



EXPLORING THE USE OF IGALA LANGUAGE IN TEACHING STATISTICS TO SAMPLE OF SELECTED PRIMARY SIX LEARNERS

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ABSTRACT- The observed poor performance in statistics aspect of mathematics has been traced to inability to communicate the subject effectively at the primary school level being the foundation. This study therefore explores the use of Igala language in teaching statistics to primary six learners. The study adopted a quasi-experimental non equivalent pre-test and post-test research design. The sample (N=380) made of boys (N = 235) and girls (N=145) was drawn using a multistage sampling technique. Primary School Statistics Achievement Test (PSSAT) with the reliability coefficient of 0.82 was used to collect data. Analyses show that pupils taught statistics using Igala language only achieved significantly higher than those taught using Igala combined with English language as well as English language only group. Pupils taught statistics using Igala combined with English language also achieved significantly higher than those taught using English language only. There was no significant difference in terms of achievement between male and female pupils taught statistics using Igala language and also Igala language combined with English language group. It was recommended among others that school authorities and Ministry of Education should encourage mathematics teachers to teach primary school mathematics to pupils' in the affected Local Government Areas in Igala.

Key words: Language of instruction; mathematics teaching in primary schools; pupils' achievement in statistics; indigenization of mathematics instruction; gender

1. INTRODUCTION

During colonial era, mathematics was essential for the success of the colonial administration, trade and mission with Nigerians; hence mathematics was recognized in the educational objectives of the pre-independence Nigeria. This trend of strong recognition accorded mathematics in educational objectives in Nigeria continued until the present day. For instance, in the present 9-3-4 (9 years for basic education or primary and junior secondary, 3 years for senior secondary and 4 years for university) system of education in Nigeria, mathematics is a core subject from the lower basic through the upper basic to the senior secondary school levels of the educational system. In addition, the present educational system has made mathematics compulsory for everybody since a credit pass in mathematics is necessary condition for entry into higher institution for most courses (FGN, 2004; FME, 2007). This important position occupied by the subject in the school curriculum is borne out of the role of mathematics in scientific and technological development. Aguele and Usman (2007) support this fact that every nation needs mathematics for sustainable scientific and technological development.

Regrettably, despite the importance of mathematics as a key subject in realizing any nation's scientific and technological aspirations, there is ample evidence of continued poor results at the post primary competitive examinations such as National Common Entrance Examination, (command, Navy, Airforce examinations) and other external examinations. Also Efunbanjo (2001) and Beticu (2002) attribute the poor performances in secondary school certificate examination by Nigerian students to poor foundation in primary school mathematics. As a result of this, all the stake holders



in mathematics education have been looking for ways of improving pupils' achievement in the subject by introducing different teaching strategies and reforms.

Reports abound to support poor performance of learners in mathematics. For instance, the Universal Basic Education Commission's (UBEC, 2003) report on its nationwide survey of performance in mathematics in primary school reveals very low achievement in mathematics. In 2009 National Examination Council (NECO) examinations, only 2% of the candidates passed mathematics and in 2010 only 25% passed mathematics at credit level in Senior Secondary Certificate Examination (SSCE) (Fagbenle, 2010). This could be as a result of poor foundation at the primary school level.

The path way to the solution to poor performance in mathematics by secondary students, points to building solid foundation at the primary school level. This makes it paramount to seek for methods of teaching mathematics that aim at improving understanding at the primary level. Amoo and Efunbajo (2004) point out the inability to understand or interpret mathematical problems as one of the factors that beset the teaching and learning of mathematics in primary schools. This language problem does not lead to a sustainable and lasting learning on the part of pupils.

