A STUDY OF INFLUENCE OF MOTHER–TONGUE, TEACHER’S QUALIFICATION, GENDER AND EXPERIENCE ON PERFORMANCE IN PRIMARY SCHOOL MATHEMATICS IN KATSINA STATE
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Abstract
This study investigated the effect of the mother-tongue, teacher’s qualification, Gender and Experience on the pupils’ performance in primary school mathematics in Katsina State. The study employed a pre-test and post-test quasi-experimental and control group design. The population of the study is 71,351 primary four pupils of which 50,265 are male and 21,086 are female. In this research random sampling were adopted to select the four schools used in experimental and control group, while stratified random sampling were used to select boys and girls. The sample of the study consisted of 200 primary school pupils (122 boys, 78 girls) in Charanchi and Rimi Local Government in Katsina State. The subjects were classified into two groups. One experimental and the other as control. Both groups participated in the pre-test and post-test those were administered in the data collection process. Five hypotheses were tested in the study. The data obtained were analyzed at a significant level of P <0.05 using t-test. The major findings from the study were that (1). The use of mother tongue as medium of instruction enhanced the performance of pupils in Primary School Mathematics (2) Teacher’s experience has an impact on pupils’ performance in primary school mathematics. (3) Teacher’s qualification and gender were not a significant factor in determining the performance of pupils in Mathematics. On the basis of these findings, recommendations were made.

Keywords: Mother- tongue, Teacher’s qualification, Gender, Experience, Pupil’s performance, Mathematics.

Introduction
Mathematics, more than any school subject, has international links and connections. The Universality of its ideas is a significant factor for this. These qualities offered mathematics a unique status in Nigerian Educational sector. The basic objectives of mathematics in our schools today are no longer realized. The Nation’s expectation from school products with regards to mathematics is not really satisfactory. One of the reasons for this may be due to poor foundation on which mathematics finds itself right from primary school.

The teaching of primary mathematics like any other school subject must be done using a language best understood by the recipients if the basic concepts, principles and laws of mathematics are to be meaningful to children. In the same vein, the teacher is the key factor in the success of any educational endeavour at all levels. The world is becoming more complex with increase in mathematical advancement. This complex knowledge creates new expectation for teaching. To help learners master more challenging contents, teachers must go far beyond dispensing information, giving test and giving a grade. They must themselves know their subject areas deeply and they must understand how students think if they are to create experiences that actually work to produce learning (Darling-Hammond, 1996). The National Policy on Education section 56 Federal Government of Nigeria (FME 1998) recognizes the importance of teachers in the achievement of educational goals at any level by stating that “no educational system can rise above the quality of its teachers” However, teachers must possess a basic qualification in the subject. Mastery of the
subject is an absolute necessity for effective teaching. The level of information possessed by the teacher should be much higher than that of the information he is expected to impart. Similarly, successful teaching prior to professional training is also a valuable asset. It will enable a person to acquire certain commendable characteristics such as adaptability, efficiency, the knack of arousing interest, command of instructional material and ability to face the class with confidence.

A similar study was conducted by Dastoor & Wamoron, (1975) and Adetula. (1990) using the children’s mother tongue from Ibadan (Yoruba) and Kano (Hausa) respectively. The findings of these studies revealed that pupils taught by their mother tongue performed significantly better than those taught in English medium of instruction.

The Effect of language in teaching of any subject has been a significant issue to psychologists and teachers over the years. The language used to convey mathematical ideas to students has become a topic of increasing concern to mathematics educators (Bolaji, 2007). Language influences all aspects of human endeavour even though not all languages are equally well developed for such use. One finds that some languages are more frequently and extensively used than others in a particular area or location (Ali, 2000).

As a developing nation, Nigeria is believed to have about four hundred distinct indigenous languages each of which by definition is a mother-tongue (Bran, 1978). A mother-tongue is one’s first or native language. In an elaborate term, it is a language acquired in early childhood and spoken with native speaker’s competence. According to UNESCO, (1953), mother tongue as first language is the language a person is exposed to and acquired during the early years of child-hood and which normally becomes his natural instrument of thought and communication.

The Yoruba medium of primary school project has demonstrated that if the learning environment is properly created and controlled, learning through the medium of the mother tongue is easier for the pupils and quantitatively better.

