IMPACTS OF LANGUAGE OF INSTRUCTION ON ACHIEVEMENT IN MATHEMATICS AMONG SECONDARY SCHOOL STUDENTS' IN KWARA STATE, NIGERIA

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Abstracts
This study investigated the impact of language of instruction on achievement in Mathematics among secondary school students in Kwara State, Nigeria. A pretest posttest control quasi experimental design was adopted for the study. Two research questions were answered and two research hypotheses were formulated and tested at 0.05 level of significance. Simple random sampling was used to select four secondary schools in Kwara South educational Zone, which were randomly assigned to experimental and control group. A total of 205 senior secondary school II students consisting of 97 males and 108 females were used for the study. The Mathematics Achievement Test (MAT) in word problem developed by the researcher was the instrument used for data collection. It was validated and tested for reliability using Pearson product moment correlation coefficient. A reliability coefficient of 0.95 was obtained pretest was given to the two groups before treatment to know their entry behavior. Posttest was given to the two groups after being taught word problem concepts for four consecutive periods to test for their academic achievement. The result shows that the group taught using Yoruba language (experimental group) performed better than students' taught with the convectional teaching method which is the control group. On the gender related issue, there was no significant difference in the mean sores of male and female students taught using Yoruba language. Based on the findings, it was recommended that the use of Yoruba language should be encourage in teaching and learning of Mathematics and other science subjects because of its positive impacts on boosting students' academic achievement.

Keywords: Language, Mathematics, Achievement, Secondary School Students

Introduction

Language of instruction has a great influence on achievement among students in Mathematics solving. It is the language used to verify thought, facilitating contempt, improve ideas and stimulates thinking in the classrooms (Salman, 2005). Fajemidagba (2016) affirmed that students at any level of education do commit errors in the process of translating Mathematical statements into algebraic equations as a result of lack of knowledge of the technical language and contextual meaning of the Mathematical concepts. The language used in impacting Mathematical knowledge to the students determines the success of such students in solving Mathematics. Fajemidagba, Salman and Ayinde (2012) presented Mathematics as a tool for the development of any science-based discipline such as technology, astronomy, graphics, industry and analytical reasoning in daily living in a modern society. Salman (2005) identified the usefulness of Mathematics in tailoring, carpentry, bricklaying, town planning, driving, photography, technology, graphics, industry, astronomy, surveying, buying and selling; indicating its requirement in virtually all fields of study and human endeavor. From these, it implies that no nation could achieved any scientific nor technological advancement without a sound foundation of Mathematics. This is as a result that Mathematics is the mother of all sciences. Therefore, without Mathematics there would be neither science nor modern society.

The introduction of education by colonial administrators was to inculcate knowledge in not favour of the African but the foreign educators. The local languages were regarded to be inferior compare to the colonial rulers' language. The imperial language is the focus and its serves as the medium of communication for other aspects of the school curriculum. In fact it is regarded as 'lingual Franca' in Nigeria (David, 2006).

The child dreams and thinks in the language through which he acquired the firsthand experience of life. This naturally happens to be the mother tongue and for this reason the mother tongue becomes the first conditions of schooling and for intellectual development of children.

Mathematics experts are needed in this nation to shrug off colonial mentality by discarding English and developing a curriculum and text books in Mathematics that will meet the cultural, ethnic and linguistic diversity of the three major Nigerian languages in Yoruba, Igbo or Hausa (Oginni, 2013). The child starts with the mother tongue as a medium of instructions in the first two or three years. The medium switches to English in the third or fourth year. Alabi (2005) from experience, education administrators who insisted that the medium of instruction in the senior classes in primary school or junior secondary schools in Nigeria should be English are either ignorant of the great national suicide implied as they are not informed about the secrets of how the developed nations got there.

According to Kolawole (2005), students in Owo local government area of Ondo State perform better whenever they are taught some basic concept in Yoruba. Salman (2016) stated that Mathematics taught in a child's mother tongue has a lot of advantages. The foreign knowledge of Mathematical vocabulary would be overcome.

Salman (2005) confirmed that word problem is one of the most difficult topic for teachers and students to teach and understood. Word problems are Mathematical statements which need to be translated into algebraic equations with the use of symbols. Mathematical word problems require that the problem solver understands both the conceptual and technical meanings of every word featuring in the problem to be able to meaningfully translate the word problem into equivalent algebraic expressions.

