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EFFECTS OF IGBO AND ENGLISH MEDIA OF INSTRUCTION ON PRIMARY SCHOOL PUPILS' ACHIEVEMENT IN MATHEMATICS IN ANAMBRA STATE.

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Abstract
This study determined the effects of Igbo and English media of instruction on primary school pupils' achievement in Mathematics word problems in Anambra state. It was guided by three research questions and three null hypotheses tested at 0.05 level of significance. Quasi-experimental, pre-test post-test nonrandomized control group design was used. A sample of 136 primary three (3) pupils from a population of 13,433 pupils was used for the study. The sample size was obtained from four primaryschools selectedfrom the two education zones using two stage sampling procedure. Data were collected using Mathematics Achievement Test (MAT). MAT was validated by four experts, two from Department of Science Education, Nnamdi Azikiwe university, Awka. and two from F.C.E(T), Umunze; one Igbo language teacher and one experience primary school teacher. The reliability of MAT in Igbo was 0.86 while and the reliability of MAT in English was 0.85 which was established using Kudder- Richardson Formula 20. Experimental group was taught word problems in mathematics using Igbo medium of instruction (Igbo MOI) while the control group was taught using English medium of instruction(English MOI). Data were collected by administering MAT on pupils as pre test and post-test. The data

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obtained were analysed using mean, standard deviation andanalysis of covariance. The findings revealed among others that there is a significant difference between the mean achievement scores of pupils exposed to Igbo MOI and English MOI in favour of the former group. There was no significant difference in the mean achievement scores of male and female pupils exposed to Igbo MOI and English MOI. The study recomended among others that (1) Primary school teachers should use Igbo language to teach primary school mathematics in igbo speaking states.(2) The curriculum planners should develop primary school mathematics curriculum in mother tongue(Igbo language).

Key words: Achievement, Media of instruction, word problems.

Introduction

Mathematics as a subject is a special spice without which many subjects especially sciences will loose its taste. It studies relationship among numbers, shapes and quantities. Mathematics is a core and compulsory subject for all primary school pupils and post-primary school students in Nigeria as indicated by the Federal Republic of Nigeria (FRN, 2014) in the National Policy on Education. The importance of mathematics is further emphasized by making credit pass in it as a pre-requisite for admission into secondary school and many higher institutions in Nigeria for all courses.

Despite the numerous importance of mathematics, evidence of pupils' poor achievement in the subject abounds. There have been also a repletion of poor performance and failure of pupils at primary school level (Ezeugwu, 2013). The summary of pupils' performance in first school leaving certificate (FSLC) examination over the period of four years from 2014 to 2017as documented by Examination Development Centre Awka, Anambra state revealed that, out of 280,596 pupils that sat for FSLC examination over the period of four years, only 114,117(40.69%) had credit pass and above while the remaining 166,419 (59.31 %) had pass and below. The analysis showed that the performance of pupils over this period of four years is below average.

The causes of poor performanceof pupils in FSLC examination and students in senior secondary mathematics have been blamed on different factors. Agwagah (2012) and Cheng (2016) attributed students' poor performance in mathematics to

teachers'poor teaching method while Popoola and Ajani (2011) and Usuman and Musa(2015) attributed students' poor performance to gender. However, Olaleye in Olosunde and Olaleye (2010) faulted poor primary school background as cause of secondary school students' poor performance. Yet, Awofala, Adeneye, Love, Nneji and Alfred (2012). Patrick and Theresa (2015) and Igbojinwaekwuand Dorgu (2015) blamed students' unabated poor performance in mathematics on the medium/ language of instruction.

