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# A Correlational Analysis of Students' Achievement in Waec and Neco Mathematics

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**Abstract:** This study presents the findings of the relationship between students' achievement in mathematics conducted by the West African Examination Council (WAEC) and the National Examination Council (NECO) in four selected secondary schools in Ifedayo Local Government Area, Osun State, Nigeria.The analysis showed that there is significant positive relationship between mathematics in all the selected schools contrary to the hypothesis that says there is no relationship in WAEC and NECO mathematics results in the schools.

It is therefore recommended that students should develop more interest in sitting for either of the two examinations since they produce equivalent results.

**Keywords:** WAEC, NECO, Correlation Coefficient, Mathematics results, Performance

## 1. Introduction

Every culture on earth has developed some mathematics. In some cases, this mathematics has spread from one culture to another. There is now a predominant international mathematics, and this mathematics has quite a history. It has its roots in ancient Egypt and Babylonia, and then grew rapidly in ancient Greece. Mathematics written in ancient Greek was translated into Arabic. About the same time, some mathematics of India was translated into Arabic. Later on, mathematics was translated into Latin and became the mathematics of Western Europe. Over a period of several hundreds of years, it became mathematics of the world (Joyce, 1998).

This study presents the findings of a study of the relationship between students' achievement in mathematics conducted by the West Africa Examination Council (WAEC) and the one by the National Examination council (NECO), in selected secondary schools in Ifedayo Local Government Area of Osun State. It is a fundamental statement nowadays that we are in the age of science and technology and Nigeria has also imbibed the idea. The school curricula thus lay emphasis on science subjects of which mathematics takes a higher rank. Hence, it is one of the core subjects in both primary and secondary schools in the nation. (Amini, 1997)

The West African Examination Council (WAEC) for a number of decades has been the only

examination body in this country especially for ordinary level examinations. A lot of concerns have been expressed by large number of concerned citizens on students' failure especially in mathematics and English language.

In the year 2000, the Federal Government of Nigeria came up with another examination board referred to as "National Examination Council" (NECO). Is this new body efficient in its work? What about students' performance if compared with that of WAEC? Is there any relationship between WASSCE mathematics results and NECO mathematics results? These are some of the questions that shall be answered during the course of this research.

Recently, there has been a lot of mounting public criticism on the fallen standard of education in the media and public places even though there has not been available or little data to back up this statement.

There has also been criticism against NECO. Some even say their questions are tough than those of WAEC.

Some universities who once rejected NECO results now accept it. Many private owned secondary schools now register their students for NECO. One of the reasons could be that WAEC and NECO have the same syllabus and each of them has a regulatory body. So, their results should be equivalent.

Investigation had shown that students in secondary schools are not very much interested in sciences even though they are aware of the benefits therein. This is due to academic difficulty, using choice of subject and course, poor standard in mathematics and English Language Others are lack of textbooks and insufficient home support (Ajeyalemi, 1987).

The importance of mathematics in studying science has long been recognized world-wide. Now that there are two major examination bodies, is there any relationship between students achievement in both examinations with respect to mathematics? If there is, how strong or weak is it?

The suggestions and recommendations in this study will go a long way in determining which examination body should be preferred by the schools or students based on the results of the analysis.

## 2. The Nature and Scope of Mathematics in the School Curriculum

Mathematics is not entirely abstract but has practical aspects. It touches all aspects of life. According to Greek philosophers, the whole life is synonymous to mathematics. The Greek believes that everything can be mathematics.

On the other hand, according to Lawton(1983), curriculum has to do with a whole range of matters and tasks relating to contents, experiences and the implementation of the plans into practice by the class-room teachers.

For all secondary school students in Nigeria, it is compulsory to offer mathematics. This is in line with the National Policy on Education (FRN, 1981) which emphasizes mathematics as a "vehicle" of science and technology. The National Educational Research and Development Council (NERDC) which was established late 1964 organized series of seminars and workshops between 1973 and 1975 on how to plan a curriculum and produce syllabi textbooks and other instructional materials for all levels of education. This was in anticipation of the proposed new policy on education.

In his work, Fakuade (1976) declared that it is a fact that excellence in the knowledge and use of mathematics is an essential factor in the development programme of any nation that wants to have respectable status among other nations of the world.

Due to Technological awareness and the need to teach Science and Mathematics for meeting societal needs and aspirations, quite a number of science curriculum projects were prepared for primary and secondary schools and are constantly reviewed.

Notably among these include: African Primary Science Programme (APSP) which was later known as Science Education programme for Africa (SEPA), Midwest Bendel Primary School Science and Nigerian Integrated Science Project (NISP) and so on.

