



## Potential Risk Factors Affecting Students' Academic Performance in Ado-Ekiti, Nigeria

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### Abstract

Academic attainment is a key factor that is required of would-be employees in any establishment. This study aimed at determining the effect of family factors, personal factors, peer-pressure factors and other factors on students' academic performance. Data on basic factors that affect students' performances were obtained with the use of structured questionnaire, 100 questionnaires were distributed to students in the study area, out of which 42 of the students were male and 58 were female, the questionnaire consists of two sections, section A of the questionnaire sourced information on the socio-demographic profile of the respondents while section B was based on questions on a 5-point Likert scale that were categorized into four groups. Each of the categories consisted of five questions. The collected data were analyzed using multiple regression (matrix notation) approach. The results indicated that peer-pressure, family factors and personal factors had effect on students' academic performance in higher institutions while some other factors such as extra-curricular activities, parental income and socio-economic status also had effects on the students' performance in higher institutions. The study concluded that apart from solid and sound secondary school background, which impact positively on students' academic performance, family background, social economic status and school environment play a crucial role in students' academic performance.

**Keywords:** Academic performance, peer-pressure, family factors, regression analysis, matrix notation

### INTRODUCTION

Students constitute the most essential part of any educational institution because schools at different levels have no value without students. The country's social-economic development is directly related to a sound educational system. The student's academic achievement is vital in producing the best graduates who will become great leaders and manpower for society and the country (Ali *et al.*, 2009). Education is one of the most critical aspects of human resource development. Academic achievement is one of employers' main factors in engaging workers, especially fresh graduates (Kuh *et al.*, 2006). Thus, students at all levels need to put in their best in their studies to achieve good grades, prepare themselves for future opportunities in their chosen careers, and fulfill the employer's demands. Students' grades also determine the quality of education the teachers have passed to the students at primary and secondary school levels (Galabawa & Lwaitama, 2008).

Poor academic performance in the university might spell doom for a student in the labour market. Several factors affect students' academic performance, including students' learning skills, financial status, parental

background, peer influence, Teachers' quality, and learning infrastructure (Karemera *et al.*, 2003). The government has intervened through scholarship, training of the Lecturers, provision of infrastructure, and so on to improve academic performance (Ali *et al.*, 2013). Nevertheless, academic performance in Nigerian universities has been deteriorating, especially in the public sector, because of poor government funding, poor lecturers' welfare, depreciation of the societal values system, and poor infrastructures, among others.

Students' academic achievement is measured through their performance across various academic subjects. Teachers and education officials typically measure achievement using classroom performance, graduation rates and results from standardized tests (Rasberry, *et al.*, 2011). Several factors also affect academic performance, including admission points, self-efficacy, strategic studying techniques, socio-economic status, and school background (Karemera *et al.*, 2003). Entrance points and the different entry qualifications into higher institutions at different levels affect the student's academic performance in tertiary institutions all over the world, including Nigeria, use prior academic

performance in terms of admission points or different entry qualifications/certificates as a basis for admitting students for admission into the higher institutions (Amasuomo, 2014). These entrance points or entry certificates are always of equivalent rating or value, even though different examination bodies may award them. Thus, students' entry points and achievement at the entry-level are good indicators of the future academic performance of the Universities. Entry qualifications linked to different certificates of equivalent value for student admission into institutions are another factor that affects the student's academic performance at the university level. The type of secondary school a child attends also affects the student's academic performance in higher institutions (Malekela, 2006).

Findings show that the quality of the schools attended at all levels will have an independent effect on the students' educational attainment, and actualizing their dream academically is a significant key to guaranteeing success in their careers (Gasti et al., 2015). Good grades in academic performance, measured by tests, assignments, attendance, and examination grades, are one of the major goals of every student (Wilder, 2014). This study carried out a multiple regression analysis of the data collected on students' academic performance in the study area. The matrix notation of multiple linear regression was chosen because it allows for a more compact framework in terms of predictors representing the observations, levels of regressor variables, regression coefficient and random errors.

