grow in whatever field of learning to have some specialized knowledge and understanding of the mechanics of language. Educationalist believe that functional education relies on the efficacy of language as a medium of communication Ayanleke [8]. In support of this view, in 1951 UNESCO experts discuss the use of African Language in education and concluded that the mother tongue, which is the language acquire naturally in the child's environment is extremely important in learning, they submitted that imparting education through child's mother tongue aids the actualization of his intellectual potentials and this enable him to learn faster ahead of the child who has been taught in foreign or second language. Language policy Without a virile national policy on education there can be no meaningful development in educational sector and without a clear and well integrated language policy, considering the language problem already existing in Nigeria, the road to national development via Economic, social, political and educational will not be achieved in the version 20-2020.

The Federal Government had made laudable efforts at developing Nigerian indigenous languages. Apart from the issue of language policy in the National policy of Education (NPE) of 1977, the Federal Government while fashioning a new constitution in 1979/1998/1999 raised the three major indigenous Languages; Hausa, Igbo, and Yoruba to the status of National Language along with English. It behooves on us to examine briefly some of the provision in the constitution.

i. The business of national assembly shall be conducted in English and in Hausa, Igbo and Yoruba when adequately arrangements have been made therefore (1999 CONS. Sect 55).
ii. In addition to appreciating the importance of language in the educational process, and as a means of pre serving the people's culture, the government considers it to be in the interest of the nation unity that each child should be encouraged to learn one of the three major languages other than his own mother tongue. In this connection, the Federal Government considered the three major languages in Nigeria to be Hausa, Igbo and Yoruba (NPE Para. 8)
iii. iii. Government will.. .Ensure that the medium of instruction will be principally the mother tongue or the language of the immediate community (NPE Para II Sec 3) pre-primary education.
iv. Government will see to it that the medium of instruction in the primary school is initially the mother tongue or the language of the immediate community and later state, English (NPE Para 15 Sec 4) primary Education. In selecting two Nigeria languages, students should study the language of their own area in addition to any of the three main Nigeria languages Hausa, Igbo and Yoruba, subject availability of teachers (NPE) Para 19 Sec 14) junior secondary school.

From the above statements there is an educational ideology that the enhancement of educational process and the presentation of culture of the individual Nigeria could be effected with imparting knowledge through mother tongue. The unfortunate thing about these provisions in NPE and nation's constitution is that they are not implemented to the letter and added to this is the fact that the issue of a Nigerian child learning his

language in addition to one of the three major one's Hausa, Igbo and Yoruba is just mere policy statement especially in FCT Primary and secondary schools

The Importance of Language (Mother Tongue) education.

National development is the Nation's human resources acting on its natural resources to produce goods and services necessary to satisfy the economic needs of the community Hamish (2009)[7]. This being the case, the pivot of any national development is the human resources and the human resources relies heavily on the vehicle of language for effective mobilization towards national development and this could best be achieved through the indigenous languages. Mother tongue is a tool for achieving vision 20-2020 considering what countries like Japan and China have achieved through technology- as a result of using their mother tongue to impart knowledge. We are stagnant in this country educationally because we refused to develop our indigenous languages. No wonder senator Jubril Bello Grada formal Tourism, culture and National Orientation attributed the alarming decline in the education system to the inability of the country to use the mother tongue for instruction in schools and developing educational curriculum. He stressed further that countries like Japan and China are able to record giant strides in science and technology through the adoption of their indigenous languages.

Also Prof Keresi Kwaa Parah, The Director of the Centre for Advanced studies of Africa Society (CASAS) blamed post Colonial elites fro adopting colonial life styles for the detriment of their own language. Similarly,[10] stated that, "Our state of underdevelopment as remained for so long due largely to our use of English and French. We import knowledge and skills almost exclusively in these foreign languages while the majority of our people are farmers and crafts men who perform their daily tasks in Yoruba, Hausa, Igbo, Nupe, Ijah etc. The question is Why not helping them to improve their social, economic and political activities via the mother tongue? Why insist in their learning English or French first before modern technology-can be introduced to them. In most developing countries, a few towns and cities operates in English, French etc, while many rural villages and harmlet operates in English, French etc, while many rural villages and harmlet operate in the mother tongue.

In his own submission to the importance of mother tongue education,[11] affirmed that, learning and understanding are made easier in the mother tongue. The Germans learns in their native German language , the English in English language, the Chinese in Chinese and Japanese in Japanese, but the Hausa abandoning their own language and learn borrowed languages of English, French, Russian e.t.c

They therefore learn the hard way and sweat to translate technology in our languages.....It is time to teach and study Yoruba language at all levels of our educational institutions.