Language is crucial to the learning process. Medium of instruction is the language through which teachers and students communicate with each other during teaching and learning process. It plays a vital role in teaching and learning. The goals of education are not achievable without a language and the process of imparting knowledge has to be carried out through a language (Aguiyi,2012). Foroverall cognitive development and better academic achievement of primary school pupils, selection of language of instruction in primary schools need to be done with caution. This might be the reason why the FRN (2014) in its National Policy on Education(NPE) states that the medium of instruction in the primary school shall be the language of the environment for the first three years while English Language shall be taught as a subject. Research showed that no primary school teacher in the Anambra state has used complete instruction in Igbo language to teach mathematics in lower basic level. According toEdeguin, Igbojinwaekwu and Nneji(2012), despite the policy of using the language of the environment as medium of instruction in the first three years in the primary school, as contained in the NPE, no record has shown any school, be it private or public, implementing it.

The three major Nigerian languages, Igbo, Hausa and Yoruba could be used to teach Mathematics successfully. Yoruba has been used during Ile-Ife six-year project to teach all the subjects in primary school from primary one to six (Fafunwa, Macauley and Sokoya, 1989; Fafunwa,2000). The pupils taught in Yoruba performed better than other pupils taught in other school with Engish.Also a research work carried out by Charanchi (2011) revealed that the use of Hausa as a medium of instruction enhanced the performance of pupils in primary school mathematics.

Very few studies have been carried out on the use of Igbo language to teach mathematics. People fear that Igbo language does not have all the terminologies needed to translate

scientific terms into Igbo language. However, English language was not able to translate all the scientific terms into English but was able to accommodate scientific terms that are of Latin and Greek origin in addition to inventing other words to meet the demand of scientific development. Such invented words include infra-red, ultra-violet, ultra-sonic, supersonic, intracellular, extracellular. In other words, these words and expressions which were not hitherto known in English language have been incorporated and widely used as a result of its contact with science language. A similar chance for development as is described for English language if given to Igbo language can make Igbo a better medium of instruction.

Statement of the Problem

The results of pupils' performance in Mathematics which is persistently poor over a period of decade has cast doubts on the country's hope of becoming a developed nation in the nearest future. Ezeugwu (2013) found out from his research work that the teaching and learning of some Mathematical concepts in geometry like; triangle, square, rectangle among othesrand teaching of subtraction, addition and multiplication still constitute problem areas in the teaching and learning of Mathematics at primary school level.The analysis of pupils performance in FSLC and common entrance examination had attested to this poor performance.

Teaching Mathematics, an abstract subjectwith a foreign language/English language may pose extra problem to pupils. The pupils battle with some ambiguous words in English language andmay find it difficult to understand some terminologies, terms and concepts when expressed and explained in English language. This observed deficient ability to understand some concepts and questions of mathematics in English language informed the decision of the researcher to investigate whether using the mother tongue (Igbo language) as medium of instruction in mathematics classroom would enhancepupils' achievement in the subject.

Research Questions

Three research questions guided the study; the following research questions were posed to guide the study

1. What is the difference between the mean achievement scores of pupils taught Mathematics word problems using Igbo medium of instruction (Igbo MOI) and those taught using

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using English medium of instruction(English MOI)?

2. What is the difference between the mean achievement scores of male and female pupils taught Mathematics word problems using Igbo MOI?
3. What is the difference between the mean achievement scores of male and female pupils taught Mathematics word problems using English MOI?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

$H_{01:}$. There is no significant difference between the mean achievement scores of pupils taught Mathematics word problems using Igbo medium of instruction(Igbo MOI) and those taught using using English medium of instruction(English MOI).

$H_{02:}$ There is no significant difference between the mean achievement scores of male and female pupils taught Mathematics word problems using Igbo MOI.

$H_{03:}$ There is no significant difference between the mean achievement scores of male and female pupils taught Mathematics word problems usingEnglish MOI.

Method

This study adopted a quasi-experimental research design. This was a pretestposttest nonequivalentcontrol group design. A quasi- experimental design was considered appropriate because the researcher was not able to randomly assign the participants to experimental and control groups instead intact classes were used. The intact classes wererandomly assigned to experimental and control groups.

