Student and Teacher Factors as Predictors of Statistics Achievement in Federal School of Statistics Ibadan

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Article Info	ABSTRACT
	The study aimed at assessing how students and teachers factor taken together influence students' achievement in Statistics as well as their relative contribution to the prediction. Two research questions were raised and purposive sampling was adopted to select national diploma year 2 students since they are already in their final level in the school. All the lecturers in Statistics department and year 2 Statistics students were used for the study. Student Questionnaire (SQ), Teaching Staff Scale (TSS), and Statistics Achievement Test (SAT) were used for data collection and analyzed using descriptive and multiple regression. The results showed that the four (4) variables taken together had significant contribution to students' achievement in Statistics and accounted for 80.8% of the variation in students' achievement in Statistics. Lecturer experience and students attitude to Statistics were found to be significant but lecturer experience contributed mostly to the students' achievement in statistics. It was recommended that stakeholders in provision of Statistics education at the monotechnic institutions level must consider the four variables that contributed significantly to achievement seriously during planning for the Statistics education programmes for optimum achievement of students in Statistics.

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1. INTRODUCTION

Statistics is an indispensable tool for national development, growth and planning. A Government without viable infrastructure for information generation, dissemination and usage is severely handicapped in doing proper planning, monitoring and evaluation of development programmes and projects and also in arriving at good decision with respect to their government policy formation. According to [40], in national development, the aspirations of a policy should be to attain such goals as full employment, price stability, and economic growth, equilibrium in the balance of payment, equitable distribution of income, educational development, social security, political stability and so on. To achieve a fair measure of success in the goals stated, there is need to map out strategic plans, set up machinery for execution of the plans and monitor the implementation process; this is exactly the point at which the role of statistics is vital and relevant.

The word "statistics" is derived from the latin term statisticum collegium ("council of state") and from the italian word statista which means "statesman or politician". The first usage of statistics was by states which collected data on its people for effective administration. Later statistics involve collection of data as well as analyzing them. The national economic policies and complex interactions among various sectors of the economy make it imperative for building up macroeconomic planning models. This kind of model build-up is only possible with statistical information (which is also used in estimating the parameters of the model) enables us to monitor the performance of the economy and the social well-being of the people; the Statistics required in economic policy formulation include Macroeconomic aggregates (GDP, GNP,

Capital Formation, External transactions, input/output coefficients, etc), Consumption data (Government & Private), Investment Expenditure (Government & Private), Import and Exports, Prices and Inflation, Industrial Production and Indices, Energy and Power production/ consumption, Agricultural and raw Material Production, Transportation & Communication Indicators, Government Services, Housing & Finance, Interest Rates & Exchange Rates, Banking & Finance, Statistics on Education, Health Indicators, Population Characteristics, Sanitation and Water Supply Indicators, Cultural and Immigration Flows, Religion & Human Rights indicators and Public order indicators [40].

Importance of statistics to economic planning and development in Nigeria cannot be overemphasized as there are many people and organization involved in gathering of statistics in Nigeria, the organizations such as National Bureau of Statistics, Central Bank of Nigeria, National Population Commission, Nigeria National Petroleum Corporation, and numerous researchers for academics purposes. However, NBS is saddled with the onerous responsibilities of collection, processing, storing and publishing the data as well as advising the government to make reasonable decision from the carefully collected and processed data. Statistics has grown over the years all over the world as a branch of knowledge through which phenomenon are better understood, sound decisions are taken and future predictions are made. In Nigeria, the role of the NBS in developing the middle level statisticians through the establishment of the Federal School of Statistics cannot be overemphasized. The graduates of the school are now occupying enviable position in the various sectors of the economy such as Central Bank of Nigeria (CBN), Nigeria Port Authority (NPC), National Population Commission (NPC), Nigeria National Petroleum Corporation (NNPC), National Institute of Social and Economic Research (NISER), Federal Ministry of Mines and power, various Federal, and state ministries of budgets, economics planning, research and Statistics as well as local government planning research departments across the country.

