

COMPARATIVE ANALYSIS OF STUDENT MATHEMATICS ACHIEVEMENT IN WEST AFRICAN SENIOR SECONDARY CERTIFICATE EXAMINATION IN NIGERIA

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ABSTRACT

This study comparatively analyzed the trends in students' achievement in the May/June West African Senior Secondary Certificate Examination (WASSCE) in general mathematics in Nigeria between 1991 and 2016 years. The study adopted survey design of the ex-post-facto research type with a sample of 24,661,758 students in Nigeria who sat for the May/June WASSCE in general mathematics between 1991 and 2014 years. Students' grade in WASSCE general mathematics were collected from records and used for the study. Three research questions and a hypothesis guided the study. The research questions were answered using percentage and mean while chi-square was used to test the null hypothesis at 0.05 level of significance. Findings from the study showed that the population of students that sat for WASSCE in general mathematics increased by 147.76% after a period of 13 years and that improvement in achievement was significant with time. Based on the findings, the study recommended among others, that the novel instructional practices and strategies for mathematics teaching and learning be sustained.

Keywords: Comparative, Analysis, Mathematics, Achievement, Examination.

INTRODUCTION

The importance of mathematics in national development is so high that the Federal Republic of Nigeria enshrined mathematics in the National Policy on Education as a core (compulsory) subject for all primary and secondary schools students in Nigeria (FRN, 2004). Its inclusion as a pre-requisite for admission into science and technology based courses in the Nigerian tertiary institutions is basically because of the recognition of the indispensable role it plays in the advancement of science and technology of any nation (Iyekekpolo & Buleis, 2009). Mathematics is to a nation what protein is to a young human organism. As a vital tool for the understanding and application of science and technology, the subject plays the necessary role of a precursor and harbinger to the much needed technological and natural development of the developing nations of the world.

In the contemporary Nigeria, subsequent to the nation's endorsement of international protocols for Education for All (EFA); the Millennium Development Goals (MDGs) and the adoption of a National Economic Empowerment and Development Strategies (NEEDS), a greater emphasis is now being placed on industrial and technological development (NERDC, 2007). Consequently, students are being encouraged to take up science and technology related disciplines. Globally today, scientific methods persuade literally field of human

endeavour and play a fundamental role in economic development of any country. In our match toward scientific and technological advancement and following our aspiration to be among the first twenty economies in the world by the year 2020 (Obioma, 2009; NERDC, 2007) we need nothing short of good performance of our youths in mathematics at all levels of education. Therefore, this research piece is targeted at comparing analytically, students' mathematics achievement in the West African Senior Secondary Certificate Examination (WASSCE) between 1991 and 2014 years to be sure that Nigerian students are improving in mathematics knowledge over time. The West African Senior Secondary Certificate Examination is a school-based ordinary level school certificate examination conducted by the West African Examinations Council (WAEC) in Nigeria every May/June.

According to Asuru (2006), the West African Examination Council is one of the major examining bodies in Nigeria. The others are the National Teacher's Institute (NTI), National Business and Technical Examination Board (NABTEB) and Joint Admissions and Matriculation Board (JAMB). The West African Examinations Council was set up in 1952 as an Inter-territorial body to conduct examinations as would be best suited to the needs of West Africa and as required in the public interest for the four British West African Countries of Nigeria, Ghana, Sierra-Leone and Gambia. Its two functions are; to review and consider annually the examinations to be held in West Africa and to conduct such examinations and award certificates and diplomas on the results of the examination conducted. In Nigeria, WAEC conducted its first examination-the Public Service Executive Competitive Examination in May, 1953. The Lagos office was opened in September of the same year. The council in conjunction with the University of Cambridge Local Examination syndicate conducted for the first time the West African School Certificate Examination (WASSCE) in December, 1955, and also the Teacher College grade II (TCII) in the same year. Liberia joined the council as an associate member in March, 1970 and as a full member in 1974.

