

Level of Intelligence among Best Brains in Mathematics in Nigeria Secondary Schools (South-East Geo-political Zone)

Candid State of Nigeria Educational Standard

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Abstract

The paper was based on the fact that Nigeria standard of education is falling without cogent reason. This paper investigated the effect of sex, and age of students on their performances in recent time. The data used was collected from result of Mathematics quiz competition organized by Cowbell Company across the country with focus on the result of South-Eastern part of the Country. The States considered include; Anambra, Abia, Ebonyi, Enugu and Imo States. Statistical tools adopted were; Chi-square, Correlation and regression (curve estimation). Chi-square was used to test the dependency of students' performances on sex (Male/Female). The Chi-square test shows the performance depends on sex with p-value less than 0.05. Correlation analysis was used to determine the strength and nature of relationship between age of students and performance. The correlation value of -0.2 implies age cannot adequately explain the present state of student performance as the value was less than 0.5, though, the negative indicated inverse relationship between the variables. Curve estimation shows none of the regression approach used could adequately model the relationship between variables of interest which implies the demographic factors (age and sex) have little contribution in academic performance of students.

Keywords: Curve Estimation, Dependency, Significant Level, Correlation and Regression.

1.0 Introduction

Education is the bed rock of every society that is willing to strive/survive in the turbulence time. The only antidote that can cure the sickness of underdevelopment of a nation and the sword that can destroy the enemy called poverty. Importance of education cannot be neglected by all nations including developed, developing and underdeveloped nations.

Apart from being the tool for development, its importance to human beings cannot be over emphasized. Education is a human right that should be accorded to all human beings solely by reason of being human. There are a lot of international human rights instruments that provide for education as a fundamental human right. These include the Universal Declaration of Human Rights (1948), the International Covenant on Economic, Social and Cultural Rights (1966) and the African Charter on Human and Peoples' Rights (1981). The relationship between education and development is well established such that education is a key index of development. It has been documented that schooling improves productivity, health and reduces negative features of life such as child labour as well as bringing about empowerment (EFA, 2002). This is why there has been a lot of emphasis particularly in recent times for all citizens of the world to have access to basic education.

State of Education in Nigeria is appalling as many of the students cannot easily do what primary school students of good old days could do without stress. In recent time, many examination bodies such as West African Examination (WAEC), National Examination Council (NECO) and NABTEB recorded mass failure of students. Although, many attributed the failure to negligence of students and some believed parents contributed to the failure recorded. According to Otiye (2007), the severe decline of the oil market in the early eighties, combined with the Structural Adjustment Programme (SAP), led to drastic reductions in spending on education. The result was unpaid teacher salaries, degradation of education facilities at all levels and strikes in universities and schools. The end result is declining literacy rates in the country.

The poor state of education in Nigeria is aptly captured in the National Empowerment Development Strategy as follows:

...the delivery of education in Nigeria has suffered from years of neglect, compounded by inadequate attention to policy frameworks within the sector. Findings from an ongoing educational sector analysis confirm the poor state of education in Nigeria. The national literacy rate is currently 57 percent. Some 49 percent of the teaching force is unqualified. There are acute shortages of infrastructure and facilities at all levels. Access to basic education is inhibited by gender issues and socio-cultural beliefs and practices, among other factors. Wide disparities persist in educational standards and learning achievements.

The paper is not to assign blame for falling standard of education in Nigeria but to investigate the impact of sex on performance of students, as well as, age as many believed age at which students attain each level of education affects their level of intelligence.

1.1 Research Questions

The drives of the research include the following questions;

- Does success depend on sex of student?
- Does age affect performance of students?

1.2 Objectives of Study

The following objectives were formulated based on the research questions above:

- To determine the impact of sex of students and age attained on academic performance.

2.0 REVIEW OF THEORETICAL AND EMPIRICAL LITERATURE

Performance of students in examinations has been a great concern among researchers in recent time due to fall in standard of education in countries of the world. Numerous studies examine gender differences and the patterns of these interactions (Lockheed & Harris, 1984; Sadker, Sadker & Bauchner, 1984; Massey & Christensen, 1990; Rodriguez, 2002; Einarsson & Granström, 2002) with most documenting greater amounts of teacher attention directed toward boys rather than girls. Research that delves carefully into the reasons under which this "over attention" to boys occurs suggests a host of potential causes. For instance, if society stresses the success of males above that of females, then teachers may unconsciously promote male students by paying greater attention to them.

While a large body of research focuses on the gender of students, less research explores the impacts of a teacher's gender on students (Hopf & Hatzichristou, 1999). Evidence suggests that male teachers tend to be more authoritative whereas female teachers tend to be more supportive and expressive (Meece, 1987). A survey of 20 teachers indicates that male teachers are likely to select a more aggressive disciplinary approach toward boys while teachers of either gender tended to ignore boys' disruptive behavior than that of girls when the behavior was not aggressive (Rodriguez, 2002).

