EFFECTS OF LANGUAGE PROFICIENCY ON MATHEMATICS PERFORMANCE AT THE BASIC EDUCATION LEVEL

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Abstract
This paper discusses the relationship between English Language proficiency and mathematics performance in word and numeric problems among primary school pupils. A sample of 120 pupils were drawn from
four (4) senior primary schools using simple random sampling techniques. Data was analyzed using t-test distribution. The analysis yielded, significant difference between proficiency in reading comprehension and mathematics performance at 5% level of significance. The researcher recommends that primary mathematics education should emphasize mathematical problem solving at the basic education level, since this has been found to aid mathematics learning through effective language communication .

Key words: Language proficiency, Word problems, Numeric problems.

Introduction

Mathematics Education is vital for success in virtually in every career. It is aimed to prepare individuals for challenges of a changing society and work place. Since mathematics is the backbone of all scientific technological investigations and all activities of human development, there is therefore the urgent need to consider mathematics as a tool for development in this country.

Most Nigerian primary pupils learn English language as a second language (L2). They have acquired their mother tongues (L1) and are very proficient in them before entering school. In most cases, many primary school pupils do not have the opportunity to use English language at home. For such students, English language learning and use is restricted to the classroom. Therefore, these pupils use their mother tongue more in the school environment, at home and for interpersonal relationship. These practices are negatively affecting the production of some sound words in English, which is the language of education, government, commerce and international communication (Bohlmann, 2001). Thus, students' ability to articulate their strategies, discuss ideas and concepts critically and communicate mathematical meaning has continued to be a more central focus in mathematics and mathematics education.

The theme of language in education has been a contentious issue ever since former colonies in Africa, Asia and South America gained their political independence. Language and communication are without doubt two of the most important factors in the learning process. The Global Monitoring Report of Education for All in 2005 (UNESCO, 2004) underlines the fact that world wide the choice of the language of instruction and language policy in schools is critical for effective learning. In a landmark study on quality of education in Africa,

carried out by the Association for Development of Education in Africa (ADEA, 2003), the language factor emerged strongly as one of the most important determinants of quality. Yet, most African countries continue to use the former colonial language as the primary language of instruction and governance.

Most Nigerian children for example start their schooling with little or no knowledge of English (Okoro,2000). This is because most grow up in a relatively isolated village/town environment which has adequately supported the development of the mother tongue, but has not provided support for the development of competency in English (Adetula, 1990). The children themselves rarely use English outside the classroom or with the people they meet. For more than 27 years, (UNESCO, 1974) has noted that there are many problems created by the interaction between English language and mathematics education in Nigeria.

This double task of interaction between language of the mother tongue and the English language entails the acquisition of two conceptually difficult and different skills at once-one being related to the English language and the other to mathematics content (Bolmann, 2001). Lassa (1980) has commented that the use of foreign language in the early primary school has placed the African child at a disadvantaged position because he has no means of communicating his thought to the teacher. This has been particularly true in developing countries, where the language of instruction is often English or French or a national language that is not the mother tongue of the learner. Nigeria with over 150 million people with three (3) major languages (Hausa, Igbo and Yoruba) and more than 300 local languages is an example.

Therefore, this study is part of a broader investigation of the effect of English language proficiency on mathematics performance among primary school pupils in Nigeria

Statement of the Problem

The number of languages varies from between two and three in Burundi and Rwanda, to more than 400 in Nigeria (Gadelii, 2004). The existence of so many languages within a single country and their right not only to survival but also to development, represent a matter of importance that has to be considered over and above the categories into which they fall. This diversity is in itself perceived as an inherent problem in matters of communication, governance and education.

Such a multiplicity is perceived as a communication barrier and viewed as synonymous with conflicts and tension. It is assumed that managing so many speech communities is problematic and costly. This state of affairs becomes more challenging in multilingual classes where the mother tongue cannot be used as the medium for mathematics instruction.

Therefore, this study is design to investigate the problem of working with language diversity in the classroom situation and to proffer recommendation for improvement.

Methods

The study was aimed at determining the extent to which language proficiency affects mathematics performance among primary school pupils, as well as the relationship between reading comprehension and mathematics performance of primary school pupils. The design for this study is quasi-experimental research design.

Two null hypotheses were raised for the study as follows: (a) There is no significant difference between performance in mathematics word problems and the same problems

presented in numeric form among primary school pupils; (b) Proficiency in reading comprehension has no significant difference with mathematics performance among primary pupils.

The target population for the study consists of all primary five and six pupils within Mubi North and South Local Government Areas of Adamawa State. A sample of one hundred and twenty (120) primary school pupils were sampled from four (4) senior primary schools through simple random sampling.