In spite of its inter-territorial structure of the council, however, the National office of each of the member countries administers the examinations within its own territory. In Nigeria, the WAEC conducts several examinations. In 1986 for instance, the council conducted thirty different examinations. Presently, the council's two major examinations are the May/June School-based and November/December private candidates-based ordinary level school certificate examination. Following the establishment of the National Examinations Council (NECO) in April, 1999 by the Federal Government of Nigeria, the WAEC monopoly on the conduct and certification in ordinary level examination has been broken.

Meanwhile, before the WAEC came on stream in Nigeria, there were such examination bodies like the Cambridge University which conducted the Cambridge school certificate examination, and London University which conducted the General Certificate Examination popularly called the London GCE. These British based examining bodies then monopolized the conduct of both ordinary and advanced level certificate examinations in Nigeria.

Problem Specification

The academic achievement of students in Nigeria has been a source of concern to researchers, educators, government and parents. Obviously, the great importance that education has on the national development of the country made it so. Research report indicated a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2004). Parents and government are in total agreement that their investment in education is not yielding the desired dividend. The reports from the West African Examination Council chief examiners

indicates that the general performance of the candidates in mathematics for the May/June 2010, 2011, 2012 and 2015 examinations did not differ significantly from those of the previous years (WAEC, 2010, 2011, 2012 & 2015). However, the Chief Examiners also reported that candidates' performance in mathematics for the May/June 2013 and 2014 examinations appeared to have improved when compared to previous years. (WAEC, 2013 & 2014). From the foregoing, it becomes necessary to ask the question; is there any comparatively significant improvement of student achievement in the May/June WASSCE in Nigeria from 1991 to 2003 and 2004 to 2016 years?

Aim and Objectives of the Study

This study comparatively analyzed the trends in students learning achievement in the May/June West African Senior Secondary Certificate Examination (WASSCE) in general mathematics in Nigeria. Specifically, the study shall:

1. Determine the percentage increase in the population of students in Nigeria that sat for the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years.
2. Ascertain the percentage of students in Nigeria that obtained credit and above (A1-C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 and 2016 years.
3. Compare the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years.

Research Questions

The following research questions guided the study;

1. What is the percentage increase in the population of students in Nigeria that sat for the May/June WASSCE in general mathematics between 1991 to 2003 and 2007 to 2016 years?
2. What is the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 and 2016 years?
3. What is the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years?

Research Hypothesis

H₀: There is no significant difference in the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years.

MATERIALS AND METHODS

Research Design

The study adopted survey design of the expost-facto research type.

Population, Sample and Sampling Technique

The population of the study consisted of all students in the five West African Countries of Nigeria, Ghana, Sierra-Leone, Gambia and Liberia who sat for the West African Senior Secondary certificate Examination (WASSCE) between 1991 and 2016 years. A sample of 24,661,758 students in Nigeria who sat for WASSCE between 1991 and 2016 years were used for the study. This sample was purposively selected.

Instrument for Data Collection

Data were collected from records. They are records of total number of students who registered and sat for WASSCE with their achievement in general mathematics.

Method of Data Collection

The total numbers of students who entered and sat for WASSCE and their percentage grade in general mathematics from 1991 to 2016 were collected from documents. The sources of these documents are both primary and secondary.

Data Analysis

Percentage, mean and Standard Deviation (SD) were used to answer the research questions while chi-square was used to test the hypothesis at 0.05 level of significance.

RESULTS

Research Question One: What is the percentage increase in the population of students in Nigeria that sat for the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years?

Table 1A: Total number of students in Nigeria that sat for the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016.

S/N	Year	Total No. of Student Sat	Year	Total No. of Student Sat
1	1991	294,079	2004	1,051,246,
2	1992	361,506	2005	1,091,763,
3	1993	491,755	2006	1,184,223
4	1994	518,118	2007	1,275,330
5	1995	462,273	2008	1,369,142
6	1996	514,342	2009	1,373,009
7	1997	616,923	2010	1,351,557
8	1998	635,685	2011	1,540,250
9	1999	642,819	2012	1,672,224
10	2000	530,074	2013	1,543,683
11	2001	843,991	2014	1,692,435
12	2002	949,139	2015	1,593,442
13	2003	518,516	2016	1,544,234
	Total	7,379,220	Total	18,282,538

Source: Test Development Division, West African Examination Council (WAEC) Lagos, Nigeria.

