

Prediction of First Year University Education Performance from Entry Academic Performances

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Abstract

The Joint Admissions and Matriculation Board (JAMB) conducts Universities Matriculation Examination (UME) for entry into all the Universities in Nigeria. At the end of the examination, the Board places suitably qualified candidates in the available spaces in these institutions. To determine the suitability of the selected candidates, the Board, from time to time, carries out predictive validity studies of UME. One of those studies was carried out in 2005, in which data was collected from 6 selected Nigerian universities for the 1998 – 2000 academic sessions. The results showed that some relationships existed between UME and FGPA. Although, the relationship between SSCE and the overall performances in first year university education was low, but significant. It was also discovered that using UME scores or SSCE grades alone did not predict performance in FGPA as much as when the two were combine.

1.0 Introduction

The Joint Admissions and Matriculation Board (JAMB) conducts matriculation examinations for admissions of candidates into all the tertiary institutions in Nigeria. One of such examinations is the Universities Matriculation Examination (UME). The Board, through UME, selects and places suitably qualified candidates into available vacancies in the universities and other degree awarding institutions. This statutory function has been carried out for the past 30 years.

To determine the suitability of the selected candidates, the Board, from time to time, carries out predictive validity studies on its examinations. The aim is to determine the predictive value of the UME. The study serves as a feedback mechanism to the system so as to ensure continued confidence in the examinations conducted by the Board. This study therefore sought to find out the relationships between students' entry academic performances i.e. Senior Secondary Certificate Examination (SSCE) and First Year Grade Point Average (FGPA), UME and FGPA, UME and SSCE combined with FGPA in the 2007 UME.

2.0 The Idea of Predictive Validity Study

The notion of 'Predictive Validity' (PV) was derived from the words, 'Prediction' and 'Validation'. Cronbach (1971), observed that 'validation' consists of checking the test

scores against some other observations that serve as the criterion. Glaser (1960), classified prediction into 3 types namely: classification, selection and guidance. Classification is the assignment of the individual into category to which he/she best belongs. Selection, on the other hand, involves the categorization of individuals in a way that would indicate the probability of success on a desired task, while guidance provides information regarding abilities, interest and the chance of success in reaching various goals.

From the foregoing, it can be seen that Predictive Validity is an issue when the purpose is to use an instrument to estimate some important form of behavior which is external to the measuring instrument itself. Nunnally (1971), refers to this as criterion. Essentially, Predictive Validity is concerned with the usefulness of the test score in predicting some future performances.

3.0 Description of Variables

3.1 Senior Secondary Certificate Examination (SSCE)

The West African Secondary School Certificate Examination (WASSCE) conducted by the West African Examination Council (WAEC) and the Senior Secondary Certificate Examination (SSCE) conducted by the National Examination Council (NECO) in Nigeria are for purposes of certification.

The rationale for using SSCE in this study as a variable is to determine whether SSCE on its own, can predict performance in the first year university education. In line with this, Hayashi (2005), submitted that consideration for admissions should take into account students' classroom achievement and that grades reflect what a student actually achieved in school. These are more powerful predictor of future academic success than test scores.

3.2 Universities Matriculation Examination (UME)

The UME, by its nature, is a selection examination. The examination comprises of the Use of English which is compulsory for all candidates and three (3) other relevant subjects related to the course of interest. UME scores are used as a variable in this study to enable us determine the extent to which the UME predicts performance in the first year university education.

3.3 First Year Grade Point Average (FGPA)

FGPA is the final grade obtained by a student at the end of first year of study at the university. This is computed from scores obtained during the first and second semester

examinations. Stillwell et.al (2005) observed that FGPA represents a composite score of the academic performance of a student after a year of schooling. Some of the courses taken may have been easier than others; some professors are more lenient in grading than others. By using the average of all the grades received, these differences in course difficulty and grading stringency tend to average out.

3.4 SSCE and UME Combined

Scores obtained from the UME and grades from SSCE were combined as a variable in this study. The essence is to determine the extent to which the combination of UME and SSCE would predict performances at the first year of university education. Omotosho (1989), conducted a study on WAEC/GCE O'level examination and Joint Matriculation Examination (JME), now UME, in the University of Ife, (now Obafemi Awolowo University, Ile-Ife), University of Lagos, University of Nigeria, Nsukka and University of Jos. The study sought a relationship between the SC/GCE O'level, the JME scores and the scores in the sessional examinations. The results revealed that the combination of JME and SC/GCE O'level subjects consistently produced a better variance than when the subjects of either of the examination were used separately as independent variables. This study intends to see the combined effect of SSCE and UME as a predictor.