Katsina State, with a population of over 6 million people is one of the 36 states of Nigeria. It was created in 1987. The predominant tribes are Hausa and Fulani people. Its official language, like any part of the country is English. In Nigeria, the official language is English, so in practice, English is used in all official matters such as trade, aviation, transportation, litigation, education, banking and so on (Ali, 2000).

Some Theorists (e.g. Whorf, 1956) in (Bolaji, 2007) have suggested that language determines and defines thoughts. Policies that frustrate a child’s native language development can cause permanent harm by literally jamming the only intellectual channel available to him when he arrives school. When a child enters school already speaking and understanding a language, he/she is ready to learn to read and write accordingly.

Statement of the problem
The poor performance and low achievement of pupils in National and States Mathematics’ common entrance Examination in Primary Schools has for long been a phenomenon of great concern to Nigerians. Some of the factors thought to be responsible for this includes among others, the adaptation of foreign language as a medium of instruction in Nigerian schools (Lesh 2003). Adetula (1990) and Dastor (1999) have shown that learning of primary school mathematics requires a variety of linguistic skills that second language learners may not have mastered.

The concern expressed by parents, teachers, and other interest groups on how to improve pupils’ performance in mathematics’ in schools in Katsina State informed the decision of this researcher to investigate whether using mother tongue as a communication tool might influence the performance of pupils in mathematics in primary schools. Nigeria has today joined the world of science and technology and the role of
mathematics in this regard, could not be over emphasized. A nation which fails to produce mathematicians of international standard is not likely to achieve its developmental goals. Nigeria as a developing nation needs to have an acceptable standard of mathematics education especially from the grassroots (i.e. primary school).

To this effect the study investigated the influence of mother tongue (Hausa) in the teaching of primary mathematics in remediating pupils’ identified concepts in selected topics. It will also investigated the effect of mother tongue (Hausa) on pupils’ understanding of these topics when compared with those taught using the English language. In addition, the effect of teacher’s experience, gender and qualifications on performance of pupils in primary school mathematics were discussed.

Research questions
Based on the problem stated above the following research questions were formed.

1. Does language of instruction affect performance in mathematics?
2. Is there significant difference in performance between male and female when taught in mother tongue?
3. Is there significant difference in performance between pupils taught by male teacher and those taught female teacher?
4. Does teacher’s qualification affect pupil’s performance.
5. Does teacher’s experience affect the performance pupils?

Null hypotheses
The research findings were based on the following null-hypotheses:-

1. There is no significant difference in mathematics performance between pupils who were taught in their mother tongue and those who were taught with mixed languages (Hausa and English).
2. There is no significant difference in performance of male and female pupils when taught using mother tongue.

3. There is no significant difference between pupils taught by male teacher and those taught female teacher.
4. There is no significant difference in performance between pupils when taught with higher qualification and those with lower qualification.
5. There is no significant difference in performance between pupils when taught by experienced teacher and those taught by inexperienced teacher.

Objectives of the study
The objectives of the study were:

1) To investigate the effect of mother tongue on the performance pupils.

2) Investigate the effect of teacher’s gender, qualification and experience on performance of primary school pupils in mathematics.

Significance/justification of the study
Mathematics has been identified as a tool for both scientific and technological advancement by the Nigerian Government. Apart from the huge sum of money sunk for the up-liftment of mathematics, teaching and learning outcome are yet to reciprocate the gesture.

Primary school provides the good foundation of mathematics as well as pupils who will be future scientists, engineers, doctors, technologists capable of managing the resources of the country for the attainment of self reliance, technological growth and advancement. It is hoped that the findings from this study might help mathematics educators in assisting pupils to learn to organize facts, seeing relationship or pattern using mother tongue.

The study in view would show the effectiveness of using mother-tongue in teaching mathematics in primary schools. The findings could be used as a guide to the government in planning and improving mathematics in schools.

It would also be helpful to other stakeholders in Mathematics Education such as the National Mathematics Association etc in their efforts
towards development of mathematics materials using mother tongue in Nigeria.

The study would also prove useful to the students and scholars of Mathematics’ as a reference material especially where they engage in research of similar nature.

The study could also encourage civil societies and individuals interested in mathematics to assist in the development of Mathematics Education in Nigeria.

The findings of the study could also encourage scholars in other disciplines to engage in similar research to ascertain whether, for instance, mother tongue has an influence on the teaching of social studies, geography, religious studies etc at primary or other level of education or not.

