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TRENDS ANALYSES OF STUDENTS' MATHEMATICS PERFORMANCE IN WEST AFRICAN SENIOR SECONDARY CERTIFICATE EXAMINATION FROM 2004 TO 2013: IMPLICATION FOR NIGERIA'S VISION 20:2020

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ABSTRACT: *This study analyzed trends of Students' mathematics performance in May/June West African Senior Secondary Certificate Examination (WASSCE) in Nasarawa State, Nigeria from 2004 to 2013. The main objectives were to investigate the pattern of students' performance for ten (10) years (2004 to 2013) in Nasarawa State, and to infer the implication of the observed and predicted mathematics performance on Nigeria's vision of 20:2020. The study used secondary data. The WASSCE mathematics results of 302, 225 Students who sat for May/June WASSCE from 2004-2013 were collected from the Education Resource Centre, Ministry of Education Lafia and used for the study. The study mainly employed AutoRegressive (AR) time series analysis. The study revealed that: (i) performance pattern was unstable over time, (ii) the observed and predicted performance rates indicated that less than 50% of the candidates passed at credit level over the reviewed period. The study discovered that mathematics performance in Nasarawa State has been persistently poor over the years reviewed similar to what has been reported for the whole nation and could continue from 2014 to 2020 based on the forecast. It further observed that the Nigeria vision 20:2020 might not be realized as planned unless urgent steps are taken to improve performance in mathematics. This is because mathematics serves critical role in the development of human capital in Science, Technology, Engineering and other key sectors of the economy. Based on the findings, the study recommended among others, that policy makers should review the existing mathematics curriculum and enforce its implementation.*

KEYWORDS: Autoregressive, mathematics, Trends, Students' performance, Nigeria Vision 20:2020.

INTRODUCTION

It is undisputable that education is a key to economic growth of a country as well as in science and technology. Therefore, science and technology education are very important and crucial factors for the development of any nation. There is no doubt that what distinguishes the developed nations from the developing nations of the world is the degree of science and technology prevalent in these nations and mathematics is the fulcrum on which science and technology rotate.

Different researchers in the field of education have acknowledged the place of mathematics in Scientific and technological developments. For instance, Jegede and Brown (1980) have

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stressed that the catalytic effect of education on national development emanate mainly from the areas of science and mathematics. This could be largely due to the impact of mathematics on both cognitive and psychomotor skills of the human capital of a nation.

The significance of mathematics in producing versatile and resourceful graduates that are needed for economic development cannot be over-emphasized. For this reason, the Science Teachers Association of Nigeria (1992) referred to mathematics as the central intellectual discipline of the technology societies. Setidisho (1996) also maintained that mathematics is a fundamental science that is necessary for understanding of most other fields in education. He further emphasized that it is glaring that no other subject forms such a strong force among the various branches of science. This implies that the place of mathematics in secondary school curriculum in Nigeria is paramount for scientific and human development as it serves both as a tool for academic progress in a chosen career and as a tool for preparing the individual for useful living.

Some international studies have indicated that schooling, labour force quality and cognitive skills have effect on the economic development of nations. For example, to measure human capital more accurately, Hanushek and Kimko (2000) introduced measures of mathematics and science skills from internal assessments into growth analysis. They found that quality of human capital was very significantly related to economic growth. This approach has been extended by a variety of authors, and the evidence indicates that economic growth is very closely related to the cognitive skills of the population. Building upon the data development of Barro and Jong-Wha (2001), it was also found that the most commonly used measure of human capital is the level of school attainment in a country. This may be why Federal Ministry of Education in the National Policy on Education (2013) maintained that education will continue to be priority of the nation.

Historical evidences proved that advanced countries depended on education for their rapid economic growth, such as those of United States, former Soviet Union, Denmark and Japan. There were significant relationships between their economic growth and the quantum and kinds of education provided to their work-force (Miachi, 2006).