**Materials and Methods**

Data for this study was sourced through the well-structured questionnaire administered to 100 students from the faculty of Science, Ekiti State University Ado-Ekiti, Ekiti State, Nigeria. Section A contained information on the social-demographic status of the respondents while section B consisted of questions on a 5-point Likert scale that were categorized into four groups. (peer-pressure, personal factors, family factors and other factors) emanating from the student's attitude and his level of relationship with other students in the university.

**Methods**

The multiple regression equation model is given by

$$\gamma_1 = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_k + \epsilon_i$$

where the  $\beta_{i's}$  are the regression coefficient. the n-tuples of observations are also assumed to follow the same model. Thus, they satisfy

$$\begin{aligned} \gamma_1 &= \beta_0 + \beta_1 x_{11} + \beta_2 x_{21} + \dots + \beta_k x_{k1} + \epsilon_1 \\ \gamma_2 &= \beta_0 + \beta_1 x_{12} + \beta_2 x_{22} + \dots + \beta_k x_{k2} + \epsilon_2 \\ &\dots\dots\dots \\ \gamma_k &= \beta_0 + \beta_1 x_{1k} + \beta_2 x_{2k} + \dots + \beta_k x_{kk} + \epsilon_k \end{aligned}$$

If we have K joint observation in Y the general linear regression model in matrix form is given as;

$$Y = X\beta + \epsilon$$

$$\underline{Y} = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_n \end{bmatrix} \quad \underline{X} = \begin{bmatrix} 1 & X_{11} & X_{21} & \dots & X_{k1} \\ 1 & X_{12} & X_{22} & \dots & X_{k2} \\ \vdots & \vdots & \vdots & \dots & \vdots \\ 1 & X_{1n} & X_{2n} & \dots & X_{kn} \end{bmatrix} \quad \underline{\beta} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_k \end{bmatrix} \quad \underline{\epsilon} = \begin{bmatrix} \epsilon_1 \\ \epsilon_2 \\ \vdots \\ \epsilon_n \end{bmatrix}$$

Y is an n X 1 dimensional random vector containing the observations, X is an n X ( K X 1) matrix determined by the predictors,  $\beta$  is a ( K X 1) X 1 vector of unknown parameters, and  $\epsilon$  is an n X 1 vector random errors.

To determine the vector of least squares estimators  $\beta$ , which provides the least possible value to the sum of the squares difference between  $\bar{y}$  and y.  $\beta$  in matrix form generated equation 2. The estimate of the error term was derived as

$$\underline{Y} = X\beta + \underline{\epsilon}$$

$$\underline{\epsilon} = \underline{Y} - X\underline{\beta}$$

$$\begin{aligned} L &= \underline{\epsilon}'\underline{\epsilon} = (y - X\beta)'(y - X\beta) \\ &= y'y - y'x\beta - \beta'x'y + \beta'x'x\beta \\ &= y'y - \beta'x'y - \beta'x'y + \beta'x'x\beta \\ &= y'y - 2\beta'x'y + \beta'x'x\beta \\ &= \frac{dL}{d\beta} = -2x'y + 2\beta x'x \end{aligned}$$

$$= -2x'y + 2x'x\beta$$

Where ( $\beta' = \beta$ )

$$= 2x'x\beta = 2x'y$$

$$x'x\beta = x'y$$

To get  $\beta$  you pre-multiply by  $(x'x)^{-1}$

$$\beta = (x'x)^{-1} x'y$$

The statistical properties of the square estimation  $\hat{\beta}$  may be investigated as

$$\begin{aligned} E(\hat{\beta}) &= E(x'x)^{-1} x'y \\ &= (x'x)^{-1} x'E(y) \\ &= (x'x)^{-1} x'E[x\beta + E] \\ &= (x'x)^{-1} x'(x\beta + 0) \\ &= (x'x)^{-1} x'x\beta + 0 \\ E(\hat{\beta}) &= \beta \end{aligned}$$