Ehindero (1980) opined that the best medium for teaching the child is in his mother tongue (MT). Educationally, the child learns more quickly through the MT than through an unfamiliar linguistic medium (Fafunwa, 1990). This means that for any child the internalization of any given concept is more effective when done in his/her own language or language of the immediate environment which he/she is familiar with. This fact was also recognized in the 6-3-3-4 (that is, 6 years for primary, 3 years for junior secondary, 3 years for senior secondary and 4 years for university) system of education, as stated in the National Policy on Education, (FGN, 2004) that the medium of instruction in the primary school is the mother tongue (MT) or the language of the immediate community. Unfortunately, the teaching of mathematics in most primary schools does not give pupils learning opportunity in their own language. This observation agrees with that of Beticu (2002) and Efunbanjo (2001) who attribute the poor performance in primary school mathematics to the cultural background of learners that does not conform to the kind of instruction they are exposed to.

One of the major challenges in the use of mother tongue is how to find the mother tongue equivalence of the terms used in science and mathematics. This appears to be taken care of by the publication of Vocabulary of Primary Science and Mathematics in Nigerian Languages (NERDC, 1990). Mathematics could now be conveniently taught in the local languages. So far there is no known evidence into the effect of Igala as a language of instruction on pupils' achievement in mathematics in Kogi State. Specifically, there is need to empirically find out if language of instruction (Igala) could improve the achievement of both male and female pupils in primary school statistics in Kogi state. The contents of statistics that were covered include collection of data, representation of data on frequency table, graphical representation of data (pictograph, bar graph, and pie chart) and calculating mean, median, and mode.

Despite the central role of statistics in the school curriculum and its importance at all levels of education and social activities, report from West African Examination Council (WAEC) chief examiners' report (2003, 2005) reveal that students have problems in statistics and such problems among others were traced to wrong presentation of data on frequencies, inability to differentiate between histogram and bar chart. The use of mother tongue as language of instruction in statistics lessons at the primary level may likely address these problems. Since statistics is concerned with the collection of data which are found inside and outside the school environment, the interpretation and explanation of these data done through mother tongue could enhance understanding and bring to concrete reality the communication of mathematics ideas to the Nigerian child.

2. LITERATURE REVIEW

Oginni and Owolabi (2013) found a significant difference in performance scores among groups in favour of mother tongue. Similarly, Anyagh (2012) showed that students taught mathematics using Tiv language had a significantly higher mean achievement score in the post-test compared to those taught using combination of Tiv and English language and those taught using English only. Espada (2012) in the study on the use of native language in teaching kindergarten mathematics found a significant difference between the mean gain of the control and experimental groups. This indicates that the level of mathematics performance of the experimental group was significantly higher than that of the control group.

On gender influence in the use of mother tongue in mathematics, Abdu (2011) investigated influence of mother tongue, teachers' qualification, gender and experience on performance in primary school mathematics in Katsina State. Findings revealed that there was no significant difference in academic performance of male and female pupils taught mathematics in mother tongue. However, for gender in language studies, Karthigeyen and Nirmale (2012) found that the performance of the girls is higher than the boys but this is language and may not apply to mathematics. Okereke (2006) reports gender as a significant factor in achievement when mathematics is taught with certain strategies or techniques. Iluno and Taylor (2013) also report gender as a significant factor in mathematics achievement when taught with ethno-mathematics teaching materials. It is therefore clear that pupils may perform differently when taught using certain strategies in mathematics, hence, the need to find out if language of instruction could bridge the gender gap in mathematics achievement of pupils.

3. THEORETICAL FRAMEWORK

This work is anchored on the law of effect. Edward Thorndike put forward "Law of effect" which stated that any behaviour that is followed by pleasant consequences is likely to be repeated, and any behaviour followed by unpleasant consequences is likely to be stopped (Mackintosh, 1983). That is, responses that elicit a satisfying effect in a particular situation become more likely to occur again in that situation and responses that elicits a discomforting effect become less likely to occur again in that situation. The law signifies that, if pupils are satisfied with an event, they are bound to be willing to participate in the event while events that cause them discomfort will scare them from further participation. In other words, the greater the satisfaction from a learning situation, in this case statistics, the stronger will the pupils possess the motive to learn. In this theory more emphasis has been laid on motivation. Thus, before starting teaching and while teaching in the classroom the pupils need to be properly motivated, for instance, by having a clear head start from language used. Teaching therefore, could be pleasing if it involves use of vernacular. The educator must obey the tastes and interests of pupils (Gandhi, 2010).