The study was conducted in Anambra state of Nigeria. The state is made up of six `education zones: Aguata, Awka, Otuocha, Nnewi, Ogidi and Onitsha. Anambra is a state in southeastern Nigeria. The population of the study was made up of 13,433(6241 males, 7192 females) primary three pupils found in 1624 primary schools in the state.

The sample for the study was made up of 136(67 males, 69 females) basic three(3) pupils from 13,433 basic 3 pupils selected through multistage sampling procedure. First,.Aguata and Awka education zones were selected by Simple random sampling (balloting) from six education zones in the state. Two local government areas(LGA) were randomly selected from each of the

education zones. Then one primary school was purposefully selected from each selected LGA making it four primary schools. Two were randomly assigned to experimental group and the other two to control group.

Theinstrumentusedfor data collection was Mathematics Achievement Test (MAT).The MAT is a 20-item test constructed by the researcher from FSLC Exam past question papers for many years. The choice of the items was based on the topics chosen for the study. The instrument was used as pre-test and after the treatment has been made, the same instrument was reshuffled and used as post-test.

Two sets of lesson plans were also prepared one was in Igbo language and was used for teaching the experimental groups A_1 and A_2 and another leson plans were prepared in English language and was used for teaching the control groups B_1 and B_2.

MAT was validated by five experts; two from Department of Science Education, Nnamdi Azikiwe University, Awka, two from FCE(T), Umunze, one in Measurement and Evaluation, the other in igbo language and one experienced primary school mathematics teacher. The instrument was also prepared using test blue print. This was done to ensure that the instrument had both content and face validity.

The reliability of MAT was established with SPSS package using Kuder RichardsonFormula 20 (kR-20). This was because the items were dichotomously scored. The reliability of MAT in Igbo was found to be 0.82 while that of MAT in English language was 0.85.Thereliability indices of 0.82 and 0.85 indicated that the MAT was reliable.

The study was conducted in the school classrooms at the time of normal classes. In the first week of the experiment. Both groups were given pre-test on MAT. The scripts were collected and scored. From the second week the actual teaching started. The class teachers for group A were trained by the researcher before teaching groups A mathematics topics in Igbo language while group B were taught the same mathematics topics in English language.

At the end of the five weeks teaching period, immediately after the treatment, all the pupils in the four intact classes weregivenMATto write for 1 hour each as post-test. The items in the post-test instrument remain the same with the items in the Pre test but this time the numbering was rearranged. The post test was given immediately after the treatment.

Table 1: Difference between the mean achievement scores of pupils taught mathematics word problems using Igbo medium of instruction (Igbo MOI) and those taught using English medium of instruction (English MOI).

Group	N	Pretest		Posttest		Mean gain
		Mean	SD	mean	SD	
Igbo MOI	66	17.73	6.27	71.68	11.02	53.94
English MOI	70	18.57	5.73	49.14	9.00	30.64
Mean Difference		**- 0.84**		**22.54**		**23.30**

Summary of result in table 1 revea is that the mean achievement gain of experimental group was 53.94 while the gain in mean achievement score of the control group was found to be 30.64. Thus, the difference in the mean achievement scores of pupils in the two groups was 23.30.This implies that primary school pupils taught mathematics word problems using Igbo MOI achieved higher than those taught with English MOI.

Table 2: Difference between the mean achievement scores of male and female pupils taught mathematics word problems using Igbo medium of instruction.

Group	N	Pretest		Posttest		Mean gain
		Mean	SD	mean	SD	
Male	29	16.38	5.56	68.2 10	.46	51.90
Female	36	18.92	6.68	74.35	10.84	55.43
Mean Difference		0.54		6.07		3.53

Table 2 shows that for the experimental group, the gain in mean achievement score of female pupils (55.43) is greater than that of male pupils (51.90) .The female had higher mean gain. Hence, the difference in the mean achievement scores of pupils by gender is 3.53.