**VARIANCE ESTIMATOR**

The error variable ( $S^2$ ) and variance of  $b_0, b_1, b_2 \dots b_p$  should be computed so that tests of significance of the coefficients can be carried out and confidence intervals can be constructed if required. The error sum of square is

$$\sum e_i^2 = (Y_i - \hat{y})^2$$

In matrix notation, we have

$$e'e = (Y - xb)'(Y - xb)$$

$$e'e = y'y - b'x'y$$

$$y'y = [y_1, y_2, \dots, y_p] \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_p \end{bmatrix} = \sum Y_i^2$$

$$b'x'y = [b_0 b_1 b_2] \begin{bmatrix} \sum y_i \\ \sum X_{1i}y_i \\ \sum X_{2i}y_i \end{bmatrix} = b_0 \sum Y_i + b_1 \sum X_{1i}y_i + b_2 \sum X_{2i}y_i$$

$$\begin{aligned} e'e &= y'y - b'x'y \\ &= \sum e_i^2 \end{aligned}$$

Having obtain  $e'e$  which is the scalar, the estimate of the variance is

$$S^2 = \frac{e'e}{n - p}$$

Where p is the number of parameters i.e  $b_0, b_1, b_2 \dots$

$n-p$  is the degree of freedom.

$n$  is the number of observations. Since we have the variance of error, w

$$varb = S^2 (x'x)^{-1}$$

$$Var \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix} = S^2 \begin{bmatrix} n & \sum x_{1i} & \sum x_{2i} \\ \sum x_{1i} & \sum x_{1i}^2 & \sum x_{1i}x_{2i} \\ \sum x_{2i} & \sum x_{2i}x_{1i} & \sum x_{2i}^2 \end{bmatrix}$$

Let the inverse of the  $x'x$  matrix above be a V matrix i.e.

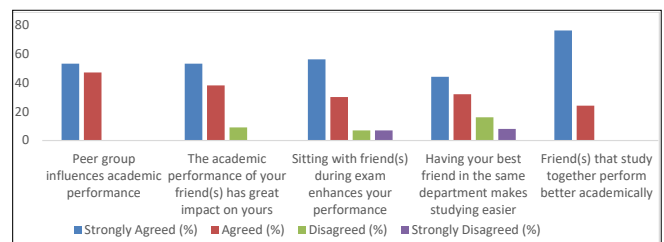
$$(x'x)^{-1} \text{ matrix} = V \text{ matrix}$$

$$Var \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix} = S^2 \begin{bmatrix} V_{11} & V_{12} & V_{13} \\ V_{21} & V_{22} & V_{23} \\ V_{31} & V_{32} & V_{33} \end{bmatrix}$$

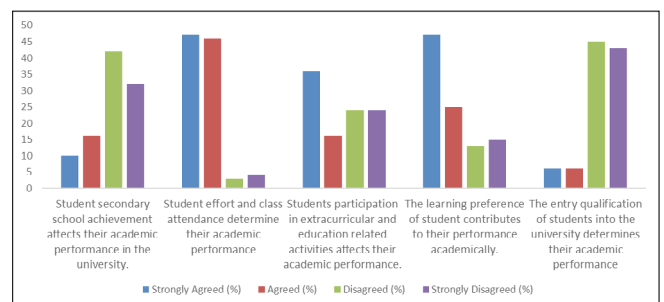
Thus, the variance – covariance matrix is

$$Var \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix} = \begin{bmatrix} S^2V_{11} & S^2V_{12} & S^2V_{13} \\ S^2V_{21} & S^2V_{22} & S^2V_{23} \\ S^2V_{31} & S^2V_{32} & S^2V_{33} \end{bmatrix}$$