The logical and complexity form of the language use in the text makes students to have phobia for word problem solving. This is because it requires a systematics process in the interpretation and analyzing of the question for proper solving. Therefore, students that are not sound in the language of instruction in the Mathematics solving could not improve in Mathematical skills let alone of scientific advancement of the nation. The West Africa Examinations Councils annual reports shows that the total of 529,425 candidates representing 31.28% obtained credits in five pointed out that there was marginal fall in the performance of candidates just as 38.81% was recorded in 2012, while the performance level stood at 36.57% in the year 2013. Also, according to chief examiner report in May/June 2015 (WASSCE), candidate deviating from the interpretation of the questions made many of them to have failed Mathematics. The deviation from the interpretation of the questions by the students could be as a result of teachers impacting wrong language of instruction into the students while teaching and learning Mathematics in the classrooms. Salman, (2016) confirmed that United National Education Scientific and Cultural Organization (UNESCO), also find that children will excel more when taught in local language. Primary school pupils were taught Mathematics using their mother tongue language (Yoruba) in their early years in school, the technical terms and syntax used in word problem are presented as test in English Language rather than mother tongue (Yoruba) language. This could not develop the Mathematics skills to be acquired by the pupils because the language of instruction used in the classroom difference from the language used in presenting Mathematical ideas. Unfortunately, the uses of mother tongue language (Yoruba) in teaching Mathematics have not been encourage in the Challenges of teaching in the Nigeria school system. According to Jannina and Mark (2004), mother language is spoken by the barbarians, hence the challenges of teaching in mother tongue remained unattainable unless Nigeria education system is decolonized, English remain our language of instruction since it is

our colonial heritage. Poor performance of students' in Mathematics could also be as a result of gender differences. The concept under has attracted the attention of many researchers such as: Anekwe, (2006); Popoola, (2007); Nwendi, (2007). They argued out that there is general imbalance on male and female achievement in scores Mathematics. According to Popoola (2007), females' reference for language and can use more words and inmate preference for language and can use more memorize words with great proficiency. Adeniyi 2006; Panel and Babaworo (2006) revealed that females are better in language reasoning which led to good performance in problem solving in Mathematics. Jacobs, Lamaz, Osgood and Winfield (2002), confirmed that self-concept of ability and task value in Mathematics determines the performace of female and male in Mathematics achievement. Apata (2012), in a research carried out in Kogi Sate, discovered that no matter how brilliant a female could be, when it comes to Mathematical reasoning, male students achieves better scores. Therefore, Jacobs, Hamza, Osgood and Wigfield (2002) discovered that was no sex difference in the achievement of students in Mathematics.

Statement of the Problem

The researchers observed that Nigerian indigenous language have been rendered unimportant in the comity of nations as a means of communicating ideas, particularly in the teaching of the subjects that seems to be abstract in nature. Like Mathematics which had eventually led many pupils to develop negative attitude towards the subject. It has been noted that some of the primary school pupils cannot interprets Mathematical language correctly thereby increases poor performance in Mathematics at the secondary schools level.

Despite the efforts made by the Government (National Policy on Education, 2013), that there is need for every child to learn the language of immediate environment. It is not surprising that many children cannot speak any of the indigenous languages including their mother tongue. Web's & Webb (2003) points out that "some Mathematics teachers rely heavily on code switching as a way of presenting instruction in the primary and Junior secondary schools level. Barwell (2011) points out that "many learners and teachers are confronted with a range of linguistic difficulties when learning Mathematics. For instance, difficulties when their mother language does not have the vocabulary to express the Mathematical ideas that they learn in the classroom and there resort to using code switching.

Therefore, code switching English language and Yoruba language as medium of instructions could not improve the reasoning skills among students which could have eventually led to lack of interest of students in solving Mathematics in their senior secondary school classes. Moreover, Apata and Abolarin (2012), further stated that in a research carried out in Kogi State, parents contribute to inadequate interest of female students in Mathematics. Some parents believes that female saying by the parents has cannot develop will in Mathematical reasoning but Flourish in Art subjects. These already affect such female students' interest in Mathematics. These could have eventually led to the poor performance of students in Mathematics in West Africa Examination Council.

Research Questions

The following questions were raised to guide the study:

(i) What is the difference in the mean achievement scores of students taught Mathematics using English language and mother tongue language?

(ii) What is the difference in the mean achievement scores of male and female students taught Mathematics using mother tongue language?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: There is no significant difference between the achievement scores of students taught Mathematics using English language and mother tongue.

Ho_2: There is no significant difference between the achievement scores of male and female students taught Mathematics using Yoruba language.