Teacher gender is also systematically related to class environment. A number of studies suggest that male teachers provide a more positive atmosphere for boys (Etaugh & Hughes, 1975; McCandless, Bush & Carden, 1976); however, relative to male teachers, Stake and Katz (1982) suggest that female teachers tend to provide a more positive classroom atmosphere overall. After observing 40 class sessions, Einarsson and Granström (2002) find that male teachers increase the attention paid to girls as pupils age while female teachers consistently give more attention to boys and this overtime led to shift in performance of student as girls perform better than boys in the same class.

Previous research also suggests that differences in teacher's perceptions of student abilities and characteristics are related to teacher gender. Parker-Price and Claxton (1996) surveyed teachers regarding their perceptions of student abilities. They learned that male teachers are more likely to believe that boys are superior visual learners while girls are more helpful in the classroom. On the other hand, female teachers do not demonstrate these differences in belief but do tend to think that boys are better with quantitative skills.

While it is clear that teachers treat and perceive boys and girls differently, it is less clear how this differential treatment impacts student performance on standardized exams. Of course, a large literature establishes differences on standardized exams by gender of student, but no research connects test results to age of students and its interaction with student performance.

If, as the previously mentioned studies suggest, male teachers treat students differently than female teachers, then one would expect teacher gender to influence student outcomes on standardized exams. Further, if male teachers treat boys differently than girls, then one would also expect standardized test score differences between boys and girls to vary systematically by teacher gender. Although teachers may overtly treat students differently by gender, overt treatment need not be the sole vehicle for generating gender-based test score differences. If, as Parker-Price and Claxton suggest, boys learn better through visual experiences, then it would be natural for a male teacher, who also learned better through these experiences, to revert to visual teaching leading to better performance by the boys in his class. The next section tests the impact and interaction of teacher gender and student gender on student test performance.

Stricker and Rock (1995) conducted an analysis by assessing the impact of the examinees' initial characteristics (gender, ethnicity, parental education, geographic region and age), college-related characteristics and college-related performance variables in the performance on the Graduate Record Examinations (GRE) General Test. They found that the students' initial characteristics have a modest impact on the GRE results and among them parental education is the most significant. On the contrary, the college-related characteristics (major, institutional quality and research University) seem to have a more important role in explaining the difference in GRE scores among students.

Sakho (2003) carried out a study of the determinants of academic performance of HEC-Lausanne graduates using a probit model. He analyses econometrically the relationship between different variables and the average grade obtained during the license studies by 156 students. The findings suggest that a large number of different factors related with the personal and family background, with the work and study discipline and with the type of degree interact together in order to explain the variation of HEC students' performance.

Akanle (2007) studied Socio-Economic Factors Influencing Students Academic Performance in Nigeria using some explanation from a local survey. The major instrument used in collecting data for the study was the self-developed instrument tagged social-economic and academic performance rating scale of the students. The data collected were analyzed using t-test at (0.05 alpha level). The time frame of the study covers the period of 2004 to 2007. A total of one hundred and twenty (120) copies of questionnaire were administered to respondents. The study revealed that insufficient parental income, family type and lack of funding by governments are factors influencing students' academic performance. Based on these findings, certain recommendations were made towards improving student academic performance. Prominent of these include proper funding of education by government, sensitization of parents towards their children education and the support of NGOs to eradicate poverty.

Using the concepts of financial capital, human capital, and social capital, Chow (2000) attempted to disentangle the major factors which affected the academic performance of 368 recent Hong Kong immigrant students attending 26 different public high schools in Toronto. Results of the ordinary-least square regression analysis used indicated that presence of father in Canada, higher self-rated socio-economic status, immigration to Canada being politically motivated, and higher level of English proficiency were significantly and positively related to academic performance.

Jing-Lin (2009) studied the determinants of international students' academic performance comparing between Chinese and other international students using a multiple regression analysis. The results suggest that the perceived importance of learning success to family, English writing ability and social communication with their compatriots are significant predictors for all international students. As the predominant group, Chinese students display some distinctive characteristics. A less active learning strategy was observed among Chinese students relative to others, but no evidence was found that this negatively affects their academic achievement.

3.0 Methodology

Age of students at which they attain a level in their educational pursuit is also considered as a variable to explain academic performance. It is hypothesized that students who are late to undertake primary education or are repeaters perform poorly as far as academic performance is considered. Also, sex of student is included in the variables of interest because of general belief that male students perform better than their female counterparts especially under unfavourable conditions. Also male students get encouragement from their families to improve their academic performances than females because they are taken as the future of the respective families.

The statistical tools applied in solving aforementioned research questioned are;

Chi-square dependency for the determination of dependency of age and sex of students on academic performance, and Curve Estimation to determine best regression approach for proper modeling of relationship between the variables and Correlation Analysis for the determination of nature and strength of relationship between the variables. Software used include Mintab version 16, SPSS version 17 and Microsoft Excel for Mathematical computation and arrangement of data set.

