

## STUDENTS' MATHEMATICS AND ENGLISH LANGUAGE MOCK EXAMINATION AS PREDICTORS TO SCHOOL CERTIFICATE PERFORMANCE IN PHYSICS.

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**ABSTRACT:** *This study was an ex-post-facto survey, which investigated students' mathematics and English language (mock) achievement as predictors to school certificate performance in Physics, using two hundred and fifty (250) students randomly selected from public secondary schools in Rivers State. The data was analyzed using the Pearson Product Moment Correlation Coefficient and t-test inferential statistics. In order to predict the performance of students on physics based on their performances in Mock examinations on mathematics and English language, the multiple regression analysis ( $R^2$ ) was used. Results showed that there was a significant relationship between the performance of students in English language Mock examination and their performance in physics. There was also a significant relationship between students' performance in mathematics mock examination and their performance in physics (SSCE). Although there exist positive dependence of performance of physics (SSCE) on their collective performances in. mock examinations on mathematics and English language, the predictor variable  $Y^1=38.79 E_M+0.17M_m$  where the partial multiple regression coefficients are 38.79 and 0.17 respectively. Based on these findings, it was recommended that learners of physics should be involved in acquisition of knowledge in mathematics and English language, if their performance in physics should improve.*

**KEYWORDS:** Students' Mathematics, English Language, Mock Examination, School Certificate, Performance, Physics

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### INTRODUCTION

In Nigeria, mock examinations are administered to final year (SSS3) students who are preparing for examinations such as the West African School Certificate examination in order to probe students' level of cognition of concepts taught in all subjects as well as create a balance psychologically for the task ahead. Although this examination is not as compulsory as the certificate examination, teachers and students welcome the idea as a pre evaluation of the level of intelligence, preparedness and extent of work covered by the teacher. Many students are handicapped in their performance in many school subjects because their knowledge of English language is greatly inadequate (Jekanyinfa, 2010).

Olagbaju & Akinsowon (2014) noted that English language has been able to; accommodate scientific terms that are of Latin and Greek origin in addition to other words so as to meet the demand of use of scientific terminology. The National Policy on Education FRN (2004) stipulates that the mother tongue of the child should be initially used in the early years of his primary education and subsequently English language should be used as a medium of instruction. This is probably based on the assumption that a child at nine years of age and above

should have acquired enough competence and mastery of the English language, as well as the native language or vernacular. The child will be faced apparently with the mastery of dual language (English and vernacular), but within few years in the secondary school, which, of course, is the formative years of the child's literacy in science. It is expected that the child could read, write, interpret, analyse, explain, predict and comprehend materials in English Language.

Recently, the nature of the English language problems suffered by most students are at variance with one another and generally poor. According to the WAEC Chief examiners' report (2005)

*The common weaknesses noticed in the candidates' scripts were misinterpretation of the questions, inability to express themselves in good language... remedies which include the understanding of the question before attempting, as well as avoiding single word answers where explanation is required. He further explained that in English language in particular, students had difficulties in expression of ideas correctly, inability to punctuate correctly, incorrect grammar, limited range of vocabulary and grammatical errors.*

In Nigeria, students find it difficult to understand instruction accompanying test, hence most students fail in school certificate subjects, for lack of proficiency in English language.

It may be as a result of the persistence of difficulties faced by student in use of English language that the reform of the language of instruction for national development attained popular use over the decades. As a language of instruction, students are required to improve on their performance. Teachers of English language should also employ teaching strategies to obviate the difficulties faced by these students in communicating English language, for example, in verbal and non-verbal communication cues, the understanding language of instruction is predominant – the tool with which the concepts are communicated, hence, students who show proficiency in English language and mathematics may be active learners of the subject.