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Table 3: Difference between the mean achievement scores of male and female pupils taught mathematics word problems usingEnglish medium of instruction.

Group	N	Pretest Mean	SD	Posttest mean	SD	Mean gain
Male	38	18.82	5.77	48.82	9.48	30.00
Female	32	18.28	5.77	49.53	8.55	31.25
Mean Difference		0.54		-0.71		-1.25

Table 3 shows that the mean achievement gain of male pupils taught mathematics concepts using English medium of instruction is 30.00 while that of female was 31.25.The female pupils taught mathematics word problems using English medium of instruction have higher mean achievement gain of 31.25 while their male counterparts have mean gain of 30,00.

Table 4: Summary of Two-way ANCOVA Test for Significant Difference between the Mean Achievement Scores of pupils taught mathematics word problems using Igbo MOI and those taught using English MOI.

Source	Type III Sum of Squares	df	Mean Square F	Sig.	Decision
Corrected Model	27102.629[a]	4	6775.657	234.349	.000
Intercept	16231.009	1	16231.009	582.940	.000
Pretest	9236.423	1	9236.423	331.728	.000S.
Method	18407.932	1	18407.932	661.124	.000S.
Gender	146.404	1	146.400	5.258	.023S.
Method*Gender	13.324	1	13.324	0.479	.490NS.
Error	3647.482	134	27.843		
Total	521671.000	136			
Corrected Total	30750.110	135			

S= Significant at 0.05 probability level
NS= Not Significant at 0.05 probability level
Table 4shows F (1, 134)) = 661. 124, P = 0.000< 0.05.

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The null hypothesis one therefore was rejected. This means that there is a significant difference between the mean achievement scores of pupils taught word problems in mathematics using Igbo MOI and those taught using English MOI. The difference was in favour of the pupils taught mathematics word problems using with Igbo MOI.

Table 5: Summary of One-way Analysis of Covariance(ANCOVA) Test for Significant Difference in the Mean Achievement Scores of male and female pupils taught word problems in mathematics using Igbo MOI .

Source	Type III Sum of Squares	df	Mean square F	Sig.	Decision
Corrected Model	5399.927[a]	2	2699.063	68.192 .000	
Intercept	15545.749	1	15545.749	392.634	.000
Preach	4799.834	1	4799.834	121.228	.000
Gender	115.888	1	115.888	2.927	.092
NS.					
Error	2494.391	63	39.594		
Total	347021.000	66			
Corrected Total	7894.318	65			

S= Significant at 0.05 probability level
NS= Not Significant at 0.05 probability level

Table 5revealed that $F(1, 63) = 2.927$, $P = 0.092 > 0.05$.Therefore, the null hypothesis three was upheld. This means that there is no significant difference between the mean achievement scores of male and female pupils taught mathematics word problems using Igbo MOI.

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Table 6: Summary of One-way Analysis of Covariance(ANCOVA) Test for Significant Difference in the Mean Achievement Scores of male and female pupils taught word problems in Mathematics using English MOI .

Source	Type III Sum of Squares	df	Mean square F	Sig.	Decision
Corrected Model	4445.542[a]	2	2222.771	129.180	.000
Intercept	3349.018	1	3349.018	194.604	.000
Preach	4436.650	1	4436.650	257.804	.000
Gender	36.824	1	36.824	2.140	.148 NS.
Error	1153.029	67	17.209		
Total	174650.000	70			
Corrected Total	5598.571	69			

S= Significant at 0.05 probability level

NS= Not Significant at 0.05probability level

Table 6 revealed that the value of the significance of F(1,67) = 2.140,P = 0.148 > 0.05. The null hypothesis 3 was upheld. This means that there is no significant difference between the mean achievement scores of male and female pupils taught word problems in mathematics using English MOI.