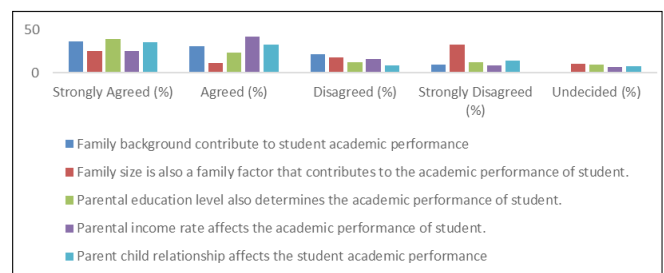
**Descriptive statistic of how students were affected with the factors**



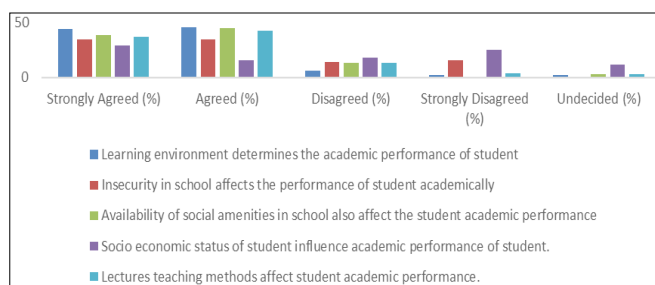
**Fig. 1.** Pictorial Representation of Influence of Peer Group on Academic Performance



**Fig.2.** Pictorial Representation Personal Factors Has Influence on Student's Academic Performance



**Fig. 3.** Pictorial Representation of Family Factors Has Influence on Student's Academic Performance



**Fig.4.** pictorial Representation of other Factors Has Influence on Student's Academic Performance

## RESULTS

The results depicted that peer pressure, personal factors, family factors, and other factors strongly influence 90.6, 51, 64.4 and 73.8 %, respectively, on students' academic performance. The regression coefficient of peer pressure as a factor revealed that, for a unit increase in peer pressure, there was an associated 0.187 unit decrease in the students' performance in higher institutions; also, for a unit increase in the class attendance, there was an associated 0.274 unit decrease in the students' performance, again, for a unit increase in extra curriculum activities, there was an associated 0.223 unit decrease in the students' performances, and finally for a unit increase in friend's impact, there was an associated 0.092 unit increase in the students' performances in the study area. The variance of the data set is 0.1449, 0.0075, 0.0149, 0.0055, and 0.0068, intercept displayed the highest variance, whereas participation in class activities displayed the lowest variance. The covariance of intercept and accept, performance, participation and learning are all negatives which implies that when intercept increases all other factors decreases and vice versa. This indicates that with the positive influence of peer pressure, class attendance, extra curriculum, and friend's impact, there will be positive academic performance academically; otherwise, the outcome will be poor academic performance. (Table 1& 2).

Personal factors: there are five factors contributing to students' academic performance in higher institutions; based on students' factors, the result revealed that for a unit increase in students' personal effort based on secondary school achievement, there was an associated 0.189 unit decrease in the students' performance, for a unit increase in the class attendance of the students as a personal effort, there was an associated 0.273 unit decrease in the students' performance, for a unit increase of students' participation in extracurricular activity there was an associated 0.234 unit decrease in the students' performances in the study area, and for a unit increase in preference to education there was an associated 0.093 unit increase in the students' performance. The