Data for the study was generated using two tests (mathematics word problems (MWP) and same problems converted to numeric problems (NP)) and reading comprehension tests of English words which was developed by the researcher in line with Mason (1979). Twenty (20) mathematics word problems were constructed to be answered by the 120 pupils in different schools. The same questions were converted to numeric form. The reliability coefficients (r) obtained for the three instruments were as follows:

1. English Reading comprehension tests --------0.59
2. Mathematics word problems ----------0.73
3. Numeric mathematics problems ----------0.86

Both test items were thoroughly vetted by a senior lecturer of mathematics education to determine their suitability and adequacy.

Data analysis and Result

The two research hypotheses were tested using t-test at 5% level of significance.

Research hypothesis 1

There is no significant difference between performance in mathematics word problems and the same problems presented in numeric form among primary school pupils.

To test this hypothesis, items on mathematics word problems and problems presented in numeric format were statistically analyzed, the result is as presented in Table 1.

Table 1: t-test result of primary pupils' performance on mathematics word problems and numeric problems.

	N	$\overline{X}$	SD	SE mean	DF	T_{cal}	T_{tab}	Decision
Word problems	120	34.13	14.92	1.36				
Numeric problems	120	59.38	15.58	1.42	119	25.06	1.96	Reject

Source: SPSS version 17.0

The calculated value of t (25.06) was computed to its corresponding critical value (t = 1.96) at 05 level of significance with 119 degrees of freedom. Therefore, there is significance difference at between the performance in word problems and the same problem presented in numeric form.

Research hypothesis 2

Proficiency in reading comprehension has no significant difference on mathematics performance among primary school pupils.

The relationship between the scores of pupils' reading comprehension and their performance in mathematics were also tested using t-test as presented in Table 2.

Table 2: Relationship between English reading comprehension performance and mathematics performance in primary pupils.

	N	$\overline{X}$	SD	SE mean	DF	T_{cal}	T_{tab}	Decision
Mathematics performance	120	59.38	15.58	1.42	119	41.75	1.96	Reject
Eng. Reading comprehension performance	120	45.35	10.10	9.14				

Source: SPSS version 17.0

The t_{cal} (41.75) > t_{tab} (1.96) at .05 level of significance, hence the null hypothesis is rejected and the alternative hypothesis is upheld. Therefore, there is significant difference between pupils reading comprehension and their level of performance in mathematics.

Discussion

The finding of this work in respect of hypothesis one indicates that there is significant difference between primary pupils performance in mathematics word problems and similar problems in numeric form. The statistically significant difference between numeric equivalent to more and less word problems can be interpreted as pupils understanding mathematics problems in one context but are not able to generate as readily to another context. Furthermore, pupils' performance not only depends on the language of presentation but also on the language of the problem. This concerns the words that express the problem as a result of the misleading, meaning that the keyword may have in the context of the problem. Research evidence (Alastair, Carolyn & Ayesha 2000) shows that the words used to state a problem do not necessarily reflect the structural complexity of the problem, but do affect the comprehension and translation of the problem statement. This is also collaborated with the findings of this study.

The second hypothesis reveals that there is significant difference between mathematics performance of primary school pupils and their English reading comprehension performance. The differences observed here are consistent with previous studies which indicate that language ability is a predictor of mathematics performance (Lassa, 1980).

Moreover, there is wide agreement and a fair amount of evidence that performance in mathematics is related to proficiency in the language in which mathematics is taught. For example a study conducted by Goldstein (1997) reveals that mathematics correlated significantly (P < 0. 05) with scores in English test. This study shows that the interaction between language and mathematics achievement is real. In a related development, previous researches (Aiken, 1972), and (Austin and Howson 1979), has indicated the relationship between reading development and mathematics performance. They added that not only is the language spoken in the classroom important for mathematical thinking and problem solving, but also in the construction of mathematical meaning.

Conclusion

This study revealed the influence of language on mathematics performance among the primary pupils in Mubi North and South Local Government Areas. Results from the study indicate that primary school pupils with different levels of performance in mathematics word problems significantly differed in their mathematics performance. The fact that majority of the pupils were not able to answer mathematics questions presented in word form indicated that the English

language was an inhibitive factor in their mathematics learning and performance.

Recommendation

Based on the findings, the following recommendations are made:

1. Schools should provide primary pupils with support in their dominant language and the English language while learning mathematics.
2. Mathematics teachers should emphasize mathematical problem solving in authentic contexts, since this has been found to aid communication.
3. Teachers should encourage pupils to speak and write in order to enhance their learning of English language as well as motivate them towards the learning of mathematics.
4. Teachers should provide opportunities to pupils with practice in both the mathematical meaning of words and their symbolic motivation with a view to provide practice for understanding and learning.

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