So, if teachers are to give learners instructions, with the interpretations and explanation of mathematical concepts in their natural environment and mother tongue, it will remove language barrier which in most cases interferes with learning content, thereby presenting the pupils with a favourable learning situation which will create a desire in them to continue participating in the learning. This may impact positively on pupils' achievement in mathematics.

4. RESEARCH QUESTIONS

The following research questions were answered in this study:



- To what extent do the mean achievement scores of pupils taught statistics in Igala language only, Igala language combined with English language and those taught in English language only differ?
- To what extent does the use of Igala language only affect the mean achievement scores of male and female pupils in statistics?
- To what extent does the use of Igala language combined with English language affect the mean achievement scores of male and female pupils in statistics?

The following null hypotheses were tested at 0.05 significant levels:

- There is no significant difference among the mean achievement scores of pupils taught statistics using Igala language only, Igala language combined with English language and those taught in English language only.
 - There is no significant difference between the mean achievement scores of male and female pupils taught statistics using Igala language only.
 - There is no significant difference between the mean achievement scores of male and female pupils taught statistics using Igala language combined with English language.
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5. METHODOLOGY

5.1. Research Design

The design of this study is quasi -experimental of a non-randomized pretest, post test control group. The study is experimental because it is the most powerful and valid design which can be used to identify the cause of any given effect (Emaikwu, 2010). The study is quasi-experimental design because intact classes were randomly assigned to experimental and control groups without disrupting the school programmes.

5.2. Population, Sample and Sampling

The target population for this study was all the primary six pupils in Ankpa, Omala and Olamaboro Local Government Areas of Kogi State. The total number of primary schools in these areas is 420 and the total number of primary six pupils is 11,196 for 2011/2012 session (source: Ankpa, Omala & Olamaboro Statistics Office, 2012)

The sample size of this study consisted of 380 primary six pupils made up of 235 boys and 145 girls of average age of 11 years drawn from six primary schools of Kogi State using a multistage sampling technique. The technique includes simple random sampling and purposive sampling techniques. Purposive technique was used to select schools that have at least Nigeria Certificate in Education (NCE) graduate teachers in mathematics with a minimum of five years teaching experience and of Igala origin. This was because NCE is the minimum teaching qualification allowed by Government of Nigeria even at primary school level. Second, the five years of experience and native speakers of Igala ensured that have ability to deliver adequately expected instructions. Similarly, schools where majority of the pupils speak Igala language and the non Igala pupils who can speak and write in Igala language were selected.

Out of the six schools selected, simple random sampling by hat and draw was used to assign two schools each to experimental group one (EGP1), experimental group two (EGP 2) and control group (CGP). In each of the schools selected all the streams of primary six were used to avoid Hawthorne effect.

5.3 Instrumentation and Validation

One research Instrument was developed by the researchers for data collection. The instrument was Primary Schools Statistics Achievement Test (PSSAT). In addition, three lesson plans were prepared

by the researcher using Igala language only for Experimental group 1 (EGP 1), both Igala and English Language for Experimental group 2 (EPG 2) and English Language only for Control group (CGP).

The PSSAT consisted of an initial package of 35 multiple-choice objective test questions with options (A-D). To ensure content validity, PSSAT was based on the table of specification. This table ensured that items selected reflect the contents and weight of contents covered during teaching by proportionate number of items or questions. Past questions on National Common Entrance Examination in mathematics were used to develop the PSSAT. The objectives of the topic in primary curriculum served as a guide in developing the questions classified under lower and higher cognitive thinking processes (Knowledge, Comprehension and Application (KCA) for lower order question while higher order question includes Analysis, Synthesis and Evaluation (ASE). These questions were to measure primary six pupils' achievement in statistics. Marking scheme for the instrument was also prepared. Thus each item answered correctly attracted a mark and total marks obtainable was 35.