Physics is the closest subject to mathematics and only the mathematical mind can take up the study of physics with confidence in higher learning. Mathematics gives a final shape to the rules of physics and presents them in a workable form (Sidhu,2006). Physics cannot do without mathematics, since the interpretation of physical phenomena can better be appreciated when quantified and interpreted by use of numbers (Adesoji,2008). Unfortunately, there are increasing learning difficulties, poor performances and students' general lack of interest in mathematics. Although the difficulty the students face in conceptual understanding of physics is related to use of language, poor problems solving skill, and lack of adequate mathematics knowledge, also account for their poor performance.

In the teaching of physics, concepts are easily represented in figures (numerical values) that can be manipulated with ease when there is a sound mathematical knowledge. Common use of transposition of formulae, arithmetic processes, squares, square root, division, multiplication, and graphical representation, calculation of slopes or tangents and area under curves are mathematical methods encountered in basic physics. Very recently, the WAEC Chief examiners' report (2005) on practical physics stated categorically that students were unable to plot acceptable graphs using fractions, decimal values and handling arithmetic processes, correctly. A good student of physics should therefore have conceptual understanding (analytical knowledge) of the subject and handle numerical problems using mathematical knowledge.

The comprehension of demands of questions and instruction require understanding of English language. However, it is the intent of this study to find out if the ability of students in physics can be predicted from their performances in English language and mathematics mock examination.

### **Purpose of the Study**

The study is to find out whether one could predict performances of students in physics from their performance in mock examinations on English language and mathematics. Specifically, the objectives are to

- i. Evaluate the general performances of students in physics, English language and mathematics.
- ii. Determine the performance of students in physics based on the performance in English language.
- iii. Determine which of English language and mathematics that relates to students performance in physics.

### **Research Questions**

The following research questions were stated in order to achieve the objectives of study.

- i. What relationship exists between the performance of students in English language and physics?
- ii. What relationship exists between the performance of students in mathematics and physics?
- iii. Which of the independent variables mathematics and English language that positively relates with the performance of students in physics.

### **Hypothesis**

The following null hypothesis was formulated.

HO<sub>1</sub>: There is no significant joint effect of students collective performance' in mathematics and English language (Mock) on their performance on physics (SSCE).

### **Research Design**

The study was a survey research design and the ex-post facto research, because the data were collated from the existing school records for year 2010, to correlate students' performance records in Mock examinations in English language and mathematics and SSCE physics.

### **Population of the Study**

The population of the study consisted of the about six hundred students (600) who sat for the senior school certificate and offered [physics, English language and mathematics in 2010 May/June WAEC examination in fourteen (14) public secondary schools in Obio/Akpor Local Government Area of Rivers State.

## Sample and Sampling Technique

The sample is made of two hundred and fifty students (250) who were randomly selected from four (4) secondary schools in Obio/Akpor Local Government Area of Rivers State. The criterion of selection is that the students must have written the Mock examinations in Certificate Examination (WASSCE).

## Data Collection

The researcher obtained the results of students in the sampled schools who sat for the Senior school Certificate Examination (SSCE) in 2010 as well as their Mock examination results, for the same year, through the assistance of the principals of the affected schools. A checklist, was designed for the purpose of collating data from the sampling of the research area these are the performance scores of students of physics standardized test (WAEC,2010) of the West African Examination Council (WAEC) and students performance on the teacher-made-test (mock examination) on English language and mathematics.

## Analysis of Data

In order to predict the relationship between the dependent variable (physics performance) and the independent variable (Mock Students performances on English language and Mathematics), the multiple regression analysis was used.

The effect of mathematics on student's performances in SSCE Physics and the effect of English language on student's performances in SSCE physics was analyzed using the Pearsons Product Moment Correlation Coefficient Statistic. The prediction of variables which have effective influence on the student's performance (behaviour) was determined using Analysis of variance (ANOVA) and multiple regression coefficients (R<sup>2</sup>), comparatively.

## Presentation of Results

### Research Question 1

What relationship existed between the performance of students in English language and physics?