Methodology

A quasi-experimental design was used for this study; pretest, protest, non-equivalent control group design was adopted. The study investigated the impact of independent variable, that is, language of instruction, on students' learning achievement which is the dependent variable. The study also considered school location as one of its variable. The population of the study comprises of all senior secondary school II students (SS2) in Kwara State, with the total number of 21,876 as indicated in the 2017/2018 annual statistics of the Kwara State Teaching Service Commission Board Ilorin. The sample size for the study consisted of 205 students from four co-educational secondary schools. Two schools each from two Local Government Areas were randomly selected from both the rural and urban locations of Kwara South educational zone. The zone comprises of seven local government with 141 senior secondary schools. One schools each from both urban and rural locations were used as experimental and controls schools. The control schools had a total of 108 students (52 male & 56 female), while the control schools had a total of 97 students (45 male & 52 female).

The Mathematics Achievement Test (MAT) was developed by the researcher for data collection. It was made up of sections A and B. Section A was concerned with the personal data of students while section B contained the test items. The MAT was used for collection of pretest and posttest achievement scores. The MAT items was made up of 20 multiple choice questions with four options, the 20 multiple choice items was equally translated to Yoruba language. The items in the test, covers all the units of word problem in Mathematics with respect to Bloom's taxonomy. It was used to administer, pretest posttest for both experimental and control groups. After administration of pretest, the question papers were collected so as to present the students from using it as a revision guide before the posttest. Two lesson notes were prepared by the researcher for teaching word problem. The lesson note written in Yoruba language was used for the experimental group, while the lesson note written in English was used for the control group.

The instrument used for data collection was validated by Head of Department lecturer from college of Education Oro in Mathematics department with two senior secondary school teachers in terms of face and content validity. Corrections and comments given by the validators were used to restricting the items. The corrected items were then administered to the students. Reliability of the instrument was established through pilot test which was conducted in a school different from the sampled schools used for the research but possess the same characteristics with the schools used for the study. Test retest method was used to ascertain the reliability of the instrument. Test was initially given as pretest and then administered a week later as post-test, the result from pretest and posttest were compared to ascertain the reliability of the instrument. Scores from both tests where then correlated using Pearson Moment Correlated Coefficient which gives internal consistency of 0.95. The result obtained indicated that the item is reliable for the research and can serve the purpose for which it was developed.

The MAT was administered by the researcher and trained research assistants as pre-test to th experimental and control group. Objective question papers containing 20 items were

given to students to tick the correct answer. After the pretest, the papers were collected from the students and marked by the researcher to obtain the students' scores on cognitive achievement before treatment was administered. This gave a clear picture of students' performance before the treatment. The researcher guided and explained to the trained researcher assistants on how to go about the teaching exercise. After one week, the researcher and the trained research assistants administered a posttest to measure achievement. The posttest items were the same items used in administering the pretest. The MAT papers were collected back from the students after the posttest and marked by the researchers to obtained the students achievement scores after treatment. Data generated were subjected to statistical analysis to find the descriptive statistics, t-test was used to find out if there is significant difference in the mean score of the experimental and control groups and also that of male and female students taught using Yoruba language. All the statistical analysis to test the hypotheses was done using (SPSS).

Results

The instrument used for the data collection was Mathematics Achievement Test (MAT) which was used to measure the students' achievement in the pretest and posttest for both experimental and control groups. The data that were obtained in the course of the study were: achievement scores from pre-test for both experimental and control groups, achievement scores from post-test for both experimental and control groups.

Table 1: Mean, Standard deviation and independents t-test result of the pretest scores of Experimental and control groups

Group	N	df	$\overline{X}$	SD	t-value	p-value	Remarks
Experimental	108	203	5.23	1.01	10.02	0.000	Significant
Control	97		6.04	1.30			

Significant at p> 0.05

Table 1 showed that there is significant difference in the mean score of experimental and control groups at pre-test. The mean score of the experimental students taught mathematics using Yoruba language is 5.23 is not significantly differ from the mean score of the control students taught using English language (6.04) with the p-value of 0.000 which is less than 0.05.

Research Question One: What is the difference in the mean achievement scores of students taught mathematics using English language and Yoruba language?

Table 2: Mean and standard deviation of post-test scored of experimental and control groups

Group	N	$\overline{X}$	SD	MD	Remarks
Experimental	108	11.77	2.913	4.13	Significant
Control	97	7.64	1.209		

Significant at p> 0.05

The result on Table 2 showed that there is significant difference in the mean scores of the experimental and control groups in favour of the experimental group. The mean score of the experimental group taught using Yoruba language was 11.77 while that of the control group

was 7.64. The result shows that there is a significant difference in the mean scores of students taught mathematics using Yoruba and those taught using English.