Abdullahi (1982) pointed out that Mathematics like an octopus has its numerous tentacles in all branches of knowledge. In the same vein, Dada (1996) reiterated the fact that teaching of mathematics in secondary education after independence did not in any significant way different from what it used to be before the independence. It was such lives and cries that forced the government to organize a national conference on curriculum development in Lagos between September 8-12, 1969. The conference on curriculum was sponsored by the Nigerian Educational Research Development Council (NERDC) and was saddled with the onerous responsibility of reviewing the nation's educational system with particular emphasis on the objectives of education and the content of the curriculum in the light of the peoples' needs; both as individuals and as a nation (Dada, 1996).

The Sogbetun Commission of enquiry recommended the setting up of NECO, along with Angulu led Commission in 1989 when Professor Bab Fafunwa became Minister of Education (FRN, 1989).

The following are some of the roles of WAEC and NECO:

i. Conduct examination and award certificates.
ii. Set questions and conduct examinations to cover such areas as practical, oral and Essay.
iii. Set a common standard through their syllabi and draw a uniform time table for conduct of examinations.
iv. Provide data or feedback on students' performance to schools, thus helping to fast- track improvement in teaching and learning in schools. (Ibrahim 2003)

Adeogun(1991) showed the relationship between students' performance in chemistry and mathematics in some selected secondary schools in Ilorin Local Government Area of Kwara State. Twelve (12) schools were selected by stratified random sampling technique.

Twenty (20) students from each of the selected secondary schools were chosen by systematic random sampling techniques.

Among the findings by the researcher are:

i. There is a positive and high correlation between students' performance in chemistry and mathematics.
ii. Boys performance in chemistry and mathematics is not better than the girls

iii. The locations of the schools (urban or rural) had influence on students' performance in chemistry and mathematics (Adeogun, 1991)

A lot of concern has been expressed by a large number of concerned citizens on students' attitudes to sciences. Their verdict was that there was low enrolment of students in science. (Aminu, 1987).

The importance of students' performance in science and mathematics could not be viewed slightly at it helps in pursuit of academic and industrial revolution.

The importance of mathematics in studying and understanding sciences has long been recognized worldwide (Ale 1981, Osibodu 1981).

Aliyu (1983), in his research study, concluded that chemistry topics which require mathematics for proper understanding are difficult areas for Nigeria High School students in terms of comprehension. He therefore concluded again that there is a relationship between mathematics and chemistry empirically. Students who find mathematics easy to understand tend to turn towards chemistry and those who find mathematics difficult choose against chemistry.

Continuous assessment is the mechanism whereby this final grading of a student in cognitive affective and psychomotor domains of behaviour takes into account a systematic way of all his performance during a given period of schooling (FRN, 1981)

Adeyemo (1991) has his primary objective highlighting the relationship between continuous Assessment and Junior school Certificate Examination scores in mathematics.

Terminal assessments are those administered on learners after a series of lessons, usually covering many different concepts or topics that have been taught (Ayodele, 1985).

He highlighted further that such assessments usually come at the end of the term, session or the middle of the session. Ayodele (1985) also said something about periodic assessments. These are more frequent especially with mathematics teachers, usually in form of quizzes, mental sums, and short tests.

Spencer (1961) was of the opinion that mathematical experience could be interesting and fruitful in developing individual abilities to understand social institution and in equipping one to meet more effectively problems which occur in his personal life.

Another study by Ogunleye (1991) was carried out in sampled secondary schools in Ikole Local Government Area of Ekiti State, Nigeria. The study examined the relationship between students' attitude toward mathematics and their performance in it. Some hypotheses were formulated and tested statistically.

Within the limitation of the study, mathematics attitudes are conclusively related to achievement in mathematics. The study revealed that mathematics is seen as more useful to males than females. This fact is documented by Sherman and Fennema (1972).

An investigation revealed significant correlation between attitudes and mathematical achievement (Jackson,1988). Since his review concentrated on measured attitude towards mathematics, one may then conclude that attitude towards specific subjects are more related to school achievement than a general attitude towards the school.

As regards sex factor in attitude and performance of students in mathematics, it was discovered that when males and females performance were compared for the analysis, there existed a sex factor in the

students' performance in mathematics. (Ogunleye, 1991).

Aiken and Danger (1961) discussed the effect of sex differences on performance of students. Aiken said: "I have consistently found a significantly more positive mean attitude towards mathematics in males". This statement implies that there are differences in attitude of males and females towards mathematics.