The objectives of teaching mathematics in secondary schools make it very important as a foundation subject for success in further academic endeavour and manpower development. In view of this, the learning of mathematics in schools, as observed by Osafehinti in Odili (2006) represents first, a basic preparation for adult life and secondly a gateway to a vast array of career choices. In this respect, Iji (2007) maintained that any country that aspires for national growth in science, industries, and technology must not neglect mathematics. This is in view of the multi-dimensional values of mathematics in virtually all facets of human development and experience. Thomaskutty and George (2007) accentuated the versatile nature of mathematics by identifying seven educational values of mathematics which include: Practical or Utilitarian values, Disciplinary values, Cultural values, Social values, Moral values, Aesthetic values and Recreational values.

Studies exists that show positive relationship between performance in SSCE and students' achievement at the tertiary level of education. The fact that performance in SSCE (WAEC) is an indicator of the potential of a nation to actualize her economic goal has been alluded to by Obioma and Salau (2007), in a study which indicated that WASSCE was the best single

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predictor of Students' Cumulative Grade Point Average (CGPA) at the tertiary level of education. In line with this, Federal Ministry of Education Ten Year Strategic Plan (2007) made a vision 2020 statement that provides a vision for the future of education in support of the national vision that by 2020 Nigeria will be one of the top 20 economies in the world and the vision is to "Become an emerging economy model, delivering sound education policy and management for public good." The Nigeria vision 20:2020 is vividly summarized in Nigeria vision 20: 2020 strategic frame work (NPC, 2009) as follows:

The vision: A large, strong, diversified, sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life to its citizens. In creating the platform for success, area of immediate policy focus are: Correcting the weakness in revenue allocation; Intensifying the war against corruption; Entrenchment of merit as a fundamental principle and core value; Fostering private sector-powered non-oil growth to build the foundation for economic diversification; Expansion of investment in critical infrastructure; Investing in human capacity development to enhance national competitiveness; Addressing subsisting threats to national security; Deepening reforms in the social sector and extending reforms to sub-national levels.

The former Minister of Education, Rufa'i, who stated in Abuja at the flagging-off of the 2012 Nigeria Mathematical Year held at the Shehu Musa Yar'Adua centre, Abuja with the theme: Mathematics, Key to National Transformation, that the trend of poor performance in mathematics must be checked if the country has to move forward. She expressed sadness that Nigeria has remained largely a consumer nation because of lack of investment in science and technology in the past. She said there could be no meaningful progress in the country without promoting the study of mathematics (Rufa'i, 2012).

Rufa'i also said that for vision 20:2020 of the federal government to be a reality, efforts must be vigorously pursued toward science education, research and development which she described as the bedrock of national development. She added that the very existence of any area of human endeavour was based on mathematics and mathematical science saying even ICT which is a product of mathematics has taken over on the global stage. She further expressed the need to motivate and encourage upcoming mathematicians, saying "For the nation, Nigeria to keep abreast with global trends of technological advancement, and for our pupils and students to achieve international recognition; our secondary school students and upcoming mathematical scientists should be motivated to participate in the mathematics improvement programme. She further added that for Nigeria to achieve her quest for sustainable economic growth and development there was the need for collective promotion of excellence in science and technology because "investment in science is vital for developing nations and a country that neglects science education for its citizens does so at its own peril" (Rufa'i, 2012).

Vision is the ability to foresee the future before it comes into existence. It represents a significant improvement on the current state of affairs supported by a clear and realistic path to its realization (Ayodele et al, 2013).Trends analyses and forecasting provide scientific approach for predicting future occurrences based on past and present state of affairs. According to Rosenberg (1997), trend in observed rates provide invaluable information for needs assessment, program planning, program evaluation, and policy development activities.

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This could be useful in building a political consensus on a broad national development strategy, which encompasses, inter-alia, the role and responsibility of different agents in the economy, such as Federal, State and Local governments, the private corporate sector and all other stakeholders.

From the foregoing, the result of the present study could provide useful statistical information which could be used as a basis for constructing planning forecasts towards the realization of Nigeria vision 20:2020 with respect to the development of Science and Technology and help in initiating timely intervention programmes to avert any predicted bleak future that could hamper the actualization of the vision. It is against this background that the study analyzed trends of students' performance in May/June WASSCE general mathematics in Nasarawa State from 2004-2013 and inferred the implication of the predicted rates of performance on Nigeria vision 20:2020.