The role of Statistics to the development and nation building is so significant and is growing by the day because it is now applied virtually in all fields of human endeavour including medicine, education, business, sports, economic. The graduates of Statistics have been found in many organizations doing well in their chosen career. They can be found in the field such as insurance (actuarial science), biometrics (biometrician), biostatistics (biostatistician), research institutions (research fellows), data analysis (data analysts) and statistics lecturers in various higher institutions of learning all over the country.

The significant roles of Statistics in education and its application to research in education cannot be overemphasized. The use of statistics in educational research has grown from just collection and analyzing of data for percentages, means and standard deviations to more sophisticated techniques such and has helped researchers to uncover the significant relationships among the various variables relating to human potentials and behaviors. The use of statistics has also been facilitated with the advent of technology and software which have hastened the process of data analysis. The analysis have been made easy through use of statistical packages like SPSS, SAS, AMOS, LISREL, BILOG, and SEPATH e.t.c. for model testing to inform policy and decision makers thereby making the use of statistics in research convenient and user friendly.

Monotechnic institution is one of the tertiary institutions of learning in Nigeria and learning take place in these tertiary institutions. The tertiary institution in Nigeria includes Universities, Polytechnics/Monotechics and Colleges of Educations. Polytechnics and Monotechnics were established to train technical and middle level manpower [30]. They offer wide range of technological innovation and science oriented courses such as metal work technology, mechanical/automobile technology, electrical and electronic technology, building and woodwork technology, Science Laboratory Technology, Statistics and other business oriented courses. Ibadan, the capital city of Oyo State, houses all the three (3) types of tertiary institutions which are owned by Federal and State governments as well as private individual owned. The focus of this study is centred on Federal Monotechnic institutions in Ibadan, Oyo State. The Federal Monotechnic institutions in Ibadan are many; Federal Cooperative College Eleyele (FCC), Federal School of Statistics (FSS) Ajibode road, Federal College of Agriculture (FCA), Federal College of Animal Health and Husbandry (FCAH&H), and Federal College of Forestry (FCF), Ibadan. This study focused only on Federal School of Statistics (FSS), Ibadan, Oyo state.

The Federal School of Statistics is a Federal Monotechnic institution that was established in 1961 by statistical act of 2007. The school came to existence as the roles of statistics in nation building is important because it plays a significant role by drawing inferences from the processed data for formulation of various macroeconomics policies in the nation building. Growth and development of the nation can only be attained through uses of qualitative and quantitative data to achieve its macroeconomics goals or objectives.

Though FSS in Nigeria operates a multi-campus system, which are located in three different states across the country; Ibadan, Kaduna and Enugu. FSS which are schools under the supervision of National Bureau of Statistics (NBS) offer quality statistics education to non- statisticians, in-service training of junior statistical personnel in public service without resigning their appointment and education in the field of Statistics and other related courses. FSS runs only National Diploma programme in the following courses as

approved by the National Board for Technical Education; Statistics, Business Administration, and Computer science as contained in the students' handbook and school prospectus. The campus is headed by a Rector who takes charge of the day to day administration on the relevant campuses while the general control of the entire school is headed by the Director (Training/NBS headquarters), internally each campus comprises academic, administrative and library sections. The National Diploma certificate of FSS can be used for employment in various establishments as middle level statisticians and also the certificate serves as pre-requisite for admission into Higher National Diploma programme and Bachelor degree programme in Nigeria Universities.