In his work, James (1992) tested for the relationship between mathematics and physics. Five questions were drawn from each topic which were given to the students to solve in five different schools. The solutions were collected and analyzed to bring out the various concepts that are involved. With this, relevant mathematical concepts for understanding physics were however identified. Adekanni, O. (1989) declared that without mathematics there is no physics.

Arinola(1996) examined the correlation between the performance in MOCK- SSCE and SSCE examinations in mathematics from 1990 to 1994 at Ajibade Grammar School, Ibadan.

The correlation analysis was employed to determine the relationship that exists between the MOCK and SSCE examination. That is to examine the contribution of the mock examination on the final SSCE examination. The findings showed that the MOCK- SSCE and SSCE results were closely related for the period of study (1990 to 1994). These results however, showed that there is less relationship between the two sets of grades for MOCK- SSCE and SSCE. Thus, the insignificant correlation obtained shows that both results were generally poor.

The implication of the close relationship of MOCK-SSCE and SSCE results are as follows:

i. That, students who passed mathematics in the MOCK- SSCE have very low probability of failing mathematics in the SSCE result.
ii. That, students who failed mathematics in the MOCK-SSCE have very low probability of passing mathematics in the SSCE. (Arinola, 1996)

The relevance of mathematics to the physical sciences was emphasized by Owa (1988) in his work on "Games in mathematics education" when he pointed out that, mathematics is a must on the school curriculum right from the primary school to the senior secondary school since it is the basis of understanding science.

It is a known fact that one cannot understand concepts and phenomena in physics or chemistry without a set of high powered mathematics tools. This was carried out and clarified further by Adeoye (1991) when he pointed out that mathematical knowledge and skills are prerequisites for successful learning of Physics.

Ninan (1970) in his study involving 76 undergraduates of liberal Arts at Hinter college of city University of New York, found that the students of the experimental group, that is those whose basic curriculum had been supplemented by mathematical models texts, performed significantly better in the physics test than the control group who has studied only the basic curriculum. He then advised that students of science should learn the mathematical concepts and skills which are applicable in science because their attainment of scientific progress depends much on their mathematical competence.

Adeniran (1990) looked at various factors responsible for poor performance of students in mathematics and ways of minimizing the problems. A total of five secondary schools from which 200

students and 40 mathematics teachers were drawn participated in the study. One cognitive measuring instrument (mathematics achievement test) and two non-cognitive (The teachers' questionnaires and students questionnaires) were used for data collection.

The results showed that a good percentage of sample of students drawn have a negative attitude towards mathematics. There was a significant relationship between students' attitudes towards mathematics and their performance in it. Results also showed that boys performed significantly better than their girls' counterpart. Several other intervening factors were suspected to be responsible for the poor students' achievement in mathematics and suggestions were made for further in depth research into effect of such factors.

## 3. *Materials and Methodology*

The data for the study were collected from four selected secondary schools in Ifedayo Local Government Area of Osun State, Nigeria using Simple Random Sampling. The Scope of data spans through the period 2000-2004.

The correlation coefficients ( r) of the relationship between students' performance in WAEC mathematics and NECO mathematics in various school were calculated

The computational formula for correlation coefficient, r, as defined or deduced by Karl Pearson is

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y^2)]}}$$

where

N = Number of pairs

$X_i$ = Marks in WAEC mathematics

$Y_i$ = Marks in NECO mathematics.

The method of analysis is chosen because the Pearson Product Moment Coefficient is sufficient to provide the direction and magnitude of the relationship between the two variables (WAEC Mathematics and NECO mathematics) for this study.

### 3.1 Testing the Significance of Correlation Coefficient

In order to test whether there is significant correlation between WAEC and NECO mathematics results in all the schools, t-test was used:

$$t = r\sqrt{\frac{N-2}{1-r^2}}$$

The level of significance was set as 0.05 significant level (or 95% confidence level) with degree of freedom = N- 2 and N is the number of students.

The null and alternative hypotheses are given as:

$H_0$: There is no significant relationship between WAEC and NECO mathematics results.
$H_1$: There is significant relationship between WAEC and NECO mathematics results.
The decision rule is: reject $H_0$ if $t_{calculated} > t_{critical}$ at 0.05 level of significance

### 3.2 Assumptions:

The following assumptions were made on the students in each of the schools selected:

(i) All the students used the same textbooks;
(ii) The students used the same syllabus in mathematics;
(iii) The students were subjected to the same environmental and social conditions;
(iv) The students have the same educational background.

All the grades scored were converted to marks for easy computation of the correlation coefficient (see appendix for conversion table).