The instruments for the study were subjected to face and content validation by three mathematics educators and three experts in measurement and evaluation. The lesson plans for the study which were developed by the researchers based on the primary school mathematics curriculum were given to three mathematics educators who were familiar with the primary school curriculum for validation. The lesson plans were given to two specialists in linguistics of Igala origin for translation. The translated lesson plans were given to two other mathematics educators of Igala origin to confirm the translation in a day conference. Corrections were made on the three sets of lesson plans which were used for the study.

PSSAT was trial tested on 30 pupils from two different primary schools outside the pilot and main studies. The instrument was administered to the pupils by the researcher and collected immediately. The scores obtained after marking were used in computing the reliability coefficient of the instrument using Kuder-Richardson formula 20. The reliability coefficient of PSSAT was found to be 0.82. This value of reliability coefficient for an achievement test according to Emaikwu (2008) shows a very high level of internal consistency as it was greater than 0.70 hence, considered reliable.

The result was further subjected to psychometric analysis. This was an attempt to determine the quality of a test in terms of how difficult the test items may be and how discriminating the distracters are. These were calculated by computing the difficulty, discrimination and distracters indices of 35 test items administered to the pupils. Harbor- Peters (1990) recommends the following ranges:

- For difficulty or easiness of indices, the acceptable range is from 0.30 – 0.70.
- For discrimination index, the acceptance range is from 0.30 – 1.0.
- The distractor index is usually dependent on the number of options and 0.33 is ideal for 4 option format.

Items whose discrimination fall within acceptable level range of 0.30 – 1.0 as well as options whose distracters indices fall within the acceptable range were accepted. However, items whose option falls below the acceptable level of distracters indices but whose discrimination fall within the acceptable range were adjusted.

5.4 Method of Data Collection

Six experienced NCE mathematics teachers with at least 5 years teaching experience were used as research assistants for the study. Before the commencement of the study, two of the research assistants were given two days training on the use of Igala language in teaching statistics to primary six pupils. Another two assistants were given two days training on the use of both Igala and English language. While the other two were given one day training in teaching statistics using English

language since they were already familiar with this method. The training session took place at a more central school between the schools selected for the study.

After assigning intact classes to experimental and control groups, the pre test was administered by the research assistants before the commencement of the treatment. The researcher monitored teaching for the experimental and the control groups on weekly basis. The instrument (PSSAT) was administered after eight weeks of teaching in all the schools on the same day. The test was scored by the research assistants using PSSAT marking scheme prepared by the researcher. Research assistants were asked to exchange scripts among them to avoid deliberate influencing of scores. The scores were collated for analysis.

6. DATA ANALYSIS AND RESULTS

The data collected were analyzed with respect to the research questions and hypotheses formulated for the study. Descriptive statistics of mean and standard deviation were used to answer research questions. The inferential statistics of Analysis of Covariance (ANCOVA) was used for the hypotheses at 0.05 significant levels. This was adopted so as to take care of the possible lack of initial equivalence in the groups since intact classes were used for the study. The pre – test scores served as covariates.

Analysis of covariance was based on two major assumptions. They were concerned with the linearity relationship between the dependent variables and covariate. Similar slope on the regression line of each group indicates this. Unequal slopes will indicate that there is an interaction between the covariate and the treatment, if otherwise; there is no interaction (Pallant, 2001).

The data collected were presented and analyzed using mean and standard deviations to answer the research questions, while analysis of covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

6.1 Achievement of pupils taught statistics in Igala language only, Igala language combined with English language and those taught in English language only

Table 1: Mean Achievement Scores and Standard Deviations of Pupils in Igala, Igala combined with English and English only Groups

Group	N	Pre-PSSAT		Post-PSSAT		Mean Gain
		\bar{x}	δ	\bar{x}	δ	
EGP1	160	20.78	9.29	62.83	10.57	42.05
EGP2	100	20.95	10.39	54.14	10.26	33.19
Mean Difference		0.17		8.69		8.86
EGP1	160	20.78	9.29	62.83	10.57	42.05
CGP	124	18.91	8.85	44.40	7.06	25.49
Mean Difference		1.87		18.43		16.56
EGP2	100	20.95	10.39	54.14	10.26	33.19
CGP	124	18.91	8.85	44.40	7.06	25.49
Mean Difference		2.04		9.74		7.70

Table 1 reveals a mean gain of 42.05 for EGP1, 33.19 for EGP2 and 25.49 for CGP. This shows that pupils taught statistics using Igala language only (EGP1) achieved best followed by those taught with Igala language and English combined (EGP2) and least was the control group taught using English language only. This means that the use of Igala language to teach statistics in primary schools in Kogi state was more facilitative than the two other language groups.