4.0 Research Questions

For this study, the following three research questions will be answered.

- (i) What is the relationship between UME scores and FGPA?
- (ii) What is the relationship between performance in SSCE and FGPA?
- (iii) What is the influence of combined UME and SSCE on FGPA?

5.0 Methodology

5.1 The instrument

An existing proforma was reviewed as an instrument to elicit information such as students' bio-data, academic records at O'level, performance in UME and first year grade point average (FGPA), academic year, name of the institution, faculty and department, etc.

5.2 Population and Sample

All the candidates admitted into the Nigerian Universities through UME conducted in 1998, 1999 and 2000 constituted the population for this study.

Data was collected from six (6) federal universities across five (5) faculties for the 1998-2000 academic years. Data on fifty percent (50%) of all the students in all the departments in each faculty were gathered. Where the total number of students was less than 100, all the data was collected.

In line with the Arts to Science ratio of 40:60, 2 faculties were taken from the Arts (i.e. Arts/Humanities and Law) and 3 faculties from the Sciences which included Engineering, Medical Sciences and Sciences.

5.3 Data collection procedure

Data were obtained from 6 Nigerian universities using a proforma designed for the purpose of the study. Out of the bulk of data collected, only 9,062 were found useable as a universal data (see the distribution in Table 1 below).

Table 1: Number of students in each University by Year

Inst./Year	Bayero	Ibadan	Ilorin	Unilag	NAU	UNN	Total
1998	48	891	335	1115	170	670	3429
1999	250	60	386	1189	331	434	2650
2000	360	444	468	880	376	455	2983
Total	658	1395	1189	2304	877	1759	9062

5.4 Data Analysis

To answer the research questions, multiple regression analysis was carried out on the UME and SSCE scores with FGPA as the dependent variable using SPSS 11.0.

The statistical tools employed to answer the three research questions raised are as follows:

- (A) To determine the relationship between UME scores and FGPA, the following statistics were used.
 - (i) Scatter diagram of FGPA (Y) on UME (X) was plotted.
 - (ii) Regression analysis of FGPA (Y) on UME (X) was carried out.

- (B) To determine the relationship between SSCE and FGPA, the following techniques were adopted.

- (i) Scatter diagram of FGPA (Y) on SSCE (X) was plotted.
 - (ii) Regression analysis of FGPA (Y) on SSCE (X) was carried out.
- (C) To determine the joint influence of UME and SSCE on FGPA, the following analyses were carried out.
- (i) Simultaneous multiple regression analysis of FGPA (Y) on UME(X_1) and SSCE (X_2), FGPA as criterion variable and X_1 and X_2 respectively as predictor variables.
 - (ii) Hierarchical multiple regression analysis of FGPA (Y) on UME (X_1) and then SSCE (X_2) as well as displaying the level of significance and the values of the regression coefficients.

6.0 Descriptive Results

Table 2: Means and Standard Deviations for UME Scores in each year

YEAR	N	Min. Obtained	Max. Obtained	Mean	Std. Dev.
1998	3354	129	286	232.58	22.89
1999	2630	107	336	225.25	23.22
2000	2931	109	311	212.20	33.87

The minimum UME score within the target year varied between 107 (in 1999) and 129 (in 1998), while the maximum UME score varied from a low of 286 (in 1998) to a high of 336 (in 1999). In the overall, the mean consistently decreased from 1998 to 2000. A heartening factor in the value of the mean is that majority of the candidates obtained the minimum of 200 which is the acceptable score for admission in most federal universities.

Table 3: Means and Standard Deviations for SSCE Scores in each year

Year	N	Min. Obtained	Max. Obtained	Mean	Std. Dev.
1998	3389	15	44	27.28	4.53
1999	2673	15	45	26.87	4.84
2000	2945	15	45	28.64	5.64

Aside from 1998, the maximum score of 45 was obtained in 1999 and 2000. The performance in the year 2000 was best with mean of 28.64, followed by 1998 with a mean of 27.28. The least was in 1999 with a mean of 26.87. The standard deviation was progressive over the years i.e. improved from 1998 to 1999 and from 1999 to 2000.