Research Question Two: What is the difference in the mean achievement scores of male and female students taught mathematics using Yoruba language?

Table 3: Mean and standard deviation of post-test scores of male and female students in experimental group

Group	N	$\overline{X}$	SD	MD	Remarks
Male	52	12.61	3.07	1.08	N/Significant
Female	56	11.53	3.06		

Significant at p> 0.05

From the above table, the result showed that there is no significant difference in mean score of male and female students: the mean of the male students (12.61) and standard deviation of 3.07 is not different from that of female student with mean of 11.53 and standard deviation of 3.06. The result shows that gender as a factor has not affected the achievement of mathematics.

Testing of Hypotheses

Ho_1: There is no significant difference in the achievement scores of students taught Mathematics using Yoruba language and those taught conventional teaching method.

Table 4: t – test analysis of the post – test mean scores of the experimental and control groups

Group	N	$\overline{X}$	SD	df	t-value	p- value	Remarks
Experiment	108	11.77	2.913	104	5.210	0.000	Significant
Control	97	7.64	1.209				

Significant at p> p< 0.05

The result should that there is significant difference between the experimental students taught using Yoruba language (11.77) while that of the control students taught with conventional method was 7.64. The t-cal value of 5.210 was found to be significant at 0.05 level (t = 5.210, df = 104, p = 0.000). Hence, the null hypothesis was rejected. That there is 'no significant difference in the achievement scores of students taught mathematics using Yoruba and those taught with conventional teaching method is there by rejected.

HO_2: There is no significant difference in the achievement scores of male and female students taught mathematics using Yoruba language.

Table 5: t-test analysis of the post-test mean scores of male and female students in the experimental group

Group	N	$\overline{X}$	SD	df	t-cal	p-value	Remarks
Male	52	12.61	3.07	106	1.501^{NS}	0.138	N/Significant
Female	56	11.53	3.06				

Ns significant at p> 0.05

The result presents the t-test analysis for mean posttest scores of male and female students taught using Yoruba language. The test was conducted to determine if the mean difference of 12.61 for male and 11.53 for female was significant or not. The t-value of 1.501 was however found not to be significant at 0.05 level ($t = 1.501$, $df = 106$, $p = 0.138$) therefore the null hypothesis is not rejected.

Discussion

The discussion of analysis of data where made under the following sub-headings: Impact of language of instruction on achievement in Mathematics among secondary school students and the impact of Yoruba language as language of instruction on achievement of male and female students in Mathematics.

The result in table 2 shows the post-test mean achievement scores of students taught with Yoruba language (experimental group) out performed higher than the post-test with conventional teaching method (control group). This is further confirmed by the result in table 4 which revealed that the achievement of experimental and control groups differ significantly. The result indicated that treatment using Yoruba language produced significant difference on students' achievement in Mathematics. This agrees with Kolawole (2005) who found that there was improvement if students are taught in Yoruba language in the classrooms.

Several possible explanations exist for the performance whenever Yoruba language was used in teaching Mathematics. One possible reason is the exposure of the child to Yoruba language during the child years since it was early was used as language of instruction in the child's background. This might have assisted the students in retrieving and retaining memory (Oginni, 2013). It could also be as a result of students' developing interest in Mathematics and concentrate while been taught in the mother tongue. It might be as result that Yoruba is the language that brought about the intellectual development of children (David, 2006).

The finding also revealed that result in table 3 shows the posttest mean achievement of male and female Mathematics students taught using Yoruba language. The mean achievement scores of the male and female students using Yoruba language is slightly higher than that of the female students taught with the same language.

This is further confirmed by the result in table 5 which indicated that treatment using Yoruba language did performed equally better not produced significant difference on gender. This result agrees with Jacobs, Hamza, Odgood and Wigfield (2002) who stated that there was no sex difference in the achievement of students in Mathematics achievement.

Conclusion

The study established that using of Yoruba language as a medium language of instruction in the primary and secondary level while teaching and learning Mathematics would enhance better academic achievement on the part of the students. In addition, using Yoruba language would interest the students and because they are bought up with the language in their various homes.

Recommendations

Base on the findings of this study, the subsequent discussion, and their implications, the following recommendations are made:

(i) The use of Yoruba language as language of instruction by teachers in secondary schools while teaching Mathematics in order to promote meaningful learning of Mathematics.

(ii) Mathematics text should be interpreted to the nation's different mother languages: Yoruba, Hausa and Igbo. This will create more interest of Mathematics into the students.

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