Figure 1 indicates that all students from primary education are to move forward for their secondary school education, the prospective final year students of secondary education are required to take the Senior School Leaving Certificate (SSCE) from either or both registered public examining bodies in Nigeria (i.e. West African Examinations Council or National Examination Council), thereafter apply with the result obtained to any of their choice of tertiary institutions of learning (University, College of Educations, or Polytechnic/Monotethnic). The applicants will write and must pass the Unified Tertiary Matriculation Examinations (UTME) by Joint Admission Matriculation Board (JAMB) before he/she can be offered admission into tertiary institution applied to. Figure 1 shows the links and three possible channels to higher institutions of learning. The first channel assumes that a graduate went through NCE and then to the University. The other two channels are the more common ones, that is, those who went straight from secondary school to University and those who went through secondary school to Polytechnics/Monotechnic then to University.
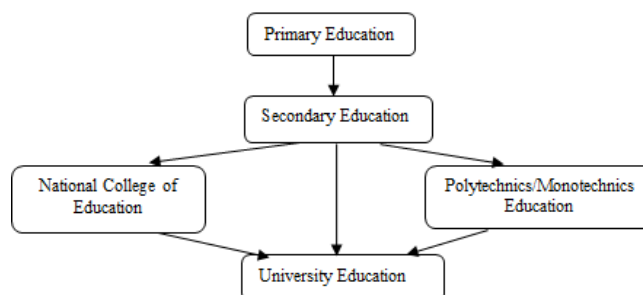

Figure 1. Organogram of the channels to higher institutions in Nigeria

Polytechnics and Monotechnics have been the institutional structures meant to enhance Nigeria's technical growth at the tertiary level. The Polytechnics became strengthened in 1985 by a decree and enrolments into them were specified to be seventy percent (70%) for science and technology related courses and thirty percent (30%) for business related courses for students' acquisition of middle level technological manpower [33].

Nigeria National Policy on Education defines Technical Education as "that aspect of Education which leads to the acquisition of practical and applied skills as well as Descriptive scientific knowledge". Technical Education is broad based and could be relevant to people by training them to be skilled in a way that enables them to be in government or be self-employed as well as teaching them the technological skills which would transform their national economy. On the whole, the benefits of Technical Education are limitless including the lowering of unemployment and enhancing national economic growth. Polytechnic/Monotechnic is saddled with the responsibility of technical education while Universities are left with production of graduates in various fields [15].

According to Ojimba [32], technical education and vocational education as a comprehensive term referring to "those aspects of the educational process involving in addition to general education the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life". Technical education therefore can be seen as the formal training of persons to become technicians in different occupations. Thus any education that is geared towards teaching technical skills and attitudes suitable to such skills can be regarded as technical education.

Researchers in Nigeria do encounter various problems as a result of data collection from public and private sectors when the need arise. The problems such as poor record keeping, inadequate funding of research, unconducive environment due to various security challenges, and hoarding of relevant document due to fear of exposure their inadequacies as some researchers also have little or no understanding of

collection, and processing of data. In view of this, the need to train more hands in statistics becomes imperative as the increase in demand of use of statistics in the society and for educational research purposes have been on increasing rate and cannot be overemphasized. It is quite obvious that increasing demand on use of quality and appropriate statistics therefore necessitated the establishment of Federal School of Statistics by the statistics act of 2007, part II, No. 7 (1) a, b, & c and National Bureau of Statistics as supervisory agency with the main objective of training the junior statistical personnel in public service the rudiments of statistics without resigning their appointment and to provide Descriptive statistical training for statistical technicians in public sector. FSS is the oldest institution of statistics education in Nigeria and has been over 55 years of existence, yet it was discovered that limited effort has been directed at the institutions by Government and individuals. However, the statistics education and training of middle level manpower (statistics technicians) has gone beyond the purview of FSS only as many accredited polytechnics, and Monotechnics in Nigeria are also running the same programme of training students in statistics education in Nigeria. Some variables are important to this study; Students' attitude towards Statistics, parental education, lecturer years of experience, qualification and Students' achorrievement in Statistics

1.1. Literature Review

There are some important in this study so as to ascertain how the student and teacher factor school had been able to predict the student Achievement in Statistics in Federal Monotechnic Institutions in Ibadan, Oyo state. In the view of the foregoing, the researcher looked into student and teacher variables (students' age, parental education, students' attitude towards statistics, Lecturer's years of experience, and qualification) to see the extent to which these variables had been able to predict and contribute to the students' achievement.