Table 4: Means and Standard Deviations for FGPA in each year

Year	N	Min. Obtained	Max. obtained	Mean	Std. Dev
1998	3003	0.05	5.00	2.56	0.86
1999	2263	0.02	5.00	2.60	0.97
2000	2541	0.06	5.00	2.61	1.05

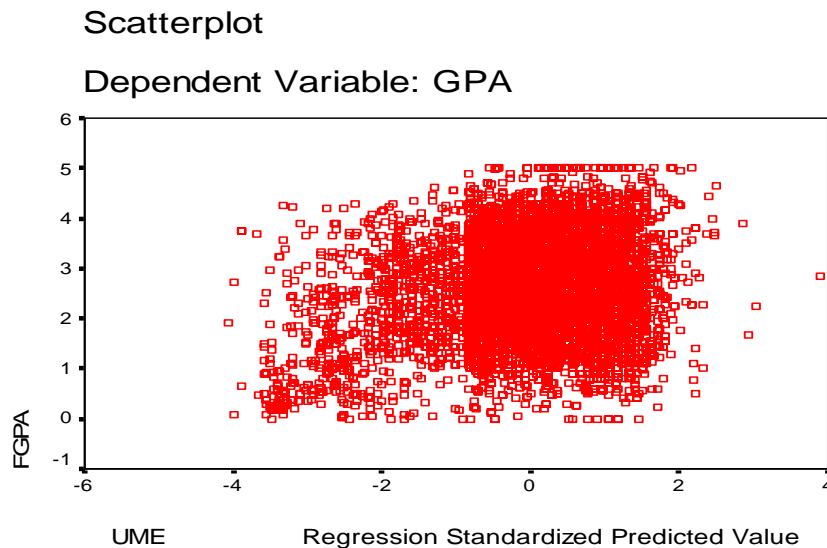
The maximum obtainable FGPA of 5.0 was achieved in all the years i.e. 1998, 1999 and 2000. The mean progressively improved over the years i.e. year 1999 was better than year 1998 and year 2000 was better than year 1999. Like the mean, the standard deviation also progressively improved over the years i.e. 1998 (0.86), 1999 (0.97) and 2000 (1.05).

7.0 Regression Analysis

As stated earlier, the analytical methods adopted were keyed to the respective research questions. In like manner, the results are presented in respect of the individual research questions.

7.1 Question 1: What is the relationship between UME scores and FGPA?

Fig. 1 is a scatter diagram of the relationship between students' UME scores and the corresponding FGPA.



The scatter diagram suggests that, in addition to UME scores, there are other factors that affect FGPA. The standardized regression diagram suggests a linear trend.

Table 5: Correlation between UME Scores, SSCE Scores and FGPA

	FGPA	UME	SSCE
FGPA Pearson Correlation	1.000	0.168**	0.167**
SIG (2-Tailed)		0.000	0.000
N	7807	7671	7766
UME Pearson Correlation	0.168**	1.000	0.038**
SIG (2-Tailed)	0.000		0.000
N	7671	8915	8816
SSCE Pearson Correlation	0.167**	0.038**	1.000
SIG (2-Tailed)	0.000	0.000	
N	7766	8816	9007

**p<0.01

Table 5 shows that the correlation coefficient of UME scores and FGPA is positive and significant ($r= 0.168$; $p<0.01$). Similarly, the correlation between SSCE and FGPA is also positive and significant ($r= 0.167^{**}$; $p<0.01$)

Table 6: Summary of the linear regression of UME scores with FGPA

	R	R²	F(1,7669)	B	t(df=1,7669)	A
UME Scores	0.168	0.028*	223.01*	0.00559*	14.933	1.337