## 4. Empirical Analysis, Results and Findings

The summary is stated below:

**Table 1: Relationship between Students' Achievement in WAEC and NECO Mathematics in School A for the Period 2000 - 2004.**

| School A | Correlation Coefficient (r) |
|---|---|
| Year 2000 | 0.56 |
| Year 2001 | -0.14 |
| Year 2002 | 0.54 |
| Year 2003 | 0.39 |
| Year 2004 | 0.04 |

Table 1 shows both an average positive (r = 0.56) for year 2000 and low relationship (r = 0.04) for year 2004 between students' achievement in WAEC and NECO mathematics.

**Table 2: Relationship between Students' Achievement in WAEC and NECO Mathematics in School B for the Period 2000 - 2004.**

| School A | Correlation Coefficient (r) |
|---|---|
| Year 2000 | 0.69 |
| Year 2001 | 0.13 |
| Year 2002 | 0.11 |
| Year 2003 | -0.27 |
| Year 2004 | 0.70 |

Table 2 shows a high positive value of r = 0.70 for the year 2004, lowest value of r = 0.11 for the year 2002 and negative relationship of r = -0.27 for the year 2003 between students' achievement in WAEC mathematics and NECO mathematics.

**Table 3: Relationship between Students' Achievement in WAEC and NECO Mathematics in School C for the Period 2000 - 2004.**

| School A | Correction Coefficient (r) |
|---|---|
| Year 2000 | 0.62 |
| Year 2001 | 0.11 |
| Year 2002 | -0.04 |
| Year 2003 | 0.40 |
| Year 2004 | 0.73 |

The table shows a high positive value of r = 0.73 for the year 2004 lowest value of r = 0.11 for the year 2001 and an inverse (negative) relationship of r = 0.04 for the year 2002 between students' achievement in WAEC mathematics and NECO mathematics.

**Table 4: Relationship between Students' Achievement in WAEC and NECO Mathematics in School D for the Period 2000 - 2004**

| School D | Correlation Coefficient (r) |
|---|---|
| Year 2000 | 0.30 |
| Year 2001 | 0.56 |
| Year 2002 | -0.16 |
| Year 2003 | 0.65 |
| Year 2004 | 0.62 |

Table 4 shows a high positive value of r = 0.65 for the year 2003, lowest value of r = 0.30 for the year 2000 and an inverse (negative) relationship of r = -0.16 for the year 2002 between students' achievement in WAEC mathematics and NECO mathematics.

**Table 5: Summary of Testing for the Significance of Correlation Coefficient**

School A

| Year | *r* | t-calculated | t-table | Remark |
|---|---|---|---|---|
| 2000 | 0.56 | 3.577 | 2.048 | Significant |
| 2001 | -0.14 | -0.748 | 2.048 | Insignificant |
| 2002 | 0.54 | 3.390 | 2.048 | Significant |
| 2003 | 0.39 | 2.450 | 2.048 | Significant |
| 2004 | 0.04 | 0.212 | 0.048 | Insignificant |

School B

| Year | *r* | t-calculated | t-table | Remark |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 2000 | 0.69 | 5.065 | 2.048 | Significant |
| 2001 | 0.13 | 0.747 | 2.048 | Insignificant |
| 2002 | 0.11 | 0.632 | 2.048 | Insignificant |
| 2003 | -0.27 | -1.484 | 2.048 | Insignificant |
| 2004 | 0.70 | 5.187 | 0.048 | Significant |

School C

| Year | *r* | t-calculated | t-table | Remark |
|---|---|---|---|---|
| 2000 | 0.62 | 4.181 | 2.048 | Significant |
| 2001 | 0.11 | 0.586 | 2.048 | Insignificant |
| 2002 | -0.04 | -0.212 | 2.048 | Insignificant |
| 2003 | 0.40 | 2.309 | 2.048 | Significant |
| 2004 | 0.73 | 5.652 | 0.048 | Significant |

School D

| Year | *r* | t-calculated | t-table | Remark |
|---|---|---|---|---|
| 2000 | 0.30 | 1.664 | 2.048 | Insignificant |
| 2001 | 0.56 | 3.577 | 2.048 | Significant |
| 2002 | -0.16 | -0.858 | 2.048 | Insignificant |
| 2003 | 0.65 | 4.526 | 2.048 | Significant |
| 2004 | 0.62 | 4.181 | 0.048 | Significant |

## 4.1 Summary of Major Findings and Discussions

The following major findings were made by the researchers in this study:

(1) There was significant positive relationship between students' achievement in WAEC and NECO mathematics in school A for the year 2000, 2002 and 2004.

(2) There was significant positive relationship between students' achievement in WAEC and NECO mathematics in school B for the year 2000 and 2004

(3) There was significant positive relationship between students' achievement in WAE and NECO mathematics in school C for the years 2000, 2003 and 2004.