On students' attitude towards statistics, Arumugam [8] defined as attitude as a disposition to respond favourably or unfavourably to objects, situations or people related to statistics learning. It was further revealed that some students show a positive attitude towards statistics, but evidence reveals that unfavorable responses far outweigh any favorable responses. Adodo [5] as cited by Gbore & Daramola [16], asserted that academic achievement may be dependent upon positive attitude from the teachers and the students in the teaching/learning processes. According to Gbore & Daramola [16], attitude is a feature viewed as the totality of an individual's inclination towards object, institution or idea. Attitude could be acquired, formed or learned from members of the family, teacher and peer group. They maintained that behaviours are obtained by observation of an individual's behaviour who could be the parent, teacher or a peer group member [16].

According to Jabor et al [21], parents play an important role in their children's learning. Aside from being actively involved in their children's education, parents also provide a home environment that can affect learning. Parents serve as a model for learning, determine the educational resources available in the home and hold particular attitudes and values towards education. Parental education according to the various studies of Grissmer [17], Musgrave [29] and Akinsanya et al [9], the parents' level of education is the most important factor affecting students' academic achievement. Parental education influence the academic achievement of students as the parents would be in a good position to be second teachers to the child; and even guide and counsel the child on the best way to perform well in education and provide the necessary materials needed by him/her.

In developing and developed countries the teacher factor has been linked to low achievement in major and important subjects in secondary schools in Nigeria [13]. According to Adodo [6] as cited in Gbore & Daramola [16], one key verifying factor for the success of students' academic achievement is the teacher. They believed that teachers' qualifications and exposure can go a long way to bring about pupils' high academic achievement while Ibukun [20] asserted that no education system can rise above the quality of its teachers. Considering the assertion of Adodo [6] and Ibukun [20], as cited by Gbore [16], it implies that teachers' role in the preparation of students to succeed in examinations cannot be undermined. Vanhoof et.al, [42] also argued that shortage of qualified teachers is responsible for the poor academic achievement observable among the students while Ademulegun [2] argued that students taught by more qualified and experienced teachers in terms of knowledge of the subject matter perform better than those taught by less qualified but experienced teachers.

This was supported by Musgrave [29] who said that a child that comes from an educated home would like to follow the steps of his/her family and by this, work actively in his/her studies. He said further that parents who have more than a minimum level of education are expected to have a favoured attitude to the child's education and to encourage and help him/her with school work. They also provide library facilities to encourage the child to show examples in activities of intellectual type such as reading of newspapers, magazines and journals. Onocha [35] concluded that a child from a well- educated family with high socio-economic status is more likely to perform better than a child from an illiterate family. This is

because the child from an educated family has a lot of support such as a decent and good environment for academic work, parental support and guidance, enough textual and academic materials and decent feeding. He or she is likely to be sent to good schools where well-seasoned teachers will handle his/her subjects [9].

2. RESEARCH METHOD

The correlational design was adopted for this study. This is because all the issues of concern to the researcher are available in the schools and are all corelated. The design was considered adequate because it help the researcher to capture all the information that was needed through use of self-developed questionnaire. The variables used in this study comprised independent and dependent variables. The independent variables are as follows; Lecturer's years of experience, Lecturer's qualification, student's parental education and students' attitude towards Statistics while the dependent variables is students' achievement in Statistics. The population of this study comprised of all the students and all the academic staff in the department of Statistics of Federal School of Statistics Ibadan under the supervision of National Bureau of Statistics (NBS). The researcher made use of intact class of National Diploma II students and all lecturers in the Statistics department of the school. The respondents (students) were two hundred and eighty-eight (288) which comprised 155 male and 133 female students and ten (10) teaching staff (6 male and 4 female lecturers).Three (3) instruments were used in this study and they were self-developed by the researcher; Students Questionnaire (SQ), Teaching Staff Scale (TSS), and Statistics Achievement Test (SAT). Following the first draft of the instruments that is; Statistics Achievement Test (SAT) which contained forty multiple objective questions which students of Statistics in the outside the final selected ones responded to and subsequent twenty five multiple objective questions after the ambiguous ones had been expunged, the reliability value of Statistics Achievement Test (SAT) was found to be .86 and it was determined through Kuder-Richardson (KR-20) since the items on the instrument were dichotomouslyscored. The Cronbach Alpha reliability values obtained for the Student Questionnaire (SQ), and Teaching Staff Scale (TSS) were .89 and 0.83 respectively. Personal contact was made by the researcher to the school and sequel to the prior permission from the school Rector, the instrument was administered personally to the respondents (Statistics lecturers and students). The administrative officer of the school assisted the researcher to coordinate the students. The administered instruments were collated and analyzed with Statistical Packages for Social Science (SPSS-IBM 20.0). Multiple regression and product moment correlation were adopted to analyze the data obtained for this study.