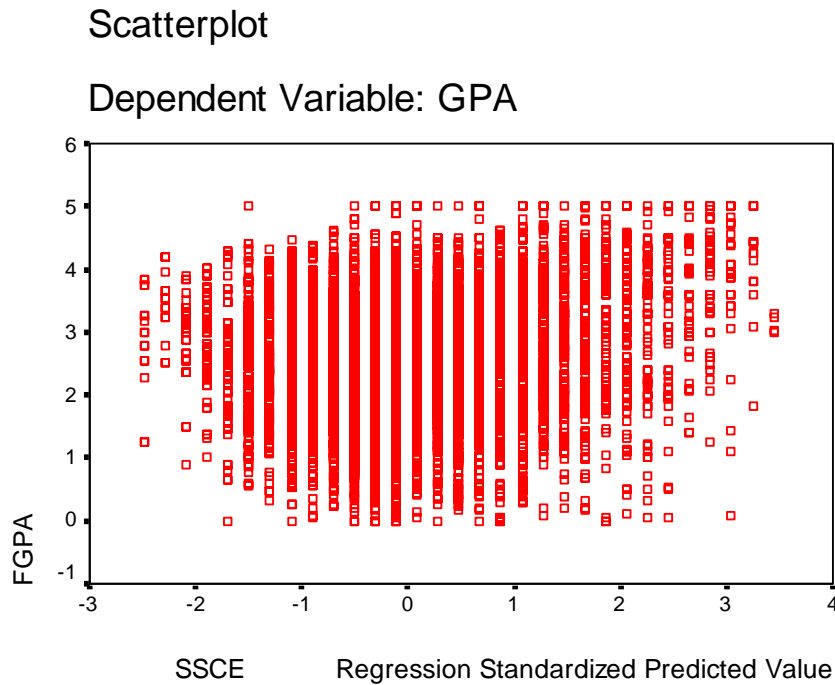
Similarly, Table 6 presents the result of the linear regression of UME scores and FGPA. The analysis shows that UME scores accounted for a significant but very low amount of variation in the FGPA ($R^2= 0.028^*$; $F_{1,7669} = 223.01^*$; $P<0.001$). The low variance (2.8%) could be attributed to the effect of restricted range in the sample. In addition to accounting for a significant amount of variance in the FGPA, the regression analysis yielded significant beta weight ($\beta = 0.0559^*$; $P<0.01$).

The resulting regression equation is: **FGPA= 1.337 + 0.00559*UME**

7.2 Question 2: What is the relationship between SSCE and FGPA?

Fig 2 is a scatter diagram of the relationship between students' performance in SSCE and FGPA.

Figure 2: Scatter diagram of SSCE Results by FGPA



As in the case of UME, the scatter diagram of performances in SSCE and FGPA while showing a linear trend, also suggests that some factors other than SSCE affect FGPA.

Again, the correlation analysis shows a positive and significant relationship between the performance in SSCE and the performance in first year of university education ($r=0.167$, $P<0.01$). (See Table 7)

Table 7: Summary of the linear regression of SSCE with FGPA

	R	R ²	F(df=1,7669)	B	t(df= 1.7764)	A
SSCE	0.167	0.028*	223.08	0.0316*	14.936	1.721

Like the UME scores, the linear regression of SSCE scores with FGPA also accounted for a significant but very low amount of variance in the FGPA ($R^2=0.028^*$; $F_{1,7669} = 223.08$; $p<0.01$). Again, the low value of the R^2 can be attributed to the effect of restricted range in the sample. Also, the resulting beta weight is significant ($\beta = 0.0316^*$; $p< 0.01$).

The resulting regression equation is: **FGPA= 1.721 + 0.0316*SSCE**

7.3 Question 3: What is the combined influence of SSCE and UME on FGPA?

Simultaneous Multiple Regression Analysis was carried out to assess the combined influence of SSCE and UME on FGPA. The results are presented in Table 8

Table 8: Summary of Multiple Regression Analysis of SSCE and UME with FGPA

Variables	R	R ²	F - value	I = R ² Change
UME	0.168	0.028*	223.01* (1,7669)	-
UME+ SSCE	0.232	0.054*	217.997* (2,7632)	0.026*

*P<0.01

The Table shows that when performance in UME is combined with performance in SSCE, the ability of the respective test scores to predict performance at first year university education is enhanced significantly. The combined effect of UME and SSCE accounts for about 5.4% in the variance of FGPA. Similarly, the unique contribution of SSCE beyond the variance due to UME is also significant (R²= 2.6%).

The regression equation is given as: **FGPA = 0.547 + 0.005359*UME + 0.03064*SSCE.**

The R is 0.232 and multiple R² is 0.054 with 2 and 7632 degrees of freedom is significant at p<0.01 level. The F-value (217.997) for the regression is highly significant. This shows that the two variables, taken together, significantly predict FGPA.

The R² value of 0.054 means that 5.4% of the variation is jointly explained by the UME scores and performances in SSCE. Table 8 also shows the individual contributions of UME scores and performances in SSCE. The R² change, due to addition of SSCE performance is 0.026. This means that the addition of 2.6% of variation in FGPA is accounted for by the addition of performances in SSCE.