(4) There was significant positive relationship between students' achievement in WAEC and NECO mathematics in school D for the years 2001, 2003 and 2004

Within the limitation of this study, it has been revealed that there is positive relationship between WAEC and NECO mathematics results. The findings of the study revealed that a student who had credit in WAEC mathematics would have at least a credit or pass in NECO mathematics.

Majority of the Students who had credit and above in NECO mathematics obtained at least passes in WAEC mathematics and those who failed in NECO mathematics also failed in WAEC mathematics.

The correlation coefficients calculated for each of the schools studied indicated that there was a positive relationship between students' achievement in NECO mathematics and WAEC mathematics in four out of five years data used for the study.

In this study, the research hypothesis that there is no significant relationship between WAEC and NECO mathematics results in all the schools was found invalid.

High marks in WAEC mathematics implied high marks in NECO mathematics and low marks in WAEC mathematics implied low marks in NECO mathematics as illustrated in school A for the year 2002 and so on.

The findings of the study also revealed that students' achievement in WAEC mathematics and NECO mathematics were not affected by the year of the examination or by the location of the school.

The least correlation coefficient ($r = 0.04$) calculated for this study was from school A. However, a unique case occurred at school C which has a high positive correlation coefficient r calculated (i.e. $r = 0.73$), meaning that students achievements here were closely related in both WAEC and NECO for year 2004.

The researchers have no available data to explain why there was a high positive correlation coefficient in WAEC mathematics and NECO mathematics in one school than other schools in the Local Government.

Adeogun (1991), determined if students' performance in mathematics will enhance their performance in chemistry. He limited his research on WAEC result of 1988 only to find their relationship. Other types of relationship were determined by Ogunleye (1991), Arinnola (1996), Olatunji (1992), Oyeyemi (1988) and James (1992) but none of them worked on relationship between WAEC and NECO mathematics results.

## 5. Conclusion, Recommendations and Suggestions

### 5.1 Conclusion

Life, according to Butter (1962) is the art of drawing sufficient conclusion from insufficient premises. Emanating from the discussion above, the following conclusions are drawn out:

(a) There was significant positive relationship between students' achievement in WAEC and NECO mathematics is school A for the years 2000, 2002 and 2004.

(b) There was significant positive relationship between students' achievement in WAEC and NECO mathematics in school B for the years 2000 and 2004.

There was significant positive relationship between students' achievement in WAEC and NECO mathematics in school C and D for the years 2000, 2003 and 2004.

Since it has been found that there is positive relationship between students achievement in most of the schools in the two examination bodies, the hypothesis that there is no significant correlation between

WAEC and NECO mathematics results in all the schools was rejected.

**5.2 Recommendations**

The following recommendations are made in an attempt to improve students' achievement in both WAEC and NECO mathematics:

i. Students should develop more interest in sitting for either of the two examinations since they were found to be the same or equivalent.
ii. Mathematics teachers and school authorities should encourage the students to prepare adequately for both examinations.
iii. Students who perform very well in WAEC mathematics should be able to perform well in NECO mathematics so as to confirm the notion that the two bodies produce equivalent results.
iv. Parents should encourage their children to put more efforts in studying to reduce the high rate of failure in the two examinations.

**5. 3 Suggestions**

On the basis of the above findings, it is suggested that further research should be carried out to:

i. investigate whether students who gained admission into higher institutions through WAEC O' level result perform better than students who were admitted through NECO O' level result.
ii. determine whether or not male students are better than their female counterparts in WAEC mathematics and NECO mathematics.
iii. investigate whether or not the urban male or female students performance in WAEC mathematics and NECO mathematics differ significantly from those of their rural male or female counterparts.

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## Appendix 1

Tables of Conversion for WAEC And NECO Exmination Results

| GRADE | MARK INTERVAL | MID-MARK |
|---|---|---|
| A1 | 75-100 | 87.5 |
| B2 | 70-74 | 72 |
| B3 | 65-69 | 67 |
| C4 | 60-64 | 62 |
| C5 | 55-59 | 57 |
| C6 | 50-54 | 52 |
| D7 | 45-49 | 47 |
| D8 | 40-44 | 42 |
| F9 | 0-39 | 19.5 |

| GRADE OBTAINED | CORRESPONDING MARK |
|---|---|
| A1 | 87.5 |
| B2 | 72 |
| B3 | 67 |
| C4 | 62 |
| C5 | 57 |
| C6 | 52 |
| D7 | 47 |
| D8 | 42 |
| F9 | 19.5 |