3.1 Source of Data

In recent time, Cowbell coy organized Mathematics competition for the best brains from both junior and senior schools in Nigeria in which both private and public schools were given equal opportunity to participate by selecting their three best students from the two sections of secondary school. The schools across the country presented six students; three students for junior category and three students for senior category, and the examination was conducted with no news of maltreatment of any kind or favoritism for any school or candidate. According to a teacher from one of the schools participated in the program, the competition can be used for true test of knowledge among the teenagers as it was conducted in examination atmosphere.

The claim of many or complain on standard of education in Nigeria could be investigated accurately using the result of the competition as it was void of malpractices of any kind, unlike other examinations in the country.

Data for the research was collected from result of Cowbell quiz competition held across states in Nigeria. The result for both senior and junior categories was collected for the analysis and the states considered are states in the South-South Geo-political Zone of the country which include;

Abia, Anambra, Ebonyi, Enugu, and Imo.

4.0 Analysis

Does success depend on sex of students?

Junior category

Statistical tool: Chi-square test of dependency

Level of significance: 0.05 (5%)

Hypothesis to be tested:

H₀: There is no significant association between sex of students and performance.

H₁: There is association between sex of students and performance.

Table 1; Sex of Student and performance in Mathematics quiz competition

	Above 40	Below 40	Total
Male	140	936	1076
Female	82	907	989
Total	222	1843	2065

Chi-Square Test: Above 40, Below 40

	Above 40	Below 40	Total
Male	140	936	1076
	115.68	960.32	
	5.115	0.616	
Female	82	907	989
	106.32	882.68	
	5.564	0.670	
Total	222	1843	2065

Chi-Sq = 11.965, DF = 1, P-Value = 0.001

*Expected counts are printed below observed counts

*Chi-Square contributions are printed below expected counts

Interpreting the results

The p-value of the Chi-square test is 0.001 which is an indication of evidence of dependency of performance of students on sex (male/female). This can also be interpreted as, evidence exists for association ($p = 0.001$) between performance in the quiz competition and gender for the junior category.

Senior category

Table 2; Sex of Student and performance in Mathematics quiz competition

	Above 40	Below 40	Total
Male	238	955	1193
Female	120	745	865
Total	358	1700	2058

Chi-Square Test: Above 40, Below 40

	Above 40	Below 40	Total
Male	238	955	1193
	207.53	985.47	
	4.474	0.942	
Female	120	745	865
	150.47	714.53	
	6.171	1.299	
Total	358	1700	2058

Chi-Sq = 12.886, DF = 1, **P-Value = 0.000**

Interpreting the results

The p-value of the Chi-square test is 0.000 which is an indication of evidence of dependency of performance of students on sex (male/female). This can also be interpreted as, evidence exists for association ($p = 0.000$) between performance in the quiz competition and gender for the senior category.

Does age affect performance of students?

Junior category

Statistical tool: Correlation

Level of significance: 0.05 (5%)

Hypothesis to be tested:

H_0 : There is no significant relationship between age of students and performance.

H_1 : There is significant relationship between age of students and performance.

Correlations: AGE, %

Table 3: Descriptive Statistics

	Mean	Std. Deviation	N
AGE	14.2667	1.20142	1987
SCORE	24.5601	12.40885	1987

Pearson correlation of AGE and Performance = **-0.206**

Interpretation: the correlation between age of student and performance for the junior category is -0.206 which implies there exists inverse relationship between the two variables and the relationship is statistically weak as the correlation value is less than 0.5. Then, there is enough evidence to accept the null hypothesis and conclude that there is no significant relationship between age of student and the performance.

Since the correlation is significantly weak, curve estimation can be adopted for determination of mathematical relationship between the variables.

Linear Model

Table 4: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.206	.043	.042	12.145

The independent variable is AGE.

Logarithmic Model

Table 5: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.206	.043	.042	12.145

The independent variable is AGE.

Inverse Model

Table 6: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.205	.042	.042	12.147

The independent variable is AGE.

Quadratic

Table 7: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.207	.043	.042	12.147

The independent variable is AGE.

Cubic

Table 8: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.207	.043	.042	12.147

The independent variable is AGE.

The curve estimation shows that irrespective of model used, the relationship between age of student and performance especially in Mathematics is insignificant, that is, Age cannot adequately predict the performance of students in an examination. For the senior category, the same response was observed.

5.0 Findings and Conclusion

Based on the available data, it was discovered that performance of students is gender sensitive and the

classification in table 1 shows male students performed better than female students in the subject considered. Also, it was discovered that age is independent of performance of students in examination and cannot adequately predict the performance. Age as one of the demographic factors considered found to have insignificant negative impact on students academic performance which implies younger ones performed better than the older students.

5.1 Further Study

The paper could not cover a very wide range due to time constraint and other factors. Due to these facts, the following areas could be investigated by researchers;

Instead of the subject Mathematics, performance of students in English Language could be checked since students prefer English Language to Mathematics especially Female.

Factors such as Sex of teacher, qualification of teachers, years of experience of teachers, fund, parent's qualification, as well as, location of the schools should be considered for proper investigation of factors contributing to poor performance of students in developing nations.

To determine state of education in Nigeria, other Geo-political Zones should be considered for better result.

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