Statement of the Problem

It is disheartening that research and data from national examination bodies like West African Examination Council (WAEC) have shown a consistent poor performance in May/June WASSCE general mathematics in Nigeria. If this trend is allowed to continue, the fear is that the country may not achieve the vision 20:2020, which is basically anchored on education. This is consequent upon the fact that without a credit pass in mathematics learners will not be able to proceed to higher educational institutions where highly skilled work force in Science, Technology, and Engineering needed for today's global economy are produced. The study, therefore, examined the pattern of students' performance in May/June WASSCE mathematics in Nasarawa State from 2004 – 2013. It aimed at inferring the implication of the observed and predicted performance pattern on Nigeria vision 20:2020 with respect to human capital development in Science, Technology, Engineering and Mathematics Education (STEME).

Research Questions

1. What is the pattern of students' mathematics performance in WASSCE in Nasarawa State from 2004 - 2013?
2. What are the expected rates of performance in WASSCE mathematics in Nasarawa State from 2004 - 2013?
3. What is the implication of the observed and predicted rates of students' performance in WASSCE mathematics on Nigeria Vision 20:2020.

METHODOLOGY

The research design was a descriptive survey of the ex-post facto type. The target population comprised of the 233 public Senior Secondary School (SSS) in Nasarawa State as at the time of this study. The study adopted purposive sampling technique based on the study objectives(s) which was to analyze the WASSCE mathematics results of 302,225 students who sat for May/June WASSCE conducted by WAEC from 2004 – 2013 out of a total of 304,286 who registered during the period under study. In line with the nature of trend data whereby units of analysis are time periods, ten was the sample size for analysis regardless of the size of the population denominator and at least ten years is deemed adequate for analyzing trend data (Rosenberg, 1997). The WASSCE mathematics results of students who sat for the examination from 2004 – 2013 which was collected from Education Resource Centre (ERC), Ministry of Education Lafia Nasarawa State formed the instruments for data

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analysis. The data were analyzed using percentages and time series analysis. The estimation technique for the study is the Autoregressive (AR) processes for modeling of time series for short-run forecasts in line with Box-Jenkins Approach (George et al., 1970). The use of AR model was defined by Akaike criterion function. The study ran the Augmented Dickey-Fuller (ADF) stationary test to overcome the problem of spurious regression often associated with non-stationary time series which according to Gujarati (1995) are misleading and makes prediction unreliable. The absolute values of the ADF test statistic were greater than the absolute value of 5% critical value. This indicated significance at 5% level of confidence. Therefore, the data had no unit root since it was stationary at first difference. In order to identify the appropriate model to be fitted for the mean equations and to determine the order of the mean equations, a test was carried out using the Akaike information criterion on the performance. Hence, first order Autoregressive model, AR (1) was fitted for credit pass and fail, third order model, AR (3) was fitted for pass while AR (2) was fitted for unreleased. The parameter estimates were as presented in Tables 3, 4, and 5 under appendices.

RESULTS AND DISCUSSIONS

The observed rates of student's performance in May/June WASSCE general mathematics in Nasarawa State from 2004-2013 were as indicated in Table 1. The results of the performance with the Jarque-Bera normality test were shown in the Table 2. It could be observed that the highest mean performance rate was at ordinary level pass with mean = 39.09, followed by credit pass (A_1-C_6) = 31.94 and fail = 21.48 during the years under review, 2004-2013. The standard deviations were as indicated in Table 2. The results of the performance with the Jargue-Bera also showed that the performance of the students was normally distributed since the p-values were greater than 0.05 significant levels. The visual view of the performance rate from 2004-2013 was provided by multiple bar chart of Fig. 1.

Table 1: Performance Rates by Credit (A_1- C_6), Pass (D_7 – E_8), Fail (F_9), and Unreleased Results (2004-2013).