[8], in own contribution to the importance of mother tongue education stated that. In Nigerian today a roadside mechanic is more efficient than a qualified mechanical engineering. Why? The former was taught in his mother tongue while the latter was taught in a foreign language. During the thirty-month old Nigerian civil war, Nigeria made their own guns and hand grenades from materials which are very effective and those who develop them were not educated but they were local artisans and crafts men. Much of our local technology can be developed to meet international standard if we can tap these resources, record them and improve on them through research. In summary, nations tike Europe and Asia have kept pace with the national development on both continents, while these nations involves their mother tongues in their development enterprises and succeed. Black nation of Africa i.e Nigeria rather withdrew their own languages from this very vital enterprise and development eludes them.

Currently, there exist a paradigm shift in mathematics education where mathematics is viewed as a cultural activity and the learning of mathematics are bound to the cognition and interaction processes [12]. Thus, learning mathematics is seen as participation in a community where students rely on language as a “tool” to think and communicate mathematical ideas and concepts [13][14].

National Council of Teachers of Mathematics [15] views communication skills that include reading, writing, listening and speaking as an essential part of mathematics and mathematics education [16]. Students have to learn and understand mathematics concepts through a language in making use of the correct vocabulary as they make mathematical investigations, interpretations and generate conclusions [17].
[18], "concepts are learned by learners through experience with language used in discussion and teaching aid which facilitates conceptual development". Clearly, one of the major issues that students faced in learning mathematics are related to an inadequate grasp of the language of instruction that plays such an important role in the students' development of conceptual understanding [19][20][21]. To demonstrate understanding of mathematics, students must be able to explain the mathematical concepts using the correct mathematical terms (e.g. parabola, denominator) and vocabulary (e.g. translation, obtuse). Hence, students who are learning mathematics with a language background other than the language of instruction such as English will face tremendous difficulty in comprehending the textbooks, teaching aids and discussions in an unfamiliar language.
[22]'s study on lower secondary student's perception regarding the teaching of mathematics in English, most students find that learning mathematics in English is difficult because they are not used to the English language to understand mathematical concepts. Besides that, many students especially rural students have not yet mastered the basic and essential skill that is reading in English [23]. Hence, during their learning of the mathematics concepts College Science in India www.collegescienceinindia.com 2:2 Oct 2008 using r e al life problems, many of them experience a great difficulty in the comprehension of mathematical ideas and problems that are presented by the teacher as well as the textbook in English.

In this study, a classroom of Form One students have been studied to determine the relationship between their language usage and mathematics learning. The authors Investigated the effect of Language on the students' learning of mathematics at Junior Secondary School level

Language Proficiency and Mathematics Achievement

The most fundamental and most asked question in the area of language as it relates to mathematics is, does bilingualism or multilingualism have any effect on the students' mathematic achievement? This question is most frequently asked by teachers, policy makers and researchers. Several studies have been conducted with the aim of answering the question. Some of these studies cut across various race, ethnicity and social classes [28],[29] different countries and culture [24],[25],[26],[27] (Riordain and O'Donoghue) and students' educational levels [30],[31],[32][33]. Furthermore, the studies were conducted using different perspectives and approaches such as comparing the following: monolingual monolingual versus bilingual students who study under the same medium of instruction[25][34]; students who study in the medium of a foreign language (English) versus those who study in their local language[35][36][37]; and students who study in a language switch mode – in a medium using both foreign and local languages15,23,26. Other studies investigate the role of the proficiency level of students in their first language as compared to the language of instruction16,17 (Clarkson, 1991); and the students' performance in word problems stated in their first language as compared to word problems stated in the students' second language[20][24][38],[39],[40].
Educational researchers' findings in all these studies, though inconclusive, tend to agree that language proficiency is one of the important factors influencing bilingual students' performance in mathematics [28];[29]. And bilingualism can be an advantage or disadvantage to the student depending on the proficiency level of the students in the two or more languages14. However, the deficit model for bilinguals has since been rejected and is now considered to be outdated by many scholars[26], [41],[42].
In this section we review some of these studies in their diversity of approach and context. For instance, in the USA, not many researchers have shown interest in following this trend of the effect of language proficiency on mathematics achievement37. However, the findings of a number of studies that looked into the issue since then [43][44] (Padilla, 2011; Calderon, 2001) indicate that the students' language proficiency has an impact on their mathematical performance.