Table 2: ANCOVA Table for Effect of Language of Instruction using Three Modes on Pupils' Achievement in Mathematics

Source	Type III Sum	Df	Mean	F	Sig
	Of Squares		Square		
Corrected Model	24326.95	6	4054.49	44.55	.00
Intercept	186569.59	1	186569.59	2.05	.00
PrePSSAT	31.19	1	31.19	343.00	.56
Method	21272.22	2	10636.11	116.87	.00
Error	34310.61	377	91.01		
Total	1200631.00	384			
Corrected Total	58637.56	383			

Table 2 presents a one-way ANCOVA for effect of language of Instruction using three modes on pupils' achievement in statistics. Pre-PSSAT scores were used as covariate to control initial difference among the three groups. The table reveals that $F_{2, 377} = 116.87$ and $p=0.00$ for method. Since the significant value (p) is less than the set significant value for the study ($p<0.05$), the hypothesis that there is no significant difference among the mean achievement scores of pupils taught statistics using Igala language only, Igala language combined with English language and those taught with English language only was rejected. The conclusion drawn was that there existed a significant difference in statistics achievement among the three groups.

Table 3: Pairwise Comparison Table for Effect of Method on Pupils' Achievement in statistics among Groups

(I) Method	(J) Method	Mean Difference(I-J)	Std Error	Sig
EGP1	EGP2	9.46	1.24	.00
EGP1	CGP	18.19	1.20	.00
EGP2	CGP	8.73	1.34	.00

Table 3 shows a post-hoc comparison among the three groups. The Table indicated that the mean achievement score for EGP 1 ($\bar{x}=62.88$) and mean achievement score for EGP 2 ($\bar{x}=54.14$) has a mean difference of 9.46 and significantly different at $p=0.00$ (that is, $p<0.05$). It therefore indicated that the mean achievement score of pupils in EGP 1 was significantly higher than those in EGP 2.

Also, the mean achievement scores for CGP ($\bar{x}=44.40$) which has a mean difference of 18.19 and is significantly different from the mean of EGP 1 as its p -value=0.00 indicating $p<0.05$. This meant that, the mean achievement scores of pupils in EGP1 and CGP was significantly different. Again, a pairwise comparison between EGP 2 and CGP shows a mean difference of 8.73 at $p=0.00$. The difference is significant at $p<0.05$.

6.2. Use of Igala language only, Igala Language combined with English and achievement of male and female pupils in statistics

Table 4: Mean Achievement Scores and Standard Deviations of Male and Female Pupils in Igala Language Only Group

Group	N	Pre-PSSAT \bar{x}	δ	Post-PSAT \bar{x}	δ	Mean Gain
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Male	95	21.58	9.82	62.71	10.37	41.13
Female	65	19.62	8.40	63.00	10.93	43.38
Mean Difference		1.19		0.29		2.25

Table 4 shows that, male pupils had a mean gain score of 41.13 while female pupils gained a close mean score of 43.38. The mean difference between male and female pupils' achievement was 0.29 showing that female pupils slightly performed better than the males in the group.

Table 5: Mean Achievement Scores and Standard Deviations of Male and Female Pupils in Igala Language Combined with English Language Group

Group	N	Pre-PSSAT		Post-PSAT		Mean Gain
		\bar{x}	δ	\bar{x}	δ	
Male	60	20.50	10.52	55.58	9.16	35.08
Female	40	21.63	10.28	51.23	11.93	29.60
Mean Difference		1.13		4.35		5.48

Table 5 also shows mean gains for male and female pupils as 35.08 and 29.60 respectively. The mean gain difference was 5.48 in favour of male pupils. Again male pupils outperformed the females when Igala language was used in combination with English language.

