PROFICIENCY IN ENGLISH LANGUAGE: A SIGNIFICANT TOOL IN SOLVING WORD PROBLEMS IN MATHEMATICS

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Abstract

Many research works have indicated that English Language and Mathematics are very important subjects in Nigerian secondary schools without which no studentcan proceed to tertiary institutions (FGN, 2013). The two subjects are closely related and also interrelated. This paper attempts to point out the link between the two subjects and how the skills in English Language and its comprehension are very useful and significant in solving word problems in mathematics. Three research questions were asked in order to guide the study and a survey research design was employed. A purposive sampling technique was used to select three secondary schools fromeach of the three states in the South-West of Nigeria namely: Ogun, Oyo and Lagos States, and one in Gainesville, Florida. Forty students (20 males, 20 females) were randomly chosen from each school, which gives a sample size of 400 students. Three validated and reliable research instruments were used to collect data for the study, namely Mathematics Word Problems Test (MWBT), Mathematics Non-word Problems Test (MNPT) and Students Questionnaire (SQ). The findings of the study showed that the students performed poorer in word problems than the non-word problems due to inability to translate and interprete the word into mathematics statements, among others. Based on the findings, conclusion was drawn, and recommendations were made.

Keywords: *Mathematics, English Language, Proficiency, Word problems, Significant tool.*

Introduction

English Language and Mathematics are considered the basic foundation and languages of the other subjects and also the foundation for studying at tertiary institutions. The benefits of English Language and Mathematics are further exemplified by the recognition given to them in official policies on examination, admissions to tertiary institutions and even employment.

English Language and Mathematics, though structurally different, appear to have certain things in common, particularly in their functional roles. Language proficiency and mathematics proficiency appear to be linked such that lower language proficiency tends to translate into poorer mathematics performance especially in the word-problem (Onabanjo, 2007; Aina, 2018). Learning is enhanced and more useful when learners make meaning out of the message that is communicated. One of the ways by which one determines if learning has taken place in mathematics is the ability to read meaningfully, whatever is given to the learner. Reading is one of the four skills in language. It is a means of extracting written or printed information, which involves penetrating the mind of the author to decode his encoded meaning (Egwuogwu, 1988). This implies that reading entails the ability of the reader to give a meaningful interpretation to the word problems given to him by his teacher or examiner. Thus we can say that reading is a mental activity that involves the encoding and decoding of language symbols. The process of reading involves recognising, interpreting, understanding and responding to the writer's message that is encoded in visual or language symbols.

In solving mathematics word problems, the key factors in reading are recognizing, interpreting, understanding and responding to whatever has been written. The teaching and learning of word problems in mathematics can be more productive if it is taught, taking into cognizance the four elements given above. It is worthy of note that English is the medium of instruction in our schools and also the official, judicial, social and the language of mass mobilization.

Mathematics on the other hand teaches figures, numbers and there is no single activity embarked upon by an individual that does not involve using figures or numbers. Most conversation or interactions are centred on figures. Thus there is a close tie or relationship between English and Mathematics. This is why this paper attempts to point out the significant role that English language plays in word problem solving in mathematics. The interactional level between teachers and students in solving word problems in mathematics can be said to be high if learners could read whatever problems that are given to them. Proficiency in English will assist the learner to perform basic learning functions like asking and responding to questions, expressing one's opinion, describing and solving the word problem given. Proficiency in reading skills will expose learners to other methods not even mentioned or taught by their teachers. This is because of the extensive reading leading them to self-discovery method, thus finding other formulae they can use to

solve whatever any word problem given. Word problems are laced with language that differs from everyday usage and which is thereby potentially difficult for problem solvers. It has been found that some common words such as table, product, rational, base and odd, carry different meanings in mathematics than in daily language.

However, there are some peculiar factors affecting students' performance in each of the core subjects as identified by Chief Examiner's Report and this is shown in the table below:

MATHEMATICS	ENGLISH LANGUAGE
Failure to adhere to rubrics of the questions.	Inability to comply with rubrics.
Lack of knowledge of and inability to apply basic mathematical principles.	Poor punctuation marks and indiscriminate use of capital letters.
Improper use of sets notations to denote sets and omission of commas to separate elements of set.	Wrong use of tenses.
Poor translation of word problems into mathematical expressions and equations.	Wrong use of prepositions.
Lack of knowledge of approximations.	Wrong spelling and interchangeable use of words e.g. 'their' and 'there', 'were' and 'where', etc.

It could also be observed that students may experience difficulties in translating English words into mathematical symbols, which is a fundamental problem that can be traced to reading skills in English Language.

Research Questions

The study sought answers to the following research questions in order to guide the study.

1. What is the profile of the students' performance in the word problems in terms of interpretation of instruction and ability to simplify?
2. What is the profile of the students' performance in the non-word problems in terms of interpretation of instruction and ability to simplify?
3. To what extent does the knowledge of English language explain the performance of the students in mathematics word problems?

Methodology

The research design employed for the study is descriptive survey. The population for the study comprised of all senior secondary school three (SSS 3)

students in Ogun, Oyo, Lagos States and Gainesville in Florida. A purposive sampling procedure was used to select three secondary schools from each state in Nigeria, and one High School in Gainesville, namely Buchholz High School. In each of the ten schools, simple random sampling was used to select forty students (20 males, 20 females); making a total of 400 students.