variance of the data set is 0.145, 0.0075, 0.0149, 0.0055, and 0.0068; intercept displayed the highest variance, whereas participation in class activities displayed the lowest variance. The covariance of intercept and accept, performance, participation, and learning are all negatives, which implies that when intercept increases, all other factors decrease and vice versa. This indicates that students with solid academic backgrounds and good participation in extracurricular activities will perform better in higher institutions. (Table 3). Family factor is a key factor that affects students' academic performance in higher institutions. The result revealed that for a unit increase in the family background, there was an associated 0.249 unit decrease in the students' performance, for every one unit in the family size there was a relationship of 0.203 unit decrease in the students' performance, for every one unit increase in parental educational there was an associated 0.220 decrease in the students' performances in the study area, again for every one unit in the parental income there was an associated 0.195 unit decrease in the students' performance and finally on family factor for every one unit in the relationship between the parent and children there was an associated 0.041 unit increase in the student's performance. (Table 4). The variance of the data set is 0.3464, 0.0163, 0.0088, 0.0078, 0.0112, and 0.0086; intercept displayed the highest variance, whereas the relationship in-class activities displayed the lowest variance. The covariance of intercept and accept, performance, participation, and learning are all negatives, which implies that when intercept increases, all other factors decrease and vice versa. This indicates that family size, parental income, and parent relationship positively influence students' performance when they get to higher institutions. (Table 4). Other factors contribute to students' academic performance in higher institutions; based on these factors, the result revealed that for a unit increase in the learning environment, there was an associated 0.159 unit decrease in the students' performance, and for a unit increase in security as a factor there was an associated 0.274 unit decrease in the students' performance, for a unit increase in availability of internet facility there was an associated 0.2987 unit decrease in the students' performances in the study area, and for a unit increase in teaching methods there was an associated 0.2256 unit increase in the students' performance. The variance of the data set is 0.3646, 0.079, 0.0150, 0.0267, and 0.0108; intercept displayed the highest variance, whereas participation in class activities displayed the lowest variance. The covariance of intercept and accept, performance, participation, and learning are all negatives, which implies that when intercept increases, all other factors decrease and vice versa. This indicates that to have a positive influence on

students' performance in higher institutions, the learning environment must be very conducive, the availability of the Internet for easy access to materials online, and the teaching methods must be modern in nature. Finally, the school management must consider lecturers' teaching methods. (Table 5)

**Table 1:** Degree of influence of the different factors on the students' academic performance

Categories of factors	Degree of influence		
	Strong	Moderate	Negligible
Peer pressure	90.6	6.4	3
Personal	51	25.4	23.6
Family	64.4	22.8	15.8
Others	73.8	16.8	9.4

**Table 2:** Regression coefficient and variance-covariance matrix on peer pressure factors

Qualification	Intercept	Affects	Performance	Participation	Learning
<b>Regression coefficient</b>					
	4.5960376	-0.1868795	-0.273739	-0.2230565	0.0919552
<b>Variance-covariance matrix</b>					
	Intercept	Accept	Performance	Participation	Learning
Intercept	0.1449	-0.0218	-0.0179	-0.0138	-0.0063
Accept	-0.0218	0.0075	-0.0023	-0.00009	0.0019
Performance	-0.0179	-0.0024	0.0149	0.0036	-0.0041
Participation	-0.0138	-0.00009	0.0036	0.0055	-0.0025
Learning	-0.0063	0.0019	-0.0041	-0.0025	0.0068

**Table 3:** Regression coefficient and variance-covariance matrix for personal factors

Qualification	Intercept	Affects	Performance	Participation	Learning
<b>Regression coefficient</b>					
	4.5970376	-0.1886795	-0.273739	-0.2340565	0.0929552
<b>Variance-covariance matrix</b>					
Intercept	0.145	-0.022	-0.018	-0.014	-0.006
Accept	-0.0218	0.0075	-0.0023	-0.00009	0.002
Performance	-0.018	-0.003	0.0149	0.0036	-0.0041
Participation	-0.014	-0.00009	0.0036	0.0055	-0.0025
Learning	-0.006	0.0019	-0.0041	-0.0025	0.0068

**Table 4:** Regression coefficient and variance-covariance matrix for family factors

Education	Intercept	Family	Size	Parental	Income	Relationship
	4.7276	-0.2487	-0.2028	-0.2195	-0.1950	0.0408
<b>Variance-covariance matrix</b>						
Intercept	0.3464	-0.0439	-0.0433	-0.0154	-0.0234	-0.0129
Family	-0.0439	0.0163	0.0046	0.0010	-0.0025	0.0003
Size	-0.0433	0.0046	0.0088	0.0011	0.0022	0.0004
Parental	-0.0154	0.0010	0.0011	0.0078	-0.0007	-0.0027
Income	-0.0234	-0.0025	0.0022	-0.0007	0.0112	-0.0008
Relationship	-0.0129	0.0003	0.0004	-0.0027	-0.0008	0.0086

