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The influence of the basic difference between everyday meaning of English words and their specialized uses in mathematics contexts on the mathematics performance of Hausa speaking Primary School children in Maiduguri Metropolis, Borno State, Nigeria.

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Abstract: *The study sought to determine theinfluence of the basic difference between everyday meaning of English words and their specialized uses in mathematics contexts on the mathematics performance of Hausa speaking primary school children. Using simple random sampling technique, 60% of each of the eleven public primary schools with a minimum of five (5) Hausa speaking pupils in its primary five and six was taken as sample for the study. This gave seven hundred and thirty five (735) respondents made up of 432 boys and 303 girls.Comprehension tests of ambiguous English words developed by the researcher were used to collect data. The result indicates that there is significant difference between Hausa speaking pupils' performance in basic every-day meaning of English words and their specialized uses in mathematics context. Hausa speaking primary school pupils tended to interpret lexically ambiguous words found in mathematics contexts in their ordinary sense.The statistically significant difference between dominant meaning and secondary context can be interpreted as pupils do not distinguish the meaning of English words. Their responses indicated that they seem prone to access the dominant sense of the common terms used even when they are used in sentences biased towards a mathematics meaning.*

I. Introduction

The great majority of children in Nigeria start their schooling with very little or no knowledge of English. 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. There are many problems created by the interaction between English language and mathematics education and this was the subject of a major International Conference (UNESCO 1974). It is widely recognized that linguistic factors are involved in mathematical learning (Aiken 1972). In a citation of studies on second language learning in science, Rollnick (2001: 100) rightly states: "… it is acknowledged that expecting students to learn a new and difficult subject through the medium of a second language is unreasonable, giving them a double task of mastering both science content and language (English)". This double task 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 (Bohlmann, 2001).

However, in Nigerian schools, students are taught in English, use English textbooks and write examinations in English. For many, however, English is a third, or even fourth language. This creates problems for students who experience difficulties in understanding the teacher and the material, as they struggle to express themselves in English (Brodie 1989). Most teachers face the difficulty of teaching mathematics in an English language to pupils who are also learning English as a second language. Lassa (1980: 23) 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." In the project carried out by him, sponsored by UNICEF, on the problem of learning mathematics in a second language; he observed that "when English is the language of education, the majority of the pupils were not able to exercise their conceptual potentials. On the other hand, the vernacular (Hausa) was a more fruitful medium for enhancing the language thought interactions."

Studies by Mac Namara (1967) in Ireland, and by Henderson and Sharma (1974) in Zambia have revealed that English is more closely related to problem solving activities than to mechanical computation. In both studies, students learning mathematics in their first language were superior in problem solving to those learning in a foreign language, but in mechanical computation, no differences were found. In Lesotho, as well as in many developing countries, a huge syllabus must be covered, in a relatively short time, and thus there is

insufficient time for deeper understanding and problem-solving. Emphasis on superficial computations may therefore be leading to an assessment of mathematics achievement not closely related to language skills.

There is wide agreement and a fair amount of evidence that achievement in mathematics is related to proficiency in the language in which the mathematics is taught. For example, in a study at the University of Zambia by Heron (1970), students were given tests in the English language and in reasoning. The English test had four parts: vocabulary (Synonyms), vocabulary in context, word usage and questions on a combination of rhymes, homonyms and word completion. The study revealed that mathematics correlated significantly ($P<0.05$) with scores on 3 of the 4 parts of the English test.

Mathews, Carpenter, Lindquist and Silver (1984) looked at the pattern of mathematics achievement among students of Mexican heritage. In their study they compared different years' national assessment results in the United States and the study indicated that there had been small gains in computation and no gain in problem solving and application. They also observed that there was a gap in the area of knowledge and skills, mathematics understanding and application as the students got older (National Centre for Education Statistics, 1990). Interestingly, the gaps do not significantly appear until the middle elementary grades and continue to increase thereafter.