Table IB: Percentage increase in the number of students that sat for the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016.

Year	Total No. of Students Sat	Increase	Percentage Increase
1991-2003	7,379,220	10,093,318	147.76%
2004-2016	18,282,538		

Table 1A shows that a total of 7,379,220 students sat for WASSCE in general mathematics between 1991 and 2003 while 18,282,538 students sat for the same examination between 2004 and 2016. Table 1B further indicated that after a period of 13years, the population of students in Nigeria who sat for the WASSCE in general mathematics increased by 10,093,318 (147.76%).

Research Question Two: What is the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 and 2016 years?

Table 2: Percentage of students in Nigeria that obtained credit and above (A1- C6) pass and below (D7- F9) in the May/June WASSCE in general mathematics between 1991 and 2016 years.

YEAR	Total No. Who Sat	No. of Students that Obtained Credit & Above (A1 - C6)	% of Students with Credit & Above (A1- C6)	No. of Students with (D7- F9)	% of Students with (D7- F9)
1991	294,079	32,727	11.10	261,352	88.90
1992	361,506	79,026	21.90	282,480	78.10
1993	491,755	53,559	10.90	438,196	89.10
1994	518,118	83,192	16.10	434,926	83.90
1995	462,273	76,080	16.50	386,193	83.50
1996	514,342	51,587	10.00	462,755	90.00
1997	616,923	47,252	7.70	569,671	92.30
1998	635,685	70,587	11.10	565,098	88.90
1999	642,819	57,858	9.00	584,961	91.00
2000	530,074	173,816	32.80	356,258	67.20
2001	843,991	350,746	41.60	493,245	58.40
2002	949,139	142,589	15.00	806,550	85.00
2003	518,516	237,377	45.80	281,139	54.20
2004	1,051,246	565,570	53.80	485,676	46.20
2005	1,091,763	388,122	35.55	703,641	64.45
2006	1,184,223	472,979	39.94	711,244	60.06
2007	1,275,330	198,441	15.56	1,076,889	84.44
2008	1,369,142	314,903	23.00	1,054,239	77.00
2009	1,373,009	425,633	31.00	947,376	69.00
2010	1,351,557	453,447	33.55	898,110	66.45
2011	1,540,250	587,630	38.93	952,620	61.07
2012	1,675,224	819,390	49.00	852,834	51.00
2013	1,543,683	555,726	36.00	987,957	64.00
2014	1,692,435	529,732	31.30	1,162,703	68.70
2015	1,593,442	544,638	34.18	1,048,804	65.82
2016	1,544,234	597,310	38.68	946,924	61.32
		Mean (%)	27.31	Mean (%)	72.69

Source: Test Development Division, West African Examination Council (WAEC) Lagos, Nigeria.

Table 2 shows that twenty six (26) years ago, 27.31% of students in Nigeria obtained credit and above (A1- C6) while 72.69% had pass and below (D7-F9) in the May/June WASSCE in general mathematics.

Research Question Three: What is the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7-F9) in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years?

TABLE 3: Mean of the percentage of students in Nigeria that obtained credit and above (A1- C6) and pass and below (D7- F9) in the May/June WASSCE in general mathematics.

Achievement	1991 - 2003		2004 - 2016	
	Mean (%)	S.D	Mean (%)	S.D
Credit & above (A1- C6)	19.19	12.27	35.42	9.43
Pass & below (D7- F9)	80.81	217.12	64.58	134.09

TABLE 3: show that the percentage of students in Nigeria that obtained credit and above is higher ($\bar{x}=25.42$) between 2004 and 2016 when compared to the period between 1991 and 2003

($\bar{x}=19.19$). Also, the students achievement rate in general mathematics with pass and below is mathematics with pass and below is low ($\bar{x}=64.58$) between 2004 and 2016 as compared to the period between 1991 and 2003 ($\bar{x}=80.81$).