Year	Credit (%)	Fail (%)	Pass (%)	Unreleased (%)
2004	15.55	39.91	31.18	13.36
2005	18.50	37.99	41.29	2.23
2006	24.42	14.74	53.47	7.36
2007	41.62	7.87	36.88	13.63
2008	40.30	15.53	32.37	11.53
2009	41.86	23.62	30.50	4.02
2010	30.27	24.23	41.79	3.71
2011	26.96	22.79	44.02	6.23
2012	38.54	14.97	40.69	5.80
2013	41.39	13.14	38.68	6.79

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Table 2: Estimates of Jarque-Bera Test of Normality of Students' Performance Rate (2004-2013)

	Credit (%)	Fail (%)	Pass (%)	Unreleased (%)
Mean	31.94	21.48	39.09	7.47
Median	34.41	19.16	39.69	6.51
Maximum	41.86	39.91	53.47	13.63
Minimum	15.55	7.87	30.50	2.23
Std. Dev.	10.15	10.56	6.93	4.05
Jarque-Bera	1.062	0.98	0.59	0.91
Probability	0.59	0.61	0.74	0.64
Sum	319.41	214.80	390.86	74.66
Years	10	10	10	10

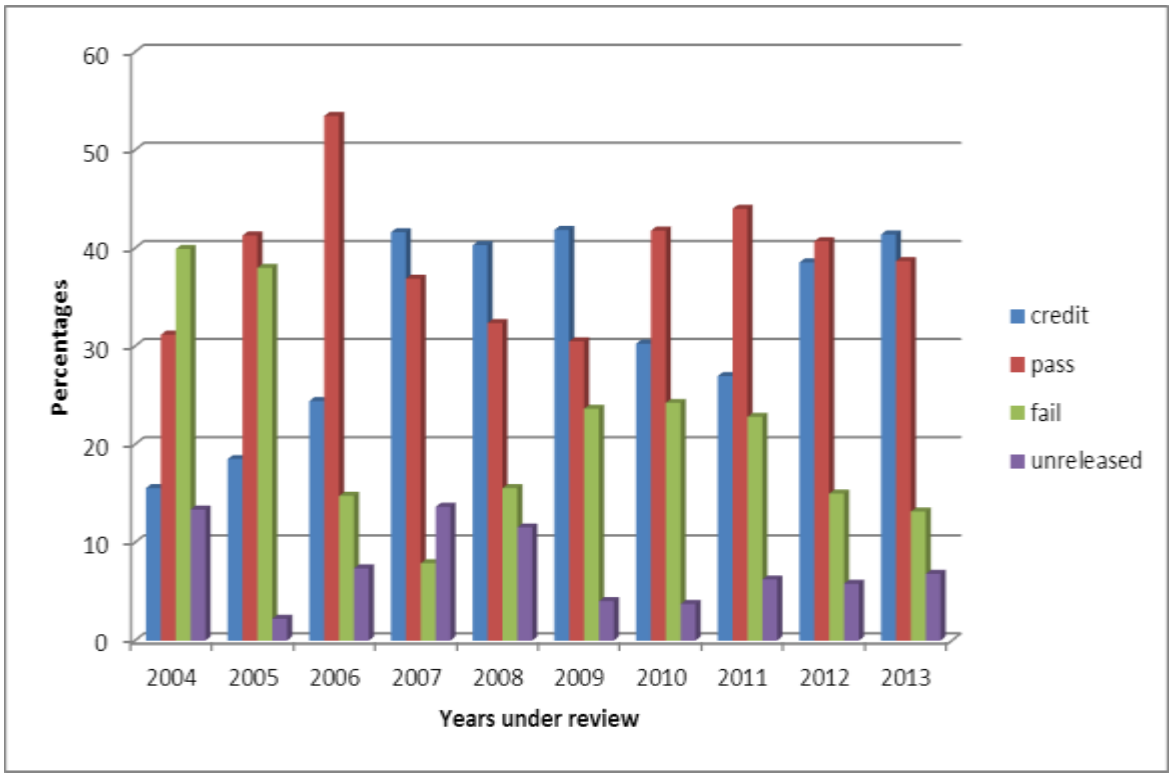

Figure 1: Distribution of Performance Rates by Credit (A_1-C_6), Pass (D_7-E_8), Fail (F_9), and Unreleased Results (2004-2013)

Research Question 1:
What is the pattern of students' performance in WASSCE mathematics in Nasarawa state from 2004 -2013?