Although there has not been extensive analysis of specific test items to suggest possible factors that might explain why performance should be significantly lower in the areas of problem solving/understanding and application, we can make some assumptions about the nature of these items. The questions in these sections likely would be more word laden thus requiring the ability to interpret and translate into mathematical symbols. The questions clearly would also require a stronger conceptual foundation than straightforward computation. In both cases, language would play important roles: first, in the comprehension of questions, and second, at the earlier point when conceptual understanding was being developed. It is significant that the middle grades appear to be a turning point because it is also here where the traditional emphasis in mathematics learning shifts from simple whole number facts to more conceptually complex kinds of numbers, mathematics and application.

Furthermore, researches have drawn attention to the importance of language in students' performance on assessments in content-based areas such as mathematics (e.g. Garcia, 1991; Abedi, Lord & Plummer, 1995; and Abedi, Lord & Hofstetter, 1998). Abedi and Lord (2000) in their study "the language factor in mathematics tests" found that English language learners score lower than students who are already proficient in English on standardized tests of mathematics achievement in elementary school. The study further revealed that modifying the linguistic structures in mathematics word problems could affect student performance.

The influence and importance of English language on mathematics learning have continued to be underscored by scholars (e.g. Aiken, 1972; Pimm, 1987; Garcia, 1991; Abedi, Lord and Plummer, 1995 and Abedi, Lord and Hofstetter, 1998 and Barton & Neville-Barton, 2003). Concerned by such lack of adequate information, particularly on English language influence on mathematics performance of primary school pupils in Maiduguri Metropolis, this study becomes imperative. Therefore, this study was designed to investigate English language influence on mathematics performance of Hausa speaking primary school pupils in Maiduguri Metropolitan Area.

Objective of the Study

The objective of this study therefore is to determinethe influence of the basic difference between everyday meaning of English words and their specialized uses in mathematics contexts on the mathematics performance of Hausa speaking Primary School children in Maiduguri Metropolis, Borno State, Nigeria.

Scope of the Study

The study was limited to Hausa speaking primary school pupils in public primary schools in Maiduguri Metropolitan Area. Hausa was chosen because it is one of the three major languages of the country and it is the most commonly used language in the northern parts of the country including Borno State.

The study focused on mathematics at primary five and primary six, because it was assumed that at these two levels, pupils may have acquired some of the basic concepts of primary school mathematics.

Null Hypotheses

The basic difference between everyday meaning of English words and their specialized uses in mathematics contexts have no significant influence on the performance in mathematics of Hausa speaking primary school pupils in Maiduguri Metropolis.

II. Methodology

Population and Sample

The population for the study consisted of 1,579 Hausa speaking primary school pupils in primary five and primary six in all the thirty six (36) public primary schools in Maiduguri Metropolitan Area of Borno State, Nigeria.

A purposive sample of 60% was used from each of the public primary schools with a minimum population of five (5) Hausa speaking pupils in its primary five and six. Going by this, only eleven (11) public primary schools met this condition.

Using simple random sampling technique, 60% of each of the eleven public primary schools with a minimum of five (5) Hausa speaking pupils in its primary five and six was taken as sample for the study. This gave seven hundred and thirty five (735) respondents made up of 432 boys and 303 girls as sample for the study.

Instruments.

Comprehension tests of ambiguous English words developed by the researcher were used to collect data (see Appendices A & B). The tests consisted of ambiguous words in sentences biased towards either their primary or secondary sense. The layout was closely modeled along that described by Mason, et.al.(1979). Each sentence was between five and nine words long. In each, the target word was underlined. Below the sentence, four possible responses were listed. In effect, the test measured pupils' comprehension of ambiguous words in mathematical contexts and contexts that support their everyday meanings. Some of the items of these tests were derived from the National Common Entrance Examinations and Borno State Common Entrance Examination.

III. Results

The hypothesis tested in this study was: The basic difference between everyday meaning of English words and their specialized uses in mathematics context has no significant influence on the performance in mathematics of Hausa speaking primary school pupils in Maiduguri Metropolis.

To test this hypothesis, pupils' responses to the items on everyday meaning of English words and their specialized uses in mathematics context were scored and analyzed. The result is presented in the table below.