The establishment of mathematical bodies and association in the country aimed at improving the standard of mathematics in schools was yet to yield positive result. Therefore there was the need for a study of this nature to support these efforts by providing them with reliable data to enable them perform effectively.

There is need to have national language for instruction rather than the use English for mathematics.

Data collection procedure
The data for the study were collected through the use of Mathematics Performance Test and Teachers Questionnaire prepared by the researcher.

Administration of instrument
Each of the teachers used for this study was given a questionnaire for him to respond and copies of test items for the pupils he taught. The pupils were given the test after teaching them for a period of six weeks.

Collection and organization of data
After the test was conducted, the scripts were collected and handed over to the researcher to mark. The marks were organized and recorded against the name of each pupil.

Data analysis
The questionnaires for the teachers and the test items were analyzed item by item using frequency and percentage tables so as to derive measuring out of the data. The identified variables in the research questions formed the basis for the tabulation and analysis as presented in tables 1-5 below.

The instruments used for the data collection were:
I. Mathematics Performance Test (MPT) which was used to measure the subjects’ performance in the pre and post tests for both experimental and control groups.
II. Teacher Factors Questionnaire (TFQ) which was used to measure the effect of teachers’ qualification gender and experience.

Hypothesis testing
The data collected as described in earlier above were used to test the stated hypothesis. The results were presented in tables

Null hypothesis I
There was no significant difference in mathematics performance between pupils who were taught in their mother tongue and those taught in mixed languages (Hausa and English).

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>S.d</th>
<th>t-cal</th>
<th>Df</th>
<th>P-Value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother Tongue</td>
<td>100</td>
<td>24.78</td>
<td>4.30</td>
<td>5.38</td>
<td>198</td>
<td>0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Mixed Language (Hausa and English)</td>
<td>100</td>
<td>19.24</td>
<td>4.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From Table 1 the t-test analysis showed a significant difference at 0.05 level of significance i.e. significant at P < 0.05 meaning that there was significant difference in the performance of pupils taught in mother tongue compared to those taught using English Language. Therefore the null hypothesis which said there was no significant difference was rejected in favor of the experimental group as recorded in their mean scores.

**Null Hypothesis II**

There was no significant difference in mathematics performance between gender when taught using mother tongue.

### TABLE 2: Summary of t-test Analysis by gender (pupils)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>S.d</th>
<th>t-cal</th>
<th>Df</th>
<th>P-value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>59</td>
<td>25.18</td>
<td>4.04</td>
<td>1.26</td>
<td>198</td>
<td>0.065</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>24.97</td>
<td>4.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not significant at P > 0.05

In Table 2 the t-test analysis showed no significant difference at 0.05 level of significance. The P-value of 0.062 > 0.05 meaning there was no significant difference in performance among gender when taught in mother tongue. The null hypothesis which said there was no significant difference in performance among gender when taught in mother tongue was therefore retained.

**Null Hypothesis III**

There was no significant difference in mathematics performance between pupils who were taught by male compared to those taught by female teachers.

### TABLE 3: Summary of t-test Analysis by gender (teachers)

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>S.d</th>
<th>t-cal</th>
<th>Df</th>
<th>P-value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupils taught by male teacher</td>
<td>50</td>
<td>25.03</td>
<td>4.39</td>
<td>3.01</td>
<td>98</td>
<td>0.062</td>
<td>NS</td>
</tr>
<tr>
<td>Pupils taught by female teacher</td>
<td>50</td>
<td>25.00</td>
<td>4.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The P-value of 0.062 was greater than 0.05 i.e. P > 0.05, the hypothesis was therefore retained; meaning there was no significant difference in performance between pupils taught by male and female teacher.

**Hypothesis IV**

There was no significant difference in performance among pupils taught with higher and those taught with a lower qualification.

### TABLE 4: Summary of t-test Analysis by teachers’ qualification

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>S.d</th>
<th>t-cal</th>
<th>df</th>
<th>P-value</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class taught by NCE Teacher</td>
<td>50</td>
<td>27.46</td>
<td>4.00</td>
<td>2.06</td>
<td>98</td>
<td>0.0001</td>
<td>significant</td>
</tr>
<tr>
<td>Class taught by Grade II Teacher</td>
<td>50</td>
<td>25.08</td>
<td>4.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant at P < 0.05
The t-test analysis shows a significant difference at 0.05 level of significance i.e. the result was significant at \( P < 0.05 \) meaning that there was significant difference in the performance of pupils taught by teachers with higher qualification compared to those taught by teachers with lower qualification.