3. RESULTS AND ANALYSIS

The following results were obtained in the course of analysis of this study.What is the estimate and direction of relationship among the predictors (students' attitude towards Statistics, parental education, lecturer years of experience and qualification) and the criterion variable (students' achievement in Statistics) in Federal Monotechnic in Ibadan, Oyo state, Nigeria?

The findings in Table 1 revealed that the intercorrelation matrix of the correlation coefficients of the predictors (students' attitude towards Statistics, parental education, lecturer's experience and qualification) and the criterion variable (students' achievement in Statistics) are mostly significant and all positive. The table shows that there is no multicollinearity between or among the variables of study. The implication is that as the lecturer's experience (LE) increases hence the students' achievement in Federal School of Statistics also increases. A general overview shows that students' achievement in Statistics in Federal School of Statistics has the strongest relationship with lecturer's experience, followed by students' attitude towards Statistics, lecturer qualifications and students' parent education in that order.

Table 1.Inter-Correlation Matrix of the Predictor Variables and the Criterion Variable

	SAS	PE	SATS	LE	LQ
SAS	1				
PE	.036	1			
SATS	.255	.395	1		
LE	.376	-.061	.059	1	
LQ	.166	.109	.062	.237	1
Mean	15.927	5.295	84.063	2.684	2.101
Std. Dev	3.227	1.672	10.697	1.412	0.699

Key: SAS-Students' Achievement in Statistics; PE-Parent Education, SATC- Students' Attitude towards Statistics; LE- Lecturer's experience; LQ- Lecturer's Qualification.

* Significant at p < .05; n =288.

It was discovered that none of the values of the correlation coefficients are highly correlated with each other (i.e r>0.85). The implication is that all the predictor variables in the study are good enough to be part of the models in predicting achievement in Statistics. This is a clear indication of non-violation of one of the major assumptions required for running a regression analysis. This is in agreement with Bakare [10] that multicollinearity amongst the variables of interest must be resolved before proceeding with regression analysis.

To what extent would the four students' and teachers' variables (Students' attitude towards Statistics, parental education, lecturer years of experience and qualification) jointly predict students' achievement in Statistics?

Table 2 shows that the joint contribution of Students' attitude towards Statistics, parental education, lecturer years of experience and qualification to student's achievement in Statistics was significant ($F_{(4,283)}$= 18.008; p= .000 < 0.05). Based on the findings from this study, the students' achievement in Federal School of Statistics Ibadan, Oyo State is jointly determined and significantly influenced by the students' attitude towards Statistics, parental education, lecturer years of experience, and qualification.

Table 2. Analysis of Variance

2	Sum of Squares	Df	Mean Square	F	Sig.
Regression	606.518	4	151.629	18.008	.000
Residual	2382.951	283	8.420		
Total	2989.469	287			

Table 3 shows that the coefficient of the determination is .808, and this indicates that the 80.8% variance in students' achievement is accounted for by the lecturer's experience, lecturer's qualifications, students' parent education and students' attitude towards Statistics while 19.2% can be attributed to other factors that were not captured by this study. In the same table 3, multiple R (.899) implies that there is strong positive relationship among the predictor variables and the criterion variable.