Table 1: t-test result of Hausa speaking pupils' performance on the everyday meaning of English words and their specialized uses in mathematics context.

GROUPS	N	$\bar{x}$	SD	SE Mean	DF	t-Value	P-Value
Everyday usage	735	10.09	3.96	0.15	1468	9.42	0.000*
Specialized usage	735	8.07	4.25	0.16			

* Significant at P<0.05

Table 1 (above) is particularly about whether the basic difference between everyday meaning of English words and their specialized uses in mathematics context has no significant influence on the performance in mathematics of Hausa speaking primary school pupils in Maiduguri Metropolis. At P<0.05, the result indicates that there is a significant difference between performance on everyday meaning of English words and their specialized use in mathematics context. The mean and standard deviation of 10.09 and 3.96 for the everyday usage and 8.07 and 4.25 for the specialized usage indicated that Hausa speaking primary school pupils tended to interpret lexically ambiguous words found in mathematics contexts in their ordinary sense. Therefore, the null hypothesis was rejected and the alternative accepted that there is significant difference between Hausa primary school pupils' performance in basic everyday meaning of English words and their specialized uses in mathematics context.

IV. Discussion

The result of testing of the hypothesisindicates that there is significant difference between Hausa speaking pupils' performance in basic every-day meaning of English words and their specialized uses in mathematics context. The statistically significant difference between dominant meaning and secondary context can be interpreted as pupils do not distinguish the meaning of English words as their responses indicated that they seem prone to access the dominant sense of the common terms used here even when they are used in sentences biased towards a mathematics meaning. It is notable that the present findings in the specific area of mathematics are consistent with Mason's, et. al' (1979) and Durkin and Beatrice's (1991) results using a wide selection of ambiguous words. Like Mason et al (1979) and Durkin and Beatrice (1991), this study found that the dominant meaning was selected in secondary contexts more often than the reverse. The pattern of error responses could be interpreted in this way; that even given sentential cues, the children were less able to repress the dominant sense in favour of the subordinate- but contextually appropriate –mathematical sense than vice versa. This would be consistent with Simpson and Foster's (1986) evidence that children in the age range tested

in this study (11-13 yrs) access automatically both meanings of homonyms. An alternative possibility is that, even given sentential cues, children found it difficult to access the mathematical sense and opted for an interpretation based in more secure knowledge of the familiar, everyday meaning. This poses questions for future research concerning what happens in the classroom when children work independently on mathematics texts which may contain ambiguous vocabulary and concerning the prospects for intervention to ameliorate the difficulties that the present study suggest may be wide spread in our schools.

The finding of this study lends credence to the findings of Kane (1968, 1970), when he stated that mathematical English and ordinary English were sufficiently dissimilar that they required different skills and knowledge on the part of readers to achieve appropriate levels of reading comprehension. In a more recent study, Orton (1992) reported the findings of his study on the difficulties faced by 2 children when they were asked "What is the difference between 24 and 9?" He reported that the first child responded that one was even and the other was odd, whereas the other responded one had two numbers and the other had one. The word difference commonly refers to qualities which distinguish one thing from another in the ordinary English, but in the specialized mathematical sense or English, it is an accurate measure of how much one quality exceeds another. The two meanings have a share sense of "distance between" in both the everyday and mathematical usage. This lack of congruence between mathematical and other contexts is further illustrated by Gay and Cole (1967) and Shuard and Rothery (1984), all of which lend credence to the finding of this study.

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Appendix A

Name of School : …….

Instructions: From the words or groups of words lettered A to E, choose the one that is **the same as or nearest in meaning to the word** underlined in each sentence.