The time series plot represented by Figure 2 showed non-stationary trends in performance patterns with varying means and variances which implied that the trend was stochastic with random walk. The trends showed upward and downward pattern over time. The percentage of candidates who had credit in general mathematics from 2004-2013 in Nasarawa State ranged

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from 15.55 to 41.86; ordinary pass ranged from 30.50 to 53.47; Fail ranged from 7.87 to 39.91 and unreleased results ranged from 2.23 to 13.63 respectively. The ranges showed that the least percentage of candidates who had credit pass was in 2004 with 15.55% and the highest percentage of candidates with credit pass was in 2009 with 41.86%. The least percentage of candidates with fail was in 2007 with 7.87% and highest percentage of 39.91 failures in 2004. The least percentage of pass was in 2009 with 30.50% and the highest in 2006 with 53.47%. The highest percentage of unreleased cases was in 2007 with 13.63% and the least in 2005 with 2.23% respectively. See Table 1 for the years and respective values.

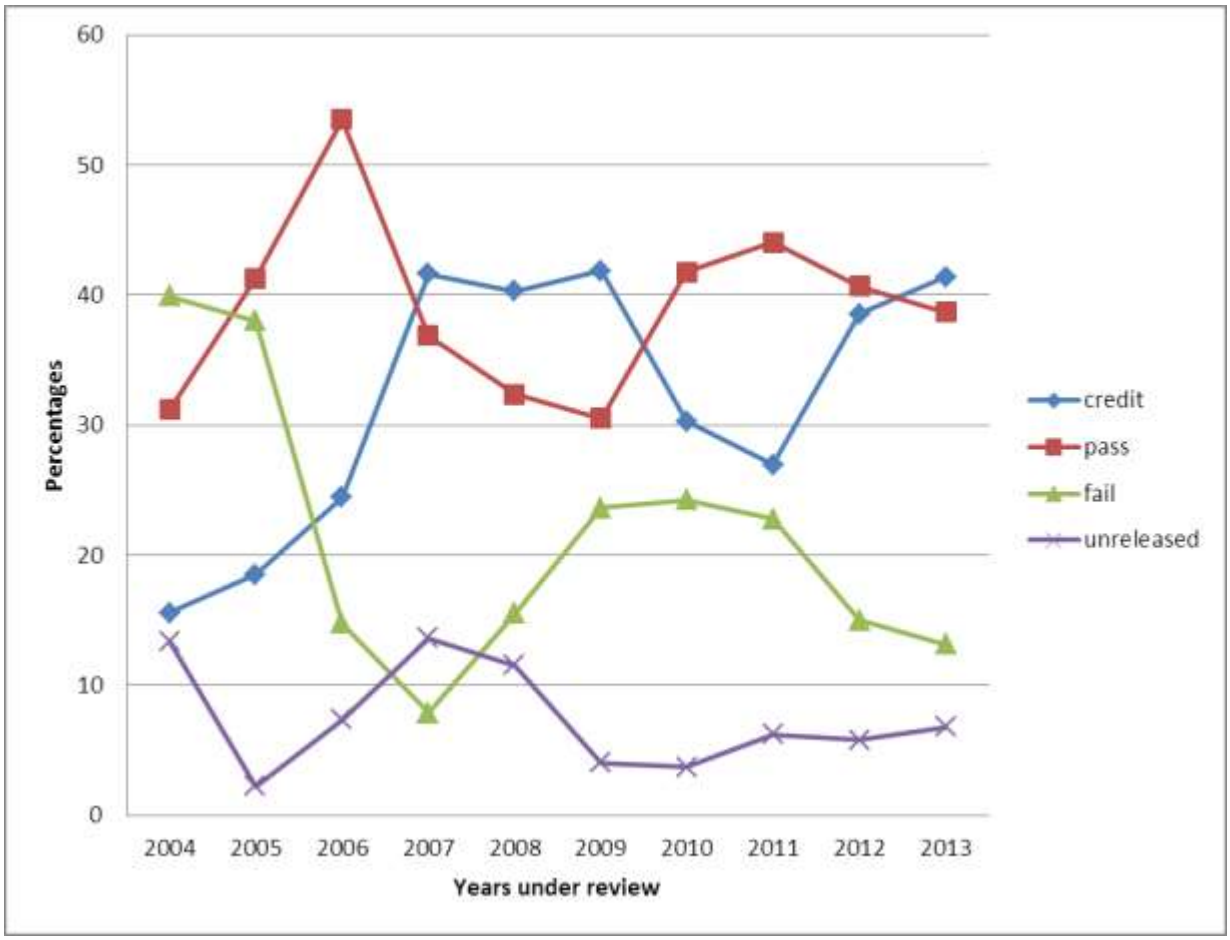

Figure 2: Trends of performance Rates by Credit (A_1-C_6), Pass (D_7-E_8), Fail (F_9), and Unreleased Results (2004-2013).

Research Question 2:
What are the expected rates of performance in WASSCE mathematics in Nasarawa State from 2014 – 2020?

The parameter estimates in Table 5 were used in the first order Autoregressive, AR (1) mean equations for credit pass and fail, the third order, AR (3) for pass and the second order, AR (2) for unreleased results to predict the rate of students' performance in May/June WASSCE general mathematics in the next seven years in Nasarawa State from 2014-2020 based on the observed rates and pattern in the state for the past ten years from 2004-2013. See Tables 1 and 6 for the observed rates from 2004-2013 and predicted rates from 20014-2020 respectively.

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Table 6: Predicted Rates of Students Performance in WASSCE Mathematics (2014-2020)

Year	Credit (%)	Fail (%)	Pass (%)	Unreleased (%)
2014	37.71	17.07	33.82	8.51
2015	35.34	19.37	37.83	8.24
2016	33.81	20.71	40.79	7.21
2017	32.82	21.49	42.15	7.20
2018	32.18	21.95	37.76	7.78
2019	31.77	22.21	35.68	7.88
2020	31.50	22.37	36.89	7.57