8.0 Discussion and Suggestions

8.1 Relationship between Students' Performance in UME scores and FGPA

A significant finding with respect to the issues of degree of relationship between UME scores and FGPA is that some relationship exists between the two variables. The incidence of restricted range due to the limitations of the process of admissions may explain the very low value of the multiple correlations. It can also be said that the skills and competencies tested in the UME may not be congruent with the skills emphasized in the first year of university education. It is advisable, therefore, to the Board to take a deeper look into her examinations in terms of focus and emphasis vis -a- vis the actual

skills and competences the universities do emphasize. A step in this direction, however, was taken by the Board in 2003 in the study of skills essential for good performance at the university level (see Odor et al 2002).

Another factor that may affect the relationship is the incidence of extraneous influences which may produce such score that may differ from the students' true score. In such a case, the students' performance at the university could ultimately be at variance. The Board should continuously look at the internal characteristics of test items to ensure their validity and reliability.

Events and conditions at the institutions such as poor and/or harsh teaching environments, sorting, impersonation, intimidation through cult activities, etc are also possible factors for the low value of the relationship between UME and FGPA.

To ameliorate extraneous influences, the Board in recent times has been sourcing and using only credible examination centers where adequate spacing of candidates can be achieved and hired 'mercenaries' kept at bay. It should be pointed out that this study did not take into consideration the effect of admission criteria (i.e. merit, catchment and ELDS) on students' performances. While some students are admitted on merit based on cut-off marks, others included in this study were selected with lower UME scores on catchment and ELDS criteria. Future studies should examine the effect of admission criteria on students' performances.

8.2 Relationship between Students' Performances in SSCE and FGPA

Like in the case of UME, the degree of relationship between SSCE overall performances in the first year university education, though significant, is low. Again, as in the case of UME, one cannot rule out the issue of restricted range of scores arising from the admission process on the relationship between SSCE scores and FGPA. The low degree of relationship between SSCE and FGPA can also be explained by similar factors with that of UME scores and FGPA. Another factor is one commonality between UME and SSCE. Both of them are achievement tests and are inherently high stake examinations (i.e. SSCE for certification and UME for selection).

8.3 Influence of Combined SSCE Grades and UME Scores on FGPA

From the findings, combining SSCE and UME variables predicted performance in FGPA much more than UME or SSCE separately. The reason for the greater prediction might be that both UME and SSCE are achievement tests in orientation. Apart from this, SSCE has something unique which it brings into the equation. First, it is a mastery test. It depends partly on School-Based Assessment (SBA). For this two reasons, SSCE focuses more on the totality of knowledge the student had acquired through secondary education. The

implication of this finding is that the admission process needs to upgrade the use of SSCE result from its present position as a pre-registration screening tool to one that contributes additively with UME scores in decision making.

9.0 Conclusion

The results showed that although relationships between UME and FGPA and SSCE and FGPA were low, but significant. When UME and SSCE were combined, there was greater prediction. This is a pointer to the fact that before candidates are admitted into any university, the UME scores and the SSCE grades should be combined as composite scores for admission. It is suggested that the Board should look into the possibility of combining UME scores and SSCE grades for the purpose of admission into the university.

African universities are advised to ensure that test scores of candidates be combined with their final secondary education grade to assure better performance in university education. It is also suggested that African examination bodies should continuously carry out predictive validity studies of their various examinations to ascertain the degree of usefulness of their test scores.

References

- 1. Hayashir, P. (2005):** "The merits of the National merit scholars programmes: Questions and concerns," center for studies in Higher Education, Universities of California, Berkeley, 2005.
- 2. Joint Admissions and Matriculation Board (1994):** "The predictive validity of the University Matriculation Examination", Edited by Awobajo, O.A and Adenusi, I.A., JAMB, Lagos, 1994
- 3. A study of the predictive validity of the Universities Matriculation Examination (UME) 1998-2000 (2007):** Research monitoring and evaluation department, JAMB, Kaduna, 2007.
- 4. Kanoy, K.W., West, J. and Latta, M. (1989):** "Predicting college success of freshmen using traditional, cognitive and psychological measures", Journal of Research and Development in Education, 22, 3, 65-70, 1989.
- 5. Odor, P.I. et.al (2002):** "Identification and Appraisal of Academic skills that are Essential for Good Performance at University level in Nigeria", Research, Monitoring and Evaluation Department, JAMB, Kaduna, 2002.
- 6. Stillwell, A.L., D'Alessandro, P.S. and Reese, M.L. (2005):** Predictive Validity of the LSAT: A National summary of the 2001-2002 Correlation studies, Law School Admission Council, LSAT Technical Report 03-01-2005