Table 3. Model Summary of Regression Result

Model	R	R^2	Adjusted R^2
1	.899	.808	.806

Table 4 shows that students' attitude towards Statistics and lecturer year experience, and qualification have significant relative effect on student achievement. The result indicates that lecturer's experience has the highest contribution to the predictor (β= .341; t= 6.191; p= .000 < 0.05), followed by students' attitude towards Statistics (β= 251; t= 4.319; p= 0.00 < .05), lecturer's qualification (β= .075; t=1.356; p= .176 > .05), and parent education (β= -050; t= -.859; p= .391 > 0.05) in that order. However, the relative contributions of parental education of the students, and lecturer's qualification were found to be insignificant.

Table 4. Multiple Regression Result

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
(Constant)	7.269	1.432		5.076	.000
Parent Education	-.097	.113	-.050	-.859	.391
Students' Attitude towards Statistics	.076	.018	.251	4.319	.000
Lecturer's experience	.779	.126	.341	6.191	.000
Lecturer's Qualification	.345	.254	.075	1.356	.176

The findings of this study revealed that there exists moderate and positive significant relationship among the student and teachers' factors on students' achievement in Statistics. This finding is in agreement with the findings of researchers like Adepoju [3], Ogunwuyi [31] as cited by Gbore & Daramola [16]. The low and significant relationships observed among the students' parent education, lecturer's qualification and students' achievement in Statistics could be due to lack of commitment on the part of the lecturers, as well as shallow knowledge of teaching strategies or method of imparting the Statistics course content by the lecturer into the students.

The finding of this study also shows that students' attitude towards statistics and lecturer's experience have significant relative effect on student achievement in Federal School of Statistics, Ibadan. On students' attitude towards statistics, the findings of Onocha [35], Mukherjee [28], Houston et al [19] and Usman [41] as cited by Gbore & Daramola [16] reported that attitude to Mathematics explained more of the total variance than the children intelligence and that attitude of students towards science were linked with some personality factors through relationship with teachers. In another finding on the significance of students attitude towards statistics, Shangodoyin & Lasisi [39] cited that Santillán el al [37], Beins [11], Yala. &Wanjohi [45], Katz &Tomezic [22], Wenglinsky [43] and Evans [12] there were existence of positive correlation among college students attitude toward statistics and their academic performance. Santillán et al [38] also corroborate the results of this study that students attitude towards statistics is significant with students' achievement.

Based on lecturer year of experience, the results obtained in this study corroborates with studies cited in Kosgei et al [24], where Ali [7] observed that there was statistically significant relationship between teacher characteristics and student academic achievement. In the same vein, Adeyemo [4] also noted that teacher characteristics influenced teaching and learning in classrooms, while Olaleye [34] established that there was relationship between teachers characteristics and pupils performance. Also, Yara [46] found that teachers' experience and educational qualifications are the prime predictors of students' academic achievement.

However, the findings of some researchers like Makinde & Tom-Lawyer [25] and Adegbile & Adeyemi [1] as cited in Fakeye [14] did not corroborates the result of this study as there was found no significant relationship between student academic achievement and teachers' qualification and experience. Also, few studies like Hanushek [18], Martin et al [26] and Wise [44] as cited in Mogari et al [27] were not consistent with this finding as they all revealed that the number of years in teaching is not associated with students' achievement Roberts & Saxe [36] finding as cited by Kimani et al [23] indicated that teachers' teaching experience was not significantly related to students' achievement.

4. CONCLUSION

This study concludes that students and teachers factor could affect positively on students' achievement in Statistics and should be given serious consideration for effective learning outcome. The following recommendations are made based on the findings of the study; the government at the Federal level should organize regular seminar and workshops (both local and international) for the lecturer in Federal Monotechnicsto keep them informed about the latest development in their discipline and chosen career, Lecturers and Statistics students of the Federal Monotechnic institutions need to improve their positive attitudinal change towards teaching and learning of Statistics accordingly to improve on the learning outcomes in Statistics, there is the need for lecturers to create conducive atmosphere for healthy academic interaction with their students to reinforce the students' confidence in the teacher and attitude towards achievement in Statistics, the Federal Government through the school authority should recruit additional qualified Statistics lecturers to ameliorate the issue of shortage of Statistics lecturers in the school.

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