Table 6: ANCOVA Table for Effect of Gender on Pupils' Achievement in statistics in Igala Language only Group

Source	Type III Sum		Mean		
	Of Squares	Df	Square	F	Sig
Corrected Model	52.18	2	26.09	.55	.80
Intercept	100651.77	1	100651.77	892.74	.00
PrePSSAT	48.82	1	48.82	.43	.51
Gender	6.50	1	6.50	.06	.81
Error	17700.93	157	112.75		
Total	649270.00	160			
Corrected Total	17753.10	159			

Table 6 presents ANCOVA for effect of gender on pupils' achievement in statistics in Igala language only. The table reveals $F_{1, 157} = 0.06$ for gender with $p=0.81$. Since $p>0.05$, the observed difference between male and female pupils' mean achievement scores was not significant. Thus, the hypothesis that, there is no significant difference between the mean achievement scores of male and female pupils taught statistics using Igala language only was not rejected.

Table 7: ANCOVA Table for Effect of Gender on Pupils' Achievement in Statistics in Igala Language combined with English Language Group

Source	Type III Sum		Mean		
	Of Squares	Df	Square	F	Sig
Corrected Model	797.26	2	398.63	3.80	.03
Intercept	62797.31	1	62797.31	599.29	.00
PrePSSAT	341.37	1	341.37	3.26	.07
Gender	413.55	1	413.55	3.95	.05

Error	10164.18	97	104.79
Total	300836.00	100	
Corrected Total	10961.44	99	

Table 7 is an ANCOVA table for effect of gender on pupils' achievement in statistics in Igala language combined with English language. The table reveals $F_{1, 97} = 3.95$ for gender with $p=0.05$. With $p=0.05$, it shows that gender has significant effect on pupils achievement in statistics when taught using Igala language combined with English language. The hypothesis that there is no significant difference between the mean achievement scores of male and female pupils taught statistics using Igala language combined with English language was rejected.

7. DISCUSSION

Findings arrived at in this research are discussed under two sections.

7.1 Effect of use of Igala Language as Language of Instruction and Gender on Primary School Pupils' Achievement in Statistics

Results showed that pupils taught statistics using Igala language only and Igala combined with English language performed better than those taught with English language only. The effect of Igala language further showed that there was a significant difference between the mean achievement scores of pupils in EGP 1 and those in EGP 2 which confirmed the effectiveness of Igala language in teaching statistics. With effective communication, students stood a better chance to comprehend what is taught to them thereby making teaching more effective and result oriented (Anyagh, 2012).

This finding is in conformity with findings of Iluno and Taylor (2013), Unodiaku (2013), Ogini and Owolabi (2013), Anyagh (2012), Espada (2012), Achor, Imoko and Uloko (2009), Kurumeh (2006), Thomas and Collier (2002) and Ali (2000). The reason for this higher mean score by pupils taught statistics in mother tongues could be attributed to more effective communication between the teacher and pupils. Opportunity for pupils to understand, appreciate the structure and function of mathematics in their mother tongues was provided. Such understanding and appreciation better enhance achievements in mathematics compared to use of English alone. Contrary to expectation, primary six pupils who just graduated from use of mother tongue in the junior primary do not perform better when Igala and English language were combined. This is an indication that they still desire for instruction in mother tongue.

In contrast to these findings, Idiala (1991) found that student taught science subjects in English performed better than those taught in mother tongue. While Kwok (1982) revealed that there was no difference in achievement between students taught physics in Chinese and in English. The possible puzzle could be if they have developed adequate equivalent names for science equipments and terminology as done by Igala experts in this study. Besides, works of 1982 and 1991, that is over 22 years and 13 years ago may be over taken by events.

Other results showed that male and female pupils taught in Igala language only had a mean gain difference of 2.25 and which was not significant indicating that the use of Igala language increased male and female pupils' performance in mathematics equally. This finding agrees with the finding of Unodiaku (2013) that the mean achievement score of male and female students taught mathematics using ethno-mathematics (that is, culturally related mathematics instruction) materials did not differ significantly at post test. There is ample evidence that when a method of instruction is good and not gender biased the usual saying of girls performing better than boys or vice versa does not arise.