**Table 2.5.1: Mean performance scores of students in Research area in Mock Examinations English language and SSCE Physics.**

S/N	Em	Pw	R	Em (mean)	Pw (mean)
i.	40.79	40.91			
ii.	43.84	33.61			
iii.	60.54	46.64	0.16	44.87	36.81
iv.	54.3	26.06			

v                      43.84                      33.61

$P \leq 0.05$      $Df = 2$

The table 2.51 above indicates that there is a positive relationship between, the performance of students in English language (mock) and their performance in physics SSCE. Although the average performance in mock examination in English language is 44.87 (pass mark) while that of physics WEAC is 36.81 (below pass mark). The degree of relationship is positive and about 16%.

### Research Question II

What relationship existed between the performance of students on (mock) mathematics and their performance in SSCE physics?

**Table 2.5.2: effect of mathematics (mock) on students performance in SSCE physics.**

S/N	mm	pw	R	Mm (mean)	Pw (mean)
I	40.4	40.91			
Ii	35.35	33.61			
Ii	58.50	46.64	0.78	40.63	36.81
Iv	54.47	26.07			
i	35.35	33.61			

$P < 0.05$   $DF = 2$

Similarly, table 2.5.2 above indicates that there is a positive relationship of dependence existing between the performance of students in physics (SSCE) and their performances in mathematics. Student performed poorly in the mock examination on mathematics (average mark of 38.49). The index of relationship is high, about 78%.

### Research Question III

Which of the independent variables of mathematics and English language (mock) that positively related to students performance in physics SSCE?

**Table 4.3: Effect of mathematics and English language (Dependent Variables) on performance of students on physics SSCE.**

Variables	r-value	t-value	Mean score	t-critical
Mathematics	0.78	5.51	38.49	
English language	0.16	1.13	44.87	0.09

At 0.05 significant level and degree of freedom = 2, the variables, mathematics and English language are significant and hence affects the performances of students in SSCE physics ( $t_m > 0.09$ ;  $t_E > 0.09$ ).

r-values are 0.78 and 0.16. For mathematics and English language respectively. Showing high relationship of physics with Mathematics productively but low relationship with English language.

### Test of Hypothesis (H0<sub>1</sub>)

There is no significant joint effect of students' collective performances in English language and mathematics (Mock) on their performance in physics (SSCE).

**Table 2.6.1: Multiple correlates of English language and mathematics (independent variables) and performance in SSCE physics (dependent variable).**

Variables	Paris of r	R	R <sup>2</sup>	F	df	A	F <sub>critical</sub>	Decision
English language and	R <sub>12</sub>	0.33						Reject
Mathematics	r <sub>13</sub>	10.16	0.37	0.14	20.11	(2,247)	3.04	H <sub>01</sub>
Physics	R <sub>123</sub>	0.37						

Since  $F_{cal} > F_{critical}$  (20.11 > 3.04) Hence the null hypothesis is rejected.

There is a significant joint effect of student's performance in English language and mathematics on their performance in physics SSCE.

However, for the purpose of prediction, only 14% ( $R^2 = 0.14$ ) of the independent variables (scores of mathematics and English language Mock) accounted for the performance of students in physics SSCE. That means that 86 ( $1 - R^2$ ) of the performance scores accounted for their physics content knowledge.

In order to predict the physics SSCE performance scores accounted for their physical content knowledge.

In order to predict the physical SSCE performance of students based on their performance in Mock English language mathematics, Multiple Regression ( $R^2$ ) was used.

The Regression Equation is stated as

$$Y^1 = a E_m + b M_m \dots\dots\dots (1)$$

Where a and b are the regression coefficients, Y the predicted performance in physics SSC.