**Table 5:** Regression coefficient table and variance-covariance matrix for other factors

Education	Intercept	Together	Affects	Performance	Participation
	4.7999	-0.1591	-0.2738	-0.2987	-0.2256
<b>Variance-covariance matrix table</b>					
	Intercept	Together	Affects	Performance	Participation
Intercept	0.3646	-0.0739	-0.0398	-0.0502	-0.0255
Together	-0.0739	0.0791	-0.0031	0.0042	-0.0092
Affects	-0.0398	-0.0031	0.0150	-0.0028	0.0016
Performance	-0.0502	0.0042	-0.0028	0.0267	0.0040
Participation	-0.0255	-0.0092	0.0016	0.0040	0.0108

**DISCUSSION**

This study used multiple regression matrix notation analysis to determine the primary factors that affect students' academic performance in higher institutions. The choice of the method was deliberate because it allows for a more compact framework in terms of predictors representing the observations, levels of regressor variables, regression coefficient, and random errors, unlike the simple regression analysis (Kelley & Bolin, 2013).

Also, personal factors (secondary school achievement, extracurricular activities, class attendance, and preference for education) are significant contributors to students' academic performance. A similar observation has been reported by earlier researchers (Raychaudhuri et al., 2010). Their study on factors affecting students' academic performance in Ghanaian private universities indicated that students' performance in annual examinations was associated with attendance in class, family income, parents' education, and teacher-student ratio, amongst others. Also, Adeyemi and Adeyemi (2014), in a related study focused on determinants of student performance in international courses using the probit model, posited that some institutional factors such as student-teacher-ratio, lecturer's interest, teaching method, economic status were significant predictors to students' academic performance.

Again, results showed that family background, family size, parental educational level and parental income contribute to how well students will perform in higher institutions which is similar to Arora & Singh (2017), who examined the relative importance of the factors affecting students' academic performance using multiple regression analysis with dummy variable by introducing categorical variable (gender), their results indicated that teaching efficacy of educators, study habits, distractions factors and family environment of students as significant predictors to students' academic performance. Also, students' performance in annual examination is associated with students' attendance in class, family

income, mother's and father's education, teacher-student-ratio and trained teacher which is in support of Farooq et al (2011), they revealed that social economic status and parents' education have a significant effect on students' overall academic achievement.

The findings of this study depicted that other factors like learning environment, teaching methods, and school security affect students' overall academic achievement, which is akin to the study of Adediran & Oyediran, (2018); they concluded that school factors, students' factors, parental background, and teachers' factors have a profound influence on students' academic performance in higher institution which is identical to Ramli et al (2018) in their work, they concluded that E-learning system management, teaching aids of the teachers and library of learning environments like hostels, sports facilities and parking and transportation of infrastructure were all significance to impact students' achievement in higher institution. Finally, the study revealed that peer pressure and personal and family factors, among others, have a strong influence on students' academic performance, as corroborated by Nchungo (2013) which revealed that over enrolment of students, inadequate poor sanitation facilities, congestion in lecture, lack of up-to-date books in the library and seductive dressing among female students' pose as high-risk factors on students' performance.

## CONCLUSIONS

This study introduced matrix algebra of multiple linear regression to analyze the basic factors that affect students' academic performance in higher institutions. The approach enlightened the students on the basic factors that affect their academic performance. The study concludes that students with strong secondary school background, class attendance, extracurricular activities, high parental level of education, parental profession, high standard of living, lecturers' teaching methods, access to the internet, and good learning environment are significant factors that determine students' performance in higher institution. It is recommended that parents should enroll their wards in secondary schools of a high standard, and proper monitoring is required from the Parents. Again, lecturers' teaching methods need to be monitored by the management.

## CONFLICT OF INTEREST

The authors have no conflict of interest

## DECLARATION

We declare that the authors carried out the original work.

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