7.2 Effect of use of Combined Igala and English Languages of Instruction and Gender on Pupils Achievement in Statistics

It is also found that the mean achievement scores of pupils in experimental group two was higher than that of pupils in the control group. The difference was confirmed to be significant. This implies that pupils taught mathematics using Igala combined with English language performed better than those taught with English language only. This finding is in agreement with the study of Anyagh (2012) that students taught in Tiv combined with English language performed significantly higher than those taught in English language only.

The reason for the higher mean score by pupils taught statistics in both Igala and English language could be attributed to the opportunity given to them to understand, appreciate the structure and function of statistics in their mother tongues. Such understanding and appreciation better enhance achievements in mathematics than the use of English language alone. The finding also revealed that the gain difference between male and female pupils in the Igala combined with English language was considered small. The observed mean difference between male and female pupils showed that they benefited equally in terms of statistics achievement gain in the combined class. This study therefore found that gender was not a significant factor in determining the achievement of male and female pupils in statistics. The finding is in agreement with that of Unodiaku (2013) and Abdu (2011) who found that there was no significant difference in academic performance between male and female pupils taught mathematics in mother tongue. The finding of this study shows that given equal opportunities to pupils male and female pupils could perform creditably the same way using the same language of instruction in mathematics.

8. CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, the conclusions drawn were that pupils who are taught in their mother tongue achieved higher in statistics than those taught in a foreign language. Gender was not significant factor in statistics achievement when Igala language only was used for instruction but however changed when Igala was combined with English language for instruction.

From the theoretical perspective, the more satisfied the pupils were in study of statistics, the stronger they possess the motive to learn statistics thereby resulting in improved performance. So, when teachers give learners instructions, with the interpretations and explanation of mathematical concepts in their mother tongue, it removes language barrier which in most cases interferes with learning content, thereby presenting the pupils with a favourable learning situation.

Based on these findings, the researchers recommend that:

- School authorities in the study area should encourage mathematics teachers to teach primary schools mathematics in pupils' mother tongue. This has implication for preparing the teachers both in use of the instructional strategy and in identification of equivalent English words.
- Replication of this study in other Nigerian languages is recommended. Outcomes of such study may inform the National Mathematical Centre (NMC) Abuja on the need to insist that the mode of instruction in primary and secondary schools should be solely in the mother tongues of pupils. This has implication for policy makers as such decision is usually a collective one.
- Textbooks writers, Publishers and Curriculum planners should work together with experts in mathematics, so as to produce standard texts in mathematics in pupils' mother tongues in order to encourage teaching in such languages. This is considered as *prima fascia* in the efforts to encourage the use of mother tongue as language of instruction in mathematics in Nigeria.



- There should be a dictionary of mathematics in Igala language. This is to serve as a necessary guide to teachers who may be asked to use the language to teach.