1. Musa and Halima <u>make</u> cakes.
   a) eat b) add c) bake d) no answer

2. The element of the iron is bad.
   a) amount b) component c) part d) no answer

3. His needs are many, but above all, a good car.
   a) on top b) over c) higher than d) no answer

4. From which angle can we judge the right from the wrong?
   a) point of view b) no answer c) position d) slant

5. What is common between the twins?
   a) no answer b) shared c) familiar d) regular

6. Please specify the degree to which we should do the work.
   a) level b) qualification c) total d) no answer

7. We could not draw a parallel between colonialism and self-government in Nigeria.
   a) contact b) equivalent c) corresponding d) no answer

8. He does his things in an odd manner.
   a) strange b) good c) peculiar d) no answer

9. How many chapters are in the volume you are reading?
   a) book b) quantity c) capacity d) no answer

10. The Time have changed.
    a) era b) point c) duration d) no answer

11. A circular has come out on the forthcoming elections.
    a) revolve b) notice c) spread d) no answer

12. The average man in Nigeria is poor.
    a) common b) ordinary c) mean d) no answer

13. Ali compromised in order to save face.
    a) front b) respect c) surface d) no answer

14. Please sign the agreement.
    a) symbol b) mark c) no answer d) endorse

15. We will square it out.
    a) match b) settle c) four-sided figure d) no answer

16. The rise in crime in society today is mainly due to social and economic factors.
    a) reasons b) parts c) features d) no answer

17. Most of our industrial products are sold abroad.
    a) manufactured goods b) crops c) number obtained after multiplication d) no answer

18. The company produces 1000 cars daily.
    a) manufactures b) extends c) constructs d) no answer

19. Three of the students voted for Halima; the balance voted for Amina.
    a) rest b) stability c) weighing scale d) no answer

20.. Politics has divided the country.
    a) separated b) shared c) distributed d) no answer

21. His father is a small farmer.
a) little b) humble c) minor d) no answer

22. There is no even distribution of marks in yesterday's mathematics test.
a) equal b) flat c) no answer d) yet

23. Ali was sitting on a low fence.
a) short b) wooden c) small d) no answer

Appendix B

Name of School: …….

Instructions: From the words or groups of words lettered 'a' to 'e', choose the one that is **the same as or nearest in meaning to the word** underlined in each sentence.

1. Two and three make five.
a) eat b) add c) bake d) no answer

2. Two is an element of set A..
a) amount b) component c) part d) no answer

3. The number above 4 is 5.
a) on top b) over c) higher than d) no answer

4. Calculate the angle of a right angle triangle.
a) point of view b) no answer c) position d) slant

5. The two fractions have a common denominator.
a) no answer b) shared d) familiar d) regular

6. Angles are measured in degrees.
a) amounts b) levels c) quantities d) no answer

7. The two lines are parallel.
a) contact b) equivalent c) corresponding d) no answer

8. Odd numbers cannot be divided by 2.
a) strange b) good c) peculiar d) no answer

9. What is the volume of this tank?
a) book b) quantity c) capacity d) no answer

10. The time on the clock face is wrong.
a) era b) period c) duration d) no answer

11. The moon is a circular object.
a) revolve b) notice c) spread d) no answer

12. The average of the following numbers 9, 1, 10, & 20 is 10.
a) common b) ordinary c) mean d) no answer

13. A cube has six faces.
a) fronts b) respects c) surfaces d) no answer

14. + is a sign of addition.
a) symbol b) mark c) no answer d) endorse

15. The figure up there is a square.
a) match b) settle c) four-sided figure d) no answer

16. 3 is a <u>factor</u> of 15.
a) reasons b) parts c) features d) no answer

17. The <u>product</u> of 3 and 2 is 6.
a) manufactured goods b) crops c) number obtained after multiplication d) no answer

18. Using a ruler <u>produces</u> a straight line.
a) manufactures b) extends c) constructs d) no answer

19.. The <u>balance</u> is a good measuring instrument.
a) rest b) stability c) weighing scale d) no answer

20.. <u>Divide</u> 10 by 2.
a) separated c) shared c) distributed d) no answer

21. This is a <u>small</u> red square.
a) little b) humble c) minor d) no answer

22. An <u>even</u> number is divisible by 2.
a) equal b) flat c) no answer d) yet

23. They were adding all the <u>low</u> numbers.
a) short b) wooden c) small d) no answer