$E_m$  = English language Mock Scores

$M_m$  = Mathematics, Mock scores

The regression coefficients a and b are determined as 38.79 respectively using the method of determination of partial regression coefficients

$$a_1 = y - \bar{y}(x_1) \text{ and } b = r \left( \frac{dy}{dx} \right)$$

$a_2 = y - \bar{y}(x_2)$  and  $b = r \left( \frac{dy}{dx} \right)$  where  $a_y$ ,  $a_{X1}$ ,  $a_{X2}$  are deviations of physics performance in SSCE score Mathematics, English language (Mock)

The regression equation in recognition of the contribution of both independent variables and determine a coefficient is written as:

$$Y^1 = 38.79 E_m + 0.17 M_m$$

Where  $Y^1$  is the predicted SSCE physics score

$E_m$  = English language Mock score

$M_m$  = Mathematics Mock score

38.79 and 0.17, are the partial multiple regression coefficients.

## DISCUSSION

The findings of this study indicated that the results of students in physics SSCE can be predicted based on their performance in Mock examination on mathematics and English language. One of the advantages of indigenization of language of instruction especially in the teaching of science is to reduce the difficulties students face in translating language of science in teaching and learning.

Jekayinfa (2010) asserted that many students are greatly handicapped in their performance in many school subjects because their knowledge of English language is greatly inadequate.

In view of the importance of English language as a means of instruction, science teachers and in fact physics learners in particular should show interest in the learning of English Language. This finding in relation to the importance of English language as affecting student's performance in science contradicts the assertion as a result of findings. Undue emphasis be laid on English for students opting for course in the area of science and applied science. Comprehension of scientific processes, laws and principles can be communicated with clarity in English especially to the Nigeria students whose medium of instruction is in English language.

Similarly, the relationship between mathematics and physics is re-established in this study. Mathematics is an essential ingredient for physics teachers. And physics teachers also need to be very conversant with the mathematical aspects of physics and teaching of mathematics in schools a sine-qua-non for proper physics technological studies. A well groomed child in the science (physics) should therefore take learning of English language and mathematics seriously to avert failure in the subject area, and lack of understanding of the physical concepts in general.

## SUMMARY OF FINDINGS

The findings of the study are:



- i. There is a significant relationship between the performance of student in physics (SSCE) and their performances in Mock Examination on Mathematics ( $r=0.78$ )
- ii. There exists a significant relationship between students' performance of student in English language (Mock) and their performance in physics SSCE ( $r=0.16$ ).
- iii. There exists a positive dependence of performances of student in physics (SSCE) on their joint performance in examination on the (English language and mathematics)
- iv. The predictor Y is related with performances of student in English and mathematics Mock examinations in a relationship show by equation  $Y_1 = 38.79 E_m + 0.17 M_m$  where, the partial multiple regression coefficients  $a_1$  and  $a_2$  are 38.79 and 0.17 respectively.

## CONCLUSION

Based on these research findings, the performance of physics students in the research area depended on their performance in mock examinations of mathematics and English language.

## RECOMMENDATIONS

The following recommendations are made based on the findings of this work.

- i. Learners of physics should be involved in acquisition of knowledge in mathematics and English Language if their performances in physics should improve.
- ii. Teaching of English language in secondary schools involves both science and Arts students. This practice, based on policy should be encouraged to enable the science students inculcate more knowledge of the subject area since it is very relevant in the learning of science.

## REFERENCES

- Adesoji, F.A (2008). English language and mathematics mock results as predictor of performance in SSCE physics. *Journal of social science* vol. 17 (2) 159-161.
- Federal Republic of Nigeria (FRN, 2004). National policy on education (4th Edition) Lagos: Nigerian Educational Research and Development Council (NERDC) Press.
- Jekayinfa, A.A. (2010). Competence in the language of instruction as a predictor of performance in secondary school history, *NIJEF* 4 (1).
- Olegbaju, O.O. & Akinsowon, F.I. (2014). The use of Nigeria languages in federal education: challenges and solutions. *Journal of Education and Practice*, 5 (9,) 123-127.
- Sidhu, K.S. (2006). The teaching of mathematics. India: Stirling publishers private Ltd.
- West African Examination Council (2005). Chief Examiners' Report, Nigeria.
- West African Examination Council (2010). Chief Examiners' Report, Nigeria.