9. REFERENCES

- Abdu, A. C. (2011). A study of influence of mother-tongue, teacher's qualification, gender and experience on performance in primary school mathematics in Katsina State. *JORIND*, 9(2), 147-154.
- Aguele, L. L. & Usman, K. O. (2007). Mathematics education for dynamic economy in Nigeria in the 21st century. *Journal of Social Science*, 15 (3), 293-295.
- Ali, A. (2000). Effects of the use of Edo and Igbo for teaching and learning mathematics in Nigeria primary school. *Abacus: Journal of Mathematics Association of Nigeria*. 25(1), 51-64.
- Ankpa, Omala & Olamoboro LGAs Statistics Office (2012). Statistics of school enrolment. Govt. Gadget.
- Anyagh, I. P. (2012). Impact of using Tiv language for teaching and learning mathematics on students' achievement in Benue state. *Unpublished PhD thesis Benue State University Makurdi*.
- Betica, O.F (2002). Factors responsible for poor performance of students in schools mathematics: suggested remedies. *Proceedings of the 43rd Annual Conference and Inaugural conference of CASTME Africa*, 342-347.
- Efunbanjo, A.O (2001). A systemic approach of teaching difficult topics in primary mathematics under UBE. A paper presented at the 1st Annual Conference of Lagos chapter of MAN, 7-9.
- Emaikwu, S.O (2008). *Fundamentals of educational research methods and statistics*. Kaduna: Deray Prints Ltd.
- Emaikwu, S.O (2010). *Fundamentals of research methods and statistics (9th ed)*. Makurdi: Selfers Academic Press Ltd.
- Espada, J. P. (2012). *The native language in teaching kindergarten mathematics*. Conference paper presented at Clute Institute International Conference, Bangkok, Thailand on March, 2012.
- Fafunwa, A.B. (1990). Mother tongue in science education: *Keynote address delivered at the 31st Annual Conference of Science Teachers' Association of Nigeria (STAN)*.
- Fagbenle, T. (2010). The New Disaster a Timely alarm Bell. <http://www.nigeriavillagesquare.com/articletundefagbenle/theneco-d>. Retrieved 27th September, 2010.
- Federal Government of Nigeria, (2004). *National policy on education* Lagos: Federal Government Press.
- Federal Ministry of Education (2007). *9-years Basic Education Curriculum for mathematics* Abuja: Federal Government Press.
- Gandhi, D. B. (2010). Thorndike's law of learning and its educational implications. Retrieved on 19th October 2010 from www.dgwaymade.blogspot.com
- Harbor Peters, V.F.A. (1999). *Noteworthy points on measurement and evaluation*. Enugu: Snaap press ltd.
- Idiala, J.O (1991). Teaching science, technology and mathematics in the mother-tongue: Implication for the learner. *STAN Proceedings*, 124-128.
- Iluno, C. & Taylor, J. I. (2013). Ethnomathematics: The key to optimizing learning and teaching of mathematics. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 3(1), 53-57.
- Karthigeyan, K. & Nirmala, K. (2012). Academic achievement in English: An analysis through gender lens. *MIER Journal of Educational Studies, Trends and Practices*, 2 (2); 144- 157.
- Kurumeh, M.S. (2006). Effects of ethno mathematics approach on students, achievement in geometry and menstruation. *Abacus: Journal of the Mathematical Association of Nigeria*, 31 (1), 35-44.
- Kwok, K. H. O. (1982). Effect of language of instruction on physics achievement. *Journal of Research in Science Technology*, 19 (9), 761-767.
- Mackintosh, N. J. (1983). *Conditioning and associative learning*. New York: Oxford University Press.
- NERDC (1990). *Vocabulary of primary science and mathematics in Nigerian Languages*. Abuja: NERDC Press.
- Oginni, O. I. & Owolabi, O. T. (2013). Effect of mother tongue and mathematical language on primary school pupils performance in mathematics. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)* 4(3): 542-546.
- Okereke, S. C. (2006). Effects of prior knowledge of implications of mathematical tasks/concepts to carer types and gender on students' achievement, interest and retention. *47th Annual Conference Preceding of STAN*, 253-259.
- Pallant, J. (2001). *SPSS survival manual*. Buckingham: Wiley.



- Thomas, W.P. & Collier, V.P. (2002). A national study of school effectiveness for language minority students, long-term achievement. *Unpublished thesis of George Mason University*. <http://www.crede.uesc.edu/research/11aa11/final.html>. 6th April, 2011.
- UBEC (2003). Report of the universal basic education commission national assessment in Nigeria.
- Umeoduagu, J.N. (1991). Curricula implications of teaching science, technology and mathematics in the mother tongue in the Nigerian school system. *Science Teacher Association of Nigeria 32nd Annual conference proceeding*, 82-87.
- Unodiaku, S. S. (2013). Effect of ethno-mathematics teaching materials on students' achievement in mathematics in Enugu State. *Journal of Education and Practice*, 4(23): 70-77.
- WAEC (2003). *Chief Examiners Report*. Lagos: The West African Examination Council.
- WAEC (2005). *Chief Examiners Report*. Lagos: The West African Examination Council.