
RELATIVE CONTRIBUTION OF COGNITIVE ENTRY QUALIFICATION AND SEMESTER GRADES ON MATHEMATICS ACHIEVEMENT OF ENVIRONMENTAL STUDIES STUDENTS

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ABSTRACT

The study examined relative contribution of entry qualifications (SSCE and PCCE) and semester scores (MTH 111, MTH 112, MTH 122, STA 111 and MTH 211) on academic achievement in Mathematics among Environmental Studies Students in Rufus Giwa Polytechnic, Owo. A sample of 175 students were selected using stratified random sampling techniques, from four Departments: 45 in Architectural Technology (Arch), 60 in Quantity surveying Technology (QST), 32 in Survey and Geo - Informatics Technology (SGT) and 38 in Town and Regional Planning (TRP). The instrument used was scores from the examination results: PCCE scores, SSCE results and semester results. Multiple regression analysis was used in the data analysis. The results showed that 48.68% of student's variability in academic achievement among the Environmental Studies students in the polytechnic could be attributed to a linear combination of the seven (7) variables at National Diploma (ND) level. MTH 122, STA 112, MTH 112 and MTH 111 made significant contributions to the criterion variable while PCCE, SSCE showed negative contributions.

Keywords: Relative Contribution, Entry Qualification, Semester Grades, Mathematics Achievement and Environmental Studies Students

INTRODUCTION

The ultimate goal of any human being is to achieve the objective of any project he/she sets for himself/herself in life (Alonge, 1986). Hence, achievement is central to our existence. Adeyemi (2005) stated that academic achievement is the scholastic standing of a student at a given moment. It is the ability of an individual to demonstrate his or her intellectual abilities. "Academic achievement usually refers to an expression used to represent students' scholastic standing (Lavin 1965). The award of marks by teachers and grade patterns are often been used to represent students' academic achievement standing, but the reliability of such marks is questionable. Hence several research studies have examined the relationship between attainment of academic success and cognitive or non – cognitive variables respectively. Adewumi (1985) reported a high positive correlation between the performance of students in Mock and WASC examinations. While Fowokan (1987) reported a significant relationship between students' achievement in mock Mathematics and Junior School Certificate Mathematics. Noble & Sawyer (1989) and Okwilagwe (2001) reported that SSCE is a potent predictor of undergraduate academic achievement since it exerted a direct and significant positive influence on undergraduate GPA which seems to reveal its stability in establishing predictive validity over time than the UME. WAEC (1992) reported that the Senior School Certificate Examination (SSCE) showed a positive significant relationship with

the scores obtained by undergraduate students. WAEC went further to postulate that the SSCE in its present state has fair predictive power. Agbonifo and Dimowo (1985) claimed that in their studies that JME scores correlated significantly and positively with first year undergraduate performance. Finally, Ajogbeje [1998, 2002 and 2005) reported positive correlations between scores of WASC, Semester scores, CGPA and GPA. He also reported a significant contribution of first year GPA to cognitive entry characteristics and formative evaluation. Thus, this study is designed to determine how previous knowledge and semester scores act as correlates of academic achievement in mathematics among environmental studies students.

Research Questions

In order to address the above stated problem the following research questions are raised:

- (i) To what extent would the variables (PCCE, SSCE, MTH 111, MTH 112, MTH 122, MTH 211 and STA 111) when taken together predict students CGPA at the National Diploma (ND) level?
- (ii) What is the relative contribution of the variables to the prediction?

RESEARCH METHOD

This is an ex – post facto research design in which the researcher does not have direct control on the dependent and independent variables. It only involved the collection of data from the available records. The study population consisted of all the National Diploma (ND) students in the School of Environmental Studies Technology of Rufus Giiwa Polytechnic, Owo for 2002/2003 academic session. A sample of 175 (45 from Architectural Technology department, 32 from Survey and Geo - Informatics Technology Department and 38 from Town and Regional Planning Department) students was drawn from the study population using stratified random sampling techniques. Document analysis of students' results was carried out using data proforma to record the scores. The information collected from the students record includes: Students' PCCE scores, SSCE grades in mathematics and the semester examination grades (or semester teacher – made achievement tests). The hypothesis generated was tested for significance at 0.05 using multiple regressions analysis.