Based on the observed rates of performance from 2004-2013 as indicated in Table 1, the predicted rates of performance shown in Table 6 revealed a downward pattern of performance at the credit level (A_1- C_6) from 2014-2020; an upward pattern of performance at outright fail (F_9) from 2014-2020. The pattern of performance at ordinary pass (D_7-E_8) level and cases of unreleased results would be rising and falling over time as indicated by the predicted rates in Table 6. The forecasts, therefore, revealed that if the pattern of observed performance in May/June WASSCE general mathematics in Nasarawa State from 2004-2013 is maintained, the percentage of students who would pass mathematics at credit level would continue to drop over the next seven years; the failure rate would continue to increase over the same period (2014-2020); the ordinary pass rate and cases of unreleased results would be rising and falling over time. It is interesting to note that there was increase in performance rate at credit level from 2012 to 2013 by 7.39% but also with increase in unreleased from 5.80 to 6.79%. The forecast for 2014 indicated there could be decrease in performance at credit level as the model predicated 37.7%. The predictions for credit pass using the AR (1) mean equations indicated a downward trend if the performance pattern over the past ten years reviewed is maintained. However, only 39% of the variation in performance pattern at credit level was captured by the model as indicated by the coefficient of determination, R^2 in the regression analysis results displayed in table 7. There is need to investigate the other 61% extraneous factors not accounted for by the model.

The general observable trends of students' performance in May/June WASSCE mathematics in Nasarawa state from 2004-2013 is in agreement with the trend at the national level which is also less than 50% as confirmed by WAEC and other researchers (Maduabum et al. 2006; Okigbo et al. 2008; Okaneme, 2011; Adeiza, 2011; Azuka, 2012) who have reviewed trends of performance at national level. It is interesting to note that the findings of the present study is not different from the findings of Useni et al. (2012) which indicated less than 50% pass rate at credit level when they carried out the analysis of students' performance in WASSCE mathematics in selected secondary schools in Awe L.G.A of Nasarawa state from 2002-2011. This portends danger for the future of the state and by extension the nation in the aspects of human capacity development in Science, Technology, Engineering and Mathematics Education (STEME) which is a critical aspect of Nigeria vision 20:2020.