Therefore the null hypothesis which said there was no significant difference in performance between pupils taught with high qualification and those with lower qualification is therefore rejected.

**Null hypothesis V**
There is no significant difference in performance between pupils when taught by experienced teacher and those taught by inexperienced teacher.

**TABLE 5: Summary of t-test Analysis by Experience**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>S.d</th>
<th>t-cal</th>
<th>df</th>
<th>P-value</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class taught by Experienced Teachers</td>
<td>50</td>
<td>26.40</td>
<td>4.55</td>
<td>2.18</td>
<td>98</td>
<td>0.002</td>
<td>significant</td>
</tr>
<tr>
<td>Class taught by Inexperienced Teachers</td>
<td>50</td>
<td>24.37</td>
<td>4.36</td>
<td>2.18</td>
<td>98</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>

The t-test analysis showed a significant difference 0.05 level of significance \( p < 0.05 \) meaning that there was a significant difference in the performance of pupils taught by experienced teachers compared to those taught by inexperienced teachers.

**Discussions of the study**
The results showed significant differences in performance between pupils who were taught in their mother tongue and those who were taught in a mixed languages (English and Hausa). This finding agreed with that Fafunwa (1977). The result was also in line with the findings of Gaarder (1985) in Bolaji (2007) where he argued that the use of English as the language of the test was one reason for the low achievement scores of Hispanic students. Therefore with effective communication students stand a better chance to comprehend what is taught to them thereby making teaching more effective and result oriented (Lassa 2005).

On gender issue the results of both male and female pupils were examined after the experiment. It was discovered that there was no significant difference between their performances. This was in line with the findings of similar research conducted by (Alio and Peter, 2000, Agwagah and Exengo, 2001, Jahun and Momoh 2001). That was to say when both male and female pupils were taught the same contents under the same condition their performance is likely to be the same. Okeke (1980) found no significant difference in the performance of boys compared with girls. Also Bichi (2002) did not find any difference between the male and female in learning mathematics. Ugwu (1998) found out that significant gender difference in performance in geometric proof between male and female students did not exist.

The study which was tested at 0.05 level of significance showed that the performance of pupils taught by both male and female teachers were almost the same. This disagreed with the belief that male teachers teach better than their female counter parts, Ukaike (2005).

Hypothesis 4, stated that there was no significant difference among pupils when taught by teacher with higher qualification and those taught by a teacher with a lower qualification. The study revealed that there was a significant difference between the performance of pupils taught by teachers with higher qualification in compared to those pupils taught by teachers with lower qualification. Oguntebi (1985) says the problem lies on the quality of mathematics
teachers and he said, ‘for a teacher to teach mathematics better he must also know mathematics better’.

Conclusions
Based on the findings of this study, the following conclusions were arrived at:

1. The use of mother tongue in the teaching and learning of mathematics in primary schools especially in the first four years was more effective than the use of English language especially in the rural areas. This was in line with his saying (Ali 2000), that in rural areas, mother tongue is more frequently and extensively used than English language.

2. Effectiveness and initiative in teaching depended largely on teacher qualification. (Reymonds, D. and Muijs D. 2000).

3. Pupils were highly interested in learning when their mother tongue was used. This was revealed by their active participation and contribution during the lesson.

This agreed with Fafunwa (1995) that the rationale for promotion of indigenous language in education process was based on the assumption that indigenous language is the best medium of education:

- In line with this, Ali (1984) said one’s language of common familiarity such as his mother tongue offers a sustainable, realistic and better opportunity to understand and appreciate the structure and function of mathematics at one’s particular level of operation.

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

1. That the State Government should make qualitative and quantitative increase in number of teachers for Hausa language to handle primary schools mathematics very well.

2. Necessitate continuous in service training for mathematics teachers more especially on the use of mother tongue.

3. Government should also provide relevant text books of Mathematics written in mother tongue (Hausa).

4. That there should be a general awareness and orientation of public, headmasters and teachers on the role of indigenous language in initial literacy in the teaching of mathematics.

5. That the Government should re-organize the curriculum to reflect more on linguistic and cultural values of children and communities in all schools interactions.

6. There should be dictionary of mathematics in Hausa language for the primary school level.

References


Darling Hammond, H. et al (1983); Teacher Evaluation in the Organizational context: A Review of the Literature