RESULT AND DISCUSSION

The results of the analysis are shown in tables I and II. In determining the hypothesis generated, multiple regressions analysis was computed. The result is contained in table I.

Table 1 (a): Summary of Regression Analysis on sample Data

Multiple	R = 0.65832
	R ² = 0.48678
Adjusted	R ² = 0.41871
Standard Error	= 2.24624

Table 1 (b) Analysis of Variances

Sources of Variation	DF	SS	MS	FC	FE	Result
Regression	7	3.74796	0.75469	9.4289		
Residual	167	4.39070	0.08004			

Table 1 (a) reveal that the composite use of the seven variables and the academic achievement of students in predicting achievements in mathematics by the Environmental Studies students of polytechnic at CGPA level yielded a coefficient of multiple correlation of 0.65832 and a standard error of 2.24624. This implies that on the average, the predicted academic achievement will deviate from the true value by 2.24624 units of that measure. Table 1 (b) shows that analysis of variance for multiple regression data yielded an F – ratio of 9.4289. This implies that the coefficient of determination is significant and seven independent variables (PCCE, SSCE, MTH 111, MTH 112, MTH 211, MTH 122 and STA 111) have significant influence on the dependent variables (CGPA). The multiple correlation of 0.65832 which upheld the assumption of linearity of regression equation shows that the relationship between the dependent variable (CGPA) and the seven independent variables (PCCE, SSCE, MTH 111, MTH 112, MTH 211, MTH 122 and STA 111) is reasonable.

Table II: Test of significance of Regression Coefficients

S/N	Variables	Regression Coefficient	Standard Error	T
1	PCCE	0.042964	0.027923	0.244
2	SSCE	-0.004895	0.040115	-0.122
3	MTH 111	0.200657	0.081466	2.463
4	MTH 112	0.313572	0.088433	3.546
5	MTH 211	0.177676	0.073664	2.412
6	MTH 122	0.432276	0.161140	2.683
7	STA 111	0.403542	0.164110	2.784

$P < 0.05$, critical value of $t = 1.96$

Table II shows the relative contribution of each of the variable to the prediction as reflected in the values of the regression coefficients which ranges from -0.004895 to 0.432276, the standard errors ranges from 0.027923 to 0.164110 and t – values range from -0.122 to 3.546. Table II also reveals that only the t – values associated with PCCE and SSCE are not significant at $P < 0.05$ level of significance. The result of this study reveals that 48.68% of the variability in academic achievement among polytechnic Environmental Studies Students is accounted for by a linear combination of the seven variables at National Diploma level leaving 51.32% un – accounted for. The result also shows that semester scores (MTH 122, STA 111, and MTH 112) has the highest predictive strength of all the variables. The result reveals that MTH 122 made the highest contribution to the prediction followed by STA 111, MTH 112, MTH 111 and MTH 211 in that order. The result that MTH 122, STA 111, MTH 112 and MTH 111 made a significant contribution to the prediction of academic achievement of Environmental studies students supported the view expressed by Ajogbeje (1998 and 2002). The negative contribution of PCCE and SSCE to the prediction of academic achievement

among environmental student in the polytechnic is at variance with the report of Yoloye (1982), Abdullahi (1983); WAEC (1992) and Okwilagwe (2001).

CONCLUSION AND RECOMMENDATIONS

The negative contribution of SSCE and PCCE might be due to prevalent assistance ("Miracle Centre" and Examination leakages) given to students during these examinations. Examination leakages and cheating or misbehaviours must be curbed. The coefficient of determination $R^2 = 0.48678$; which indicates that only 48.68% of the total variation in CGPA are explained by the regression equation leaving 51.32% unexplained, shows that there are other factors, which influenced students' academic achievement in higher institution other than their previous knowledge and semester scores. These other factors such as availability of training materials, adequate library facilities and student – lecturer interaction must be addressed in order to improve learning/teaching environments.

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