There is need to reverse the present trend of poor students' performance in mathematics, for Nigeria to be able to consolidate its leadership role in Africa and establish itself as a

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significant player in the global economic and political arena as contained in the vision 20:2020 statement. This is because public opinion and research evidence abound locally and internationally (Hanushek et al. 2000; Barro et al. 2001; Odili, 2006; Iji, 2007; Obioma et al. 2007; Gyang, 2011; Rufa'i, 2012) to support the view that mathematics is a key factor for equipping the youths to get them into critical or productive economic sectors and occupations.

It is important to note some limitations of this study. In the first place, the study was an ex-post facto evaluation of students' performance in May/June General mathematics, 2004-2013 and based on this, the researcher do not assume any causal relationship between performance and any confounding variables. Secondly, the study was only limited to Nasarawa state. Hence the findings cannot be generalized to other states of the federation.

IMPLICATIONS OF THE FINDINGS OF THE STUDY ON NIGERIA VISION 20:2020

The implications of the findings of this study on Nigeria Vision 20:2020 is in terms of the important role of mathematics literacy in facilitating growth in the quantity and quality of Science, Technology, Engineering, and Mathematics Education (**STEME**) including Information Communication Technology (**ICT**). The more mathematically literate students who are capable of passing WASSCE mathematics at credit level on their own we have in the nation, the more would be the chances of the candidates having access to tertiary institutions, and the more the country would have human capital development in different fields of human endeavor, especially in the science related fields. However, the findings of this study has shown that Nigeria vision 20:2020 would suffer a setback in terms of: quantity and quality of human capacity development in **STEME** and **ICT**; gender equity in Science Education; entrenchment of merit as a fundamental principle and core value where there are proven cases of examination malpractices in the education system.

The implication of the downward trend in predicted rates of performance at credit level on economic growth is that more and more youths will find it difficult to gain admission into tertiary institutions where the youths are offered variety of opportunity for skills acquisition and professional training in different fields of human endeavour. As a result of which the country might have a growing population of youths without the requisite capacity for global economic competitiveness, particularly in Nasarawa state.

Unless urgent steps are taken to reverse the trend in desired direction, Nigeria will not "Become an emerging economy model, delivering sound education policy and management for public good" as contained in the Federal Ministry of Education Ten Year Strategic Plan (2007) which provided a vision for the future of education in support of Nigeria vision 20:2020. Given the present pattern of students' performance in WASSCE general mathematics, the vision of the Federal Ministry of Education might not be realized in the nearest future.

CONCLUSION

Based on the findings of this study it could be inferred that the trend of students' performance in May/June WASSCE mathematics in Nasarawa state has been, so far,

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consistently unstable and poor as less than 50% of the total number of candidates were able to pass at credit level over the period of ten years reviewed. The situation is similar to what research and data from national examination bodies like WAEC has reported for the entire country. It could be concluded that performance in WASSCE mathematics in Nasarawa state is characteristic of performance in WASSCE mathematics in Nigeria. The performance in the next seven years (2014-2020) is expected to keep decreasing, especially at credit level.

RECOMMENDATIONS

Based on the major findings of the study, the following measures are recommended:

1. The government and other stakeholders should take urgent steps to reverse the trend of poor performance in mathematics. For instance, the various mathematics improvement programmes should be reviewed and mechanisms should be put in place for the effective implementation, monitoring and evaluation of mathematics programmes as this has been identified as one of the major challenges facing Nigeria vision 20:2020.
2. There should be investigation into factors responsible for the unsteady and persistent poor performance in May/June WASSCE general mathematics in Nasarawa State.

The following suggestions for further study are hereby made: Similar study should be conducted in other states of the federation to make programme intervention strategies more targeted and effective; Because of the interconnectedness of mathematics with other science subjects, study of this nature should be conducted in the other science-related subjects like physics, Chemistry, and Biology for comparative analysis.