[45]compared the performance of students in the English medium who are native English speakers with Asians whose English is a second language. The performance of the Asian students in mathematics was far below their native English-speaking peers and also below the national mean. Further analysis of the examination items indicated that language factors were responsible for the low performance of the students.
Another study was conducted in the Wales where the students have different linguistic backgrounds. Some attended Welsh medium schools while others were taught in English [46]. It was reported that students in Welsh-medium schools performed better in mathematics than those in English-medium schools. Language factors were reported to contribute to these differences [46]. In a similar study, Roardria (2013) conducted an intensive study in Ireland on students whose local language is Gaelic. The study found out that students in the transition from a Gaelic medium primary level education to an English-medium second level mathematics education experienced a disadvantage of 8.7 percent in performance on mathematical word problems. A significant relationship was also found between the students' performance on mathematical word problems through the medium of English and their Gaelic language proficiency. Furthermore, it was found that students with a high level of proficiency in both languages, and those who were predominantly proficient in Gaelic performed mathematically better than their monolingual peers. From the general view of the scholars quoted above we can conclude that imparting through mother tongue is vital to achieving vision 20-2020.

Objective Of Study

This research employs quantitative and qualitative methods to understand the language background and culture of the classroom of Form One students in a school and the influence it has towards their learning of mathematics. The researchers try to determine if there is any pattern or relationship between the student's language background and their mathematical performance by employing appropriate statistical analysis.

Purpose of the study

The purpose of this research was to determine the effect of Language on Junior secondary schools students performance in Mathematics in Katsina State of Nigeria

Research Question

For the purpose of this research the following question were formulated

1. To what extent does mother-tongue affects the achievement of students in mathematics?
2. Is there any significant difference in student's performance in Mathematics between those taught with their mother tongue (Hausa) and those taught in English

Hypothesis

The following hypothesis was tested: There is no significant difference between the mathematics achievements of students taught in their mother-tongue(Hausa) and students taught in English language at junior secondary school level.

Research Design

The design of this study is quasi-experimental research design. Precisely, a pre-test and post-test experimental-control group design is adopted for the study. The experimental and control group were pretested before the treatment to determine the in Arithmetics. They were also post-tested after the treatment. Intact classes were randomly assigned to experimental group (EG) and control group (CG) by balloting

Population

The Population for this research consists of all students in Junior Secondary schools in Dutsin-ma and Daura Local Governments Area in Katsina State of Nigeria.

Sample

The sample is made up of 100 students in Junior secondary school class two (JS1) of Government Science Secondary School, in Katsina State of Nigeria. The school was chosen from 10 secondary schools in Dutsin-Ma Local Government Area in Katsina by Purposeful sampling. A simple random sampling without

replacement was used in selecting a class (JS1) in school among the junior classes (JS1, JS2, JS3). Finally, JS1 was divided into experimental group and control group using the result of a pre-test. This is to ensure equal ability grouping

Validity of the Instrument

The instruments were taken to the mathematics teachers of the concerned schools in the study for face content validity. Then the instruments also were taken to the mathematics educators whose have M.Ed and Ph.D for content validity.

Reliability

The instruments MAT was taken for pilot testing in order to determine the reliability coefficient of the instruments which was found to be 0.75.

Procedure for data Collection

Data collection occurred before and after teaching. The teaching was in 12 weeks. Mathematics Achievement Test (MAT) was used for data collection in both pre-test and post-test analysis. Informed consent was obtained from students prior to the test. Confidentially subject‟s information and data was addressed

Research Instruments

The research instrument was Mathematics Acheivement Test (MAT) conducted by the researchers, before the treatment as pretest. And the other after the treatment as posttest.

Results

The results obtained from the study were analyzed using the SPSS 16 package. T-test statistics was used to determine any significant difference. The result obtained is presented in the tables below:

Research Question 1: To what extent does mother-tongue affects the achievement of students in mathematics?