Research Hypothesis (H_0): There is no significant difference in the percentage of students in Nigeria that obtained credit and above (A1 - C6) and pass and below (D7 - F9) in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years.

TABLE 4: Chi-square analysis of the difference in the percentage of students in Nigeria that obtained credit and above (A1 - C6) and pass and below (D7 - F9) in the May/June WASSCE in general mathematics

Achievement grades	No. of Students		
	1991 - 2003	2004 - 2016	Total
A1 - C6	1,456,396	6,453,521	7,909,917
D7 - F9	2274553	5635364	11,751,841
Total	5,922,824	11,829,017	11,751,841
	5104667	12647174	
	7,379,220	18,282,538	25,661,758
**=597131.83	*=3.841		df=1

Table 4 shows that there is significant difference in the percentage of students in Nigeria that obtained credit and above (A1 - C6) and pass and below (D7 - F9) in May/June WASSCE in general mathematics between 1991to 2003 and 2004 to 2016 years.

DISCUSSION OF FINDINGS

The study comparatively analyzed the learning achievement of students in general mathematics in the May/June West Africa Senior Secondary Certificate Examination (WASSCE) in Nigeria between 1991 to 2003 and 2004 to 2016 years. The result from table 1B showed that the population of students in Nigeria who sat for the WASSCE in general mathematics increased by 147.76% after a period of 13 years. The results in table 2 indicated

students abysmal performance in mathematics over the years, precisely twenty six (26) years ago with 27.31% of students obtaining credits and above while 72.69% had pass and below in the May/June WASSCE. However, the result from table 3 showed that the percentage of students in Nigeria that obtained credit and above was higher (35.42%) between 2004 and 2016 when compared to the period between 1991 and 2002 (19.91%). Also, the students achievement rate in general mathematics with pass and below was low (64.58%) between 2004 and 2016 as compared to the period between 1991 and 2003 (80.81%).

The statistical test from table 4 showed that there was significant difference in the percentage of students in Nigeria that obtained credit and above and pass and below in the May/June WASSCE in general mathematics between 1991 to 2003 and 2004 to 2016 years. The null hypothesis was rejected at .05 level of significance. This finding is consistent with WAEC chief examiners reports that candidate's performance in mathematics for the May/June 2013 and 2014 examinations appeared to have improved when compared to previous years (WAEC, 2013 and 2014). This improvement over time could be attributed to mathematics curriculum reforms, availability and utilization of innovation instructional materials, strategies and practices for teaching and learning, investment in education and hard-work on the part of the students.

CONCLUSION

From the findings, the number of Nigerian students who sat for the WASSCE in general mathematics increased by 147.76% after a period of 13 years. Though abysmal performance of students in mathematics was observed in the past twenty- six years but there was a comparatively significant improvement in students' mathematics achievement over time. This significant improvement could be as a result of mathematics curriculum reforms, availability and utilization of innovative instructional materials, strategies and practices for mathematics classroom instruction, investment in education and hard-wok on the part of the students.

RECOMMENDATIONS

Based on the findings of the present study, the following recommendations were made:

1. More qualified mathematics teachers should be recruited to cater for the increasing number of students in Nigerian schools to ensure the teacher and students ratio of 1:50 for secondary schools as enshrined in the National Policy on Education (FRN, 2004).
2. Effective teaching and learning of mathematics at all levels of schooling should be ensured by all concerned stalk holders in other to reverse the trends of abysmal performance in the subject.
3. Mathematics laboratories should be built in all Nigerian secondary schools to ensure practical mathematics teaching and learning. This practical approach to mathematics instruction will help remediate students learning difficulties in mathematics. These learning difficulties accounts for students poor performance in mathematics.
4. The trends in mathematics curriculum reforms, instructional practices and investment in education by stalk holders should be sustained or improved in view of the observed comparatively significant improvement in students' mathematics achievement over time.

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