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APPENDICES

Table 3: Estimates of Augmented Dickey-Fuller Stationary Test

Performance	ADF test statistic	Comment
Credit	-2.2152	Stationary at first level difference
Fail	-6.7497	Stationary at first level difference
Pass	-3.7085	Stationary at first level difference
Unreleased	-5.5340	Stationary at first level difference

1% critical level = -2.9372 5% critical level = -2.0063 10% critical level = -1.5981

Table 4 Estimates from Akaike Information Criterion

Performance	Model	Akaike info criterion
Credit	AR(1)	7.1450
	AR(2)	7.3624
	AR(3)	7.6672
Fail	AR(1)	7.4379
	AR(2)	7.5383
	AR(3)	7.6463
Pass	AR(1)	7.3247
	AR(2)	7.5295
	AR(3)	7.2861
Unreleased	AR(1)	6.2164
	AR(2)	5.7266
	AR(3)	6.0587

Table 5: Parameter Estimates for Mean Equations

Performance	Model	Parameter Estimates			
		α_0	α_1	α_2	α_3
Credit	AR(1)	37.1860**	0.6440		
Fail	AR(1)	16.9101	0.4589		
Pass	AR(3)	38.4391**	-0.2066	-0.2520	-0.5517
Unreleased	AR(2)	7.6709**	0.2922	-0.4087	

** Significance at 1%, * significance at 5%

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Table 7: Estimate of Performance- Credit (2004-2013)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	37.18601	6.478381	5.740015	0.0007
AR(1)	0.544019	0.257387	2.113619	0.0724

R-squared	0.389573	Mean dependent var	33.76133
Adjusted R-squared	0.302369	S.D. dependent var	8.871684
S.E. of regression	7.410011	Akaike info criterion	7.036671
Sum squared resid	384.3578	Schwarz criterion	7.080499
Log likelihood	-29.66502	Hannan-Quinn criter.	6.942091
F-statistic	4.467385	Durbin-Watson stat	1.787713
Prob(F-statistic)	0.072400		

Inverted AR Roots	.54

Table 8: Estimate of Performance- Fail (2004-2013)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.91005	5.500013	3.074547	0.0180
AR(1)	0.458853	0.257897	1.779212	0.1184

R-squared	0.311403	Mean dependent var	19.43193
Adjusted R-squared	0.213032	S.D. dependent var	8.850510
S.E. of regression	7.851396	Akaike info criterion	7.152390
Sum squared resid	431.5109	Schwarz criterion	7.196217
Log likelihood	-30.18575	Hannan-Quinn criter.	7.057810
F-statistic	3.165595	Durbin-Watson stat	1.667582
Prob (F-statistic)	0.118431		

Inverted AR Roots	.46

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Table 9: Estimate of Performance - Pass (2004-2013)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.43906	0.540110	71.16891	0.0000
AR(1)	-0.206620	0.204879	-1.008495	0.3875
AR(2)	-0.252007	0.156556	-1.609699	0.2058
AR(3)	-0.551566	0.192832	-2.860347	0.0646

R-squared	0.845496	Mean dependent var	37.84639
Adjusted R-squared	0.690993	S.D. dependent var	4.954981
S.E. of regression	2.754396	Akaike info criterion	5.159833
Sum squared resid	22.76010	Schwarz criterion	5.128924
Log likelihood	-14.05942	Hannan-Quinn criter.	4.777810
F-statistic	5.472338	Durbin-Watson stat	0.937368
Prob(F-statistic)	0.098180		

Inverted AR Roots	.29-.79i	.29+.79i	-.78

Table 10: Estimate of Performance - Unreleased (2004-2013)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.670687	1.051032	7.298240	0.0008
AR(1)	0.292153	0.309860	0.942854	0.3890
AR(2)	-0.408697	0.269844	-1.514567	0.1903

R-squared	0.386864	Mean dependent var	7.384180
Adjusted R-squared	0.141609	S.D. dependent var	3.488790
S.E. of regression	3.232343	Akaike info criterion	5.464288
Sum squared resid	52.24021	Schwarz criterion	5.494079
Log likelihood	-18.85715	Hannan-Quinn criter.	5.263363
F-statistic	1.577396	Durbin-Watson stat	0.568889
Prob(F-statistic)	0.294370		

Inverted AR Roots	.15+.62i	.15-.62i

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