Table 1: Descriptive Statistic of the Survey Questions

Questions	Strongly disagree	Disagree	Neither agree	agree	Strongly agree
I understand mathematics better in Hausa than in English	5 (4.2%)	10(8.3%)	11(9.2%)	53(44.2%)	41(34.1%)
I often understand mathematics easily	68(56.7%)	23(19.2%)	12(10.0%)	10(8.3%)	7(5.8%)
I often find mathematics difficult when taught in English	8(6.7%)	15(12.5%)	-	74(61.7%)	23 (19.2%)
I often find mathematics easy when taught in Hausa	7(5.8%)	8(6.7%)	-	82(68.3%)	23(19.3%)
I think mathematics is easy but when it is written in English on the blackboard or textbook, I found it difficult to follow.	23(19.3%)	24(20.0%)	10(8.3)	53(44.2)	20(17.7%)
I like reading my mathematics books in Hausa, but in English I find it difficult to even open the pages of the book.	12(10.0%)	14(20.0%)	-	62(51.7%)	32(26.7%)
I started to have understanding mathematics only when the language of instruction was changed to Hausa.	11(9.2%)	10(8.3%)	3(1.7)	72(60.0%)	24(20.0%)
I found it difficult to understand mathematics lessons in either Hausa or in English.	13(10.8%)	33(27.5%)	5(4.2%)	32(26.7%)	37(30.8%)
	24(20.0%)	21(17.5%)	7(5.8%)	33(27.5%)	34(28.3%)

Mathematics lessons are clear to me in either Hausa or English					
I understand mathematics lessons better in English than in Hausa	12(10.0%)	13(10.8%)	31(25.8%)	33(27.5%)	31(25.8%)
I will do better if my mathematics exams are all in Hausa	23(19.2%)	25(20.8%)	23(19.2%)	18(15.0%)	25(20.8%)
My performance will be better if my mathematics instruction is in Hausa	12(10.0%)	15(12.5%)	21(17.5%)	38(31.7%)	34(28.3%)
My performance is better since my mathematics instruction changed to Hausa	18(15.0%)	15(12.5%)	-	45(37.5%)	27(22.5%)
It does not matter if my exam is in Hausa or English, I do perform well in my mathematics exams	18(15.0%)	13(17.5%)	12(10.0%)	43(35.8%)	22(22.5%)
I would have been encouraged to do my homework on time and by myself it was in Hausa.	12(10.0%)	16(13.3%)	23(19.2%)	35(29.2%)	34(28.3%)

It quite clear from the above Table 1, some statistics of the survey items. Students prefare Hausa(Mother-tongue) than English in Mathematics lessons. For these items, most of the student responses are on lesson in Hausa. The item with the highest response was which (68.3%) indicates that the students found it easy having mathematics lessons in Hausa and learn better in Hausa. The item with lowest response (4.2%), those students understand mathematics in English than in Hausa. There seems to be feeling better – having their exams in Hausa.

Research Question 2: There is no significant difference between the mean academic achievement of students Taught in Hausa Language and taught in English Language

Table 1: T-Test Analysis Of Pretest Scores Of Experimental Group And Control Group

Group	Number	Mean	S.d	d.f	t-cal	t-crit	Decision
Experimental	60	28.5	18.2	118	0.23		Not Significant at .05 level
Control	60	29.3	18.5				

Table 1 show that the experimental group (JSIA) and control group (JSIB) were equally matched at the pre-testing stage of the experiment. The different between the pretest mean score (28.5) of the experimental group and the pretest mean score (29.3) of the control group was not significant. The calculated t value (0.23) was below the critical t value (1.9973) at 0.05 level of significant

Table 2: T-Test Analysis of Post-Test Scores of Experimental Group And Control Group

Group	Number	Mean	S.d	d.f	t-cal	t-crit	Decision
Experimental	60	37.3	14.6	118	1.8		Significant at .05 level
Control	60	31.5	16.7				

Table 2 has a different result. The posttest mean score (37.3) of the experimental group was higher than the posttest mean score (31.5) of the control group. The difference in these two mean scores was significant at

0.05 levels since the calculated t value (1.8) was greater than the critical t value (1.671). The hypothesis is therefore rejected in favour of student taught in Hausa Language who were much better in mathematics achievement than others students.

Table 3 Analysis of Variance of Pretest and Posttest Scores of Students

Source	Sum of square	d.f	Mean square	F	Decision
Between	241507.15	3	80502.38	63.94	Significant at .05 level
Within	146030.81	116	1258.88		
Total	95476.34	119	802.32		

Analysis of covariance presented in table 3 confirms the significant difference between the mathematics of experimental group (students who were taught in Hausa) and control group who were taught in English as usual. The hypothesis is therefore rejected in favour of those taught in Hausa who were much better in Mathematics performance than other students.

Conclusion

Students learn mathematics in English better as they master mathematics concept better in their first language (mother tongue). Talking about mathematics in their first language could help them to understand mathematics better and then learning mathematics in English would be smoother for them. This finding is supported by studies which show that mathematics learning in English can be impaired when mathematical knowledge is not developed in the first language.

Future study could further explore students' command of language in grasping mathematical concepts. Also, the role of mathematics tuition teachers and parents' coaching at home need to be studies to determine their contribution to students' mathematics learning.

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