The mathematics word problems (MWPT) was a 10-item essay (worded), instrument while the non-word problem (MNWPT) was the translated form of the word problems, written in mathematical statements. The questions were selected from the past question papers of the WASCE conducted between 2015 and 2018, based on SS3 syllabus already covered, and also standardized. The content validity was still ascertained by two experts in the Maths Department, University of Ibadan. The reliability of each instrument was obtained using Kudar Richardson Formular 20 which yielded a reliability estimate of 0.72. The Students' Questionnaire (SQ) was a 20-item structured questionnaire developed by the researcher, on which the respondents were required to indicate their agreement and disagreement, weighted Agree 1, Disagree 2. The validity was established and the reliability estimate using Crombach Coefficient alpha was 0.69. the percentage of return after administering the instruments (at the same time) on students was 100%.

The research questions were answered using frequency counts and percentages.

Results

Research Question 1: What is the profile of the students' performance in the word problems in terms of interpretation of instruction and ability to simplify.

Table 1: The profile of Students' Performance in Mathematics Word Problems (MWP)

Question No.	Interpretation of Instruction		Ability to simplify and solve correctly	
	Frequency	%	Frequency	%
01	185	46.25	183	45.75
02	226	56.50	225	56.25
03	188	47.00	188	47.00
04	125	31.25	125	31.25
05	252	63.00	250	62.50
06	230	57.50	229	57.25
07	212	53.00	212	53.00
08	68	17.00	66	16.50
09	71	17.75	70	17.50
10	150	37.50	150	37.50
	$\frac{1707}{4000}$	$\cong$ 42.7%	$\frac{1698}{4000}$	42.5%

Results revealed that 42.7% of the students were able to interprete correctly while 42.5% were able to simplify and solve correctly. It could also be seen that the abilities to interprete and simplify are closely related, as 42.5% is close to 42.7%. However, the overall results showed that the performance in interpretation was very poor, as it was below the average.

Research Question 2: What is the profile of the students' performance in Mathematics Non-word Problems (MNWP)

Table 2: The profile of students' performance in Mathematics Non-word Problems (MNWP)

Question No.	Interpretation of Instruction		Ability to simplify and solve correctly	
	Frequency	%	Frequency	%
01	266	66.50	266	66.50
02	273	68.25	273	68.25
03	224	56.00	222	55.50
04	289	72.25	285	71.25
05	282	70.50	281	70.25
06	302	75.50	302	75.50
07	288	72.00	288	72.00
08	292	73.00	290	72.50
09	308	77.00	305	76.25
10	278	69.50	273	68.25
	2802	70.05	2785	69.63

The results in Table 2 showed that the students performed much better in non-word problem as it revealed that 70% were able to interprete the instruction from the already given mathematical statements. It is also obvious here that students find it easier to solve non-word problem more than word problem.

Research Question 3: To what extent does the knowledge of English Language explain the performance of the students in mathematics word problem?

Results from the analyses showed that 95.7% of the students agreed that they needed the knowledge of English Language to guide them in interpreting word problems and translate into mathematical statements, from where they can easily

solve correctly 94.2% of the students were of the opinion that their mathematics teachers should also be endowed with the knowledge of English because it has to do with mathematics teaching and learning.

Discussion

The performance of the students in both word and non-word problem was displayed in Tables 1 and 2. It was obvious that the students performed better in the non-word problem than the word problem. The students' questionnaire's results revealed that students who lack knowledge of English Language, will not be able to interprete well the language of instruction and therefore will lack the skill to translate.

95.7% of the students agreed on the need for mathematics teachers who are well versed in English to be handling mathematics as this will help them to be thoroughly guided the more in the area of interpreting the language and the demands of the instruction correctly, since it was obvious that English Language is relevant and significant in interpreting mathematics word problem correctly.

Conclusion

Mathematics is an interesting subject if properly handled, taught, expressed and explained. It is expected of every student to attain mastery level of at least 95% all things being equal. Every student was born to learn and attain. Therefore, the onus is on teachers, educational administrators and policy makers to uphold, sustain and guide these students so as to ensure improved students' academic achievements in mathematics with the help of English Language.

Recommendations

Based on the findings of this study, the following recommendations are made:

* English and Mathematics teachers are advised to make efforts to participate in the WAEC coordination exercises for the purpose of enhancing their teaching skills.

* The mathematics curricula as from elementary schools and junior secondary schools must be enriched to include problem solving, introduction to Algebra and sorts.

* Mathematics teachers should discount the practice whereby students give answers to mathematical questions without explaining the logic behind it. Also, mathematics teachers must provide justifications for any algorithms they teach their students. Simple justifications in words, diagrams, pictures or drawings would serve this purpose.

* In order for mathematics word problems and English to make sense to students, Mathematics and English teachers should do culturally responsive teaching. Home and in-class assignments will certainly help. Also mathematics teachers should be sound in the knowledge of English which will be as a guide to further explanations.

* There should be enough provision of textbooks of various types for the students, and the textbooks should be self-explanatory.

* Schools should set up series of clubs on Mathematics and English which will dispel Mathematics and English phobia in students.

* Mathematics teachers should be ready to encourage students by all means to build up their interest in mathematics as well as in English comprehension.

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