Discussion

The findings had revealed that the experimental group taught using Igbo medium of instruction achieved higher than the control group taught with English medium of instruction.Thus,the difference between the mean achievement scores of pupils taught mathematics concepts with Igbo MOI and those taught with English MOI is 23.30 in favour of the experimental group. This implies that pupils taught word problems in mathematics with Igbo MOI achieved higher than those taught with English MOI. To find out if the difference in the mean achievement scores between the groups was significant or not, a Two-way analysis of covariance was used which showed that there is a significant difference between the mean achievement scores of pupils taught mathematics word problems using Igbo MOI and those taught using English MOI. By inspection of table 1, the post-test mean achievement score of pupil taught with Igbo MOI is 71.68 which is greater than the post-test mean

achievement scores of pupils taught using English MOI which is 49.14.The difference is in favour of the pupils in the experimental group taught mathematics concepts with Igbo MOI. Table 4indicates that the use of Igbo MOI in teaching mathematics concepts is a significant factor in academic achievement of pupils in favour of experimental group. a significant difference exist. The findings of this study revealed that use of Igbo medium of instruction is more effective in enhancing academic achievement of primary school pupils in mathematics word problems than the use of English MOI. When pupils are taught in the language best understood by them, they tend to perform better.

This finding is in agreement with the findings of Patrick and Theresa(2015) who found out from their study that pupils understand concepts when they are taught in mother tongue.In the same line, Charanchi(2011) found out from his study that the use of mother tongue(Hausa) improved pupils' achievement better than the use of English language.

Findings from this study further revealed how the male and female pupils' achievement were affected when taught with Igbo and English media of instruction. When pupils are taught with Igbo MOI as seen in tables 2 and 4. table 2 revealed that female pupils taught mathematics word problems using using Igbo MOI perfomed better than their male counterparts. The gain in mean achievement score of female pupils (55.43) is greater than that of male pupils (51.90) .The female had higher mean gain. Hence, the difference in the mean achievement scores of pupils by gender is 3.53. It means that female pupils achieved higher than male pupils when taught mathematics concepts using Igbo MOI. To find out if the difference in the mean achievement scores between gender was significant or not, a one-way analysis of covariance in table 5was used which showed that there was no significant difference between the mean achievement scores of male and female pupils taught mathematics word problems using Igbo MOI.. It was found out that when pupils are taught with English MOI, female pupils performed higher than their male counterpart. The gain in mean achievement scores of female pupils is 31.25. female pupils taught mathematics word problems using English medium of instruction have higher mean achievement gain of 31.25 while their male counterparts have mean gain of 30,00. To check if this difference in mean achievement score is significant or not, one-way analysis of Covariance

in table 6 revealed that the difference was not significant. This means that there is no significant difference between the mean achievement scores of male and female pupils taught word problems in mathematics using English MOI.

This finding is supported by Onakoya(2013), Ameen and Salman(2015) and Ato and Adelaye(2015) who reported that there was no significant difference between the mean achievement scores of male and female pupils in mathematics .The finding of this work is in contrast to the findings of Okotemi and Nzewi(2015) and Dauda and Bulus(2015) who reported that there was a significant difference between the mean achievement scores of male and female pupils taught mathematics concepts despite the language of instruction.

Conclusion:

The findings from the study showed that the use of Igbo medium of instruction as a teaching strategy to teach primary school mathematics is an effective strategy that can be used to enhance academic achievement of primary school pupils in mathematics.Thusthere is no gender influence on pupil' achievement in mathematics.This implies that use of Igbo medium of instruction is a gender friendly strategy that can be used to teach mathematics to males and females pupils effectively

Recommendations

Based on the findings of this study, the following recommendations were made.

(1) Primary school teachers should use Igbo language to teach primary school mathematics in Igbo speaking states. They should translate mathematics topics and contents to Igbo language and use mother tongue (Igbo) to explain figures, facts and relationships.

(2) The curriculum planners should develop primary school mathematics curriculum in mother tongue(Igbo language). They should incorporate the use of mother tongue in teaching mathematics in restructuring mathematics curriculum in the country.

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