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STATISTICAL ANALYSIS ON THE PERFORMANCE OF STUDENTS IN SOME SELECTED MATHEMATICAL COURSES AT IBRAHIM BADAMASI BABANGIDA UNIV LAPAI, NIGER STATE

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Abstract

Multiple regression, partial correlation and chi-square analysis are statistical techniques use is measuring relationship among variables. The regression analysis gives a standard trend for the selected mathematical courses with codes MTH202, MTH201andMTH104. Where MTH202 is the subordinate variable and both MTH201andMTH104 are Auxiliary variables which was used with the regression model in the method. The partial correlation also reveals that there exist weak positive relationship between the coursesMTH202andMTH201, holding the course MTH104 constant, there also exist strong positive relationship between the two courses MTH202andMTH104, holding the course MTH201constant and there exist strong positive relationship between MTH201andMTH104, holding MTH202 constant. Chi-square analysis was used to deduce the performances of students depend on the understanding of the courses, and it indicates that there is a major contributor to the element of heteroskedasticity in the data. Lastly the manual solution was the same as that of the package.

Keywords: Partial Correlation, Multiple regression, Chi-Square and Academic performance.

1 INTRODUCTION

The significance of statistics as a tool for analysis as amplified a great deal in recent years. These days, it has grown to be a vital tool of study and research in every phase of human activities. Most statistical analysis methods are concerned with making inferences from observed data i.e. drawing valid conclusion using sampled information.

In correlation analysis, inferences are made about association between two or more variables when we have a single variable say Y and linear combination of $X_i = (X_1, X_2, X_3, \dots, X_n)$then it is known as multiple correlations.

Where Xi is a single variable and X1 X2 till Xn are the subordinate variables.

In regression analysis, we have two types of regression model.

1. Simple regression.
2. Multiple regression

Simple regression: Has one (1) autonomous variable and one (1) subordinate variable, and the model is given by $\hat{Y} = \beta_o + \beta_1 X + e_i$

Multiple regression: Has one (1) autonomous variable and more than one subordinate variables and the model is given by $\hat{Y} = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_n X_n + e_i$

Where $\beta_o, \beta_1, \beta_2, \beta_3, \dots, \beta_n$ are constant and often referred to as regression coefficient and the e_i is the error term and it is independently and normally distributed with μ = 0 and $\delta^2 \geq 0$, i.e. e_i is NID (0, δ^2). Read as (Normally and Independently Distributed)

As will be shown in the subsequent review of related literature, several studies have been conducted,on comparative studies of academic performance, but the statistical analysis on some Mathematics courses have rarely been investigated.

A study on girls science classroom environment as correlates to academic performance of girls in science. He created two research questions and a null hypothesis for the study. Questionnaire was used for the collection of data. The respondents were permitted to respond to the questionnaire items on four points liker scale. The population of the study was 200 students randomly drawn from two secondary schools sampled from, the total population of all female students in JSS II in Oji River Local Government Area of Enugu State. The data collected were analyzed using descriptive and inferential statistics. The research questions were answered using Pearson product moment co-efficient while t-test was used in testing

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the hypothesis at 0.05 level of significant. From the review of the empirical studies, it is revealed that studies have been carried out on the issue of correlation in the achievement of few subjects and the students' performance. It appears none has concentrated on the general influence of the school environment on the academic achievement of students of public secondary schools in the state. [1].

LITERATURE REVIEW OF PAST STUDIES

A related study was also examined on the effect of location of school on secondary school students' achievement in reading comprehension. The study specifically is to find out whether urban or rural school affects performance of students in secondary schools. Two hundred and sixty (260) senior secondary class 2 (SS2) students in Enugu education zone of Enugu State were used for the study.

The data collected were analyzed using mean and standard deviation. While analysis of co-variance (ANCOVA) was used to test the null hypothesis at 0.05 level of significance later it was found that location of school has significance impact on achievement in reading comprehension. [2]

There was another survey study that evaluated a school plant in terms of adequacy, usage and maintenance in secondary schools in Idemili North Local Government Education Area. The descriptive survey research method was utilized with the questionnaires as the instrument for data collection. The population of the study comprised all the principals and the teachers in post primary institutions in Idemili Education zone. Two hundred and fifty teachers formed the sample of the study. There was 90% return rate of the questionnaires. [3]. The statistical technique used in the analysis of the data was the t-test and mean score. The findings of this study included the following.

1. It was the opinions of the principals and teachers that they supply physical plant facilities in the post primary schools in Idemili North, Anambra State which include science laboratories, classroom, furniture, staffroom, facilities, library facilities and laboratory equipment.
2. The principals and teachers posited that students should not be charged for the cost of repairing of school plant. The post primary school management Board should employ store officers and other workers to be in charge of school plant including the maintenance, repairing and distributing.
3. Both the principals and teachers were of the opinions that community in which the school is located should refurbish the school plant.

Recently students have discovered a need to look for business while considering on low support because of money related requirements. The utilization of data is used to pick up from sitting through addresses can be gotten at the snap of a mouse. In reality, electronic learning approaches have changed into the request of the day. [4]

Given every single one of these degrees of progress that either makes it tremendous or pointless for understudies to go to classes, the demand that should be asked is whether non-investment impacts understudies scholarly execution. Research with respect to this issue appears to give an understanding that understudies who miss classes perform insufficiently veered from the general population who go to classes.

A study on mathematics anxiety and mathematics teacher efficacy investigated the relationship between mathematics anxiety and mathematics teacher efficacy among elementary preserves teachers. Findings revealed a significant, moderate negative relationship between mathematics anxiety and mathematics teacher efficacy ($r = -.440, p < .05$). In general, the preserves teachers with the lowest degrees of mathematics anxiety had the highest levels of mathematics teacher efficacy. The interviews indicated that efficaciousness toward mathematics teaching practices, descriptions of mathematics, and basis for mathematics teaching efficacy beliefs were associated with mathematics anxiety. [5]

Another study on the effects of mathematics anxiety on matriculation students as related to motivation and achievement" and it investigated the effects of mathematics anxiety on matriculation students as related to motivation and achievement. Subjects included 88 students who were at the end of their second semester of study. The ANOVA results showed that the mean achievement scores and motivation scores of low, moderate and high anxiety groups were significantly different. Findings also revealed a low($r = -0.32$)but significant ($p < 0.05$) negative correlation between mathematics anxiety and achievement and also a strong ($r = -0.72$) significant ($p < 0.05$) negative correlation between mathematics anxiety and motivation. The study also revealed a significant low positive correlation ($r = 0.31$) between motivation and achievement. [6]

Similarly and in a more technical way [7] conducted "a study on relationship between anxiety and academic achievement of B.Sc math students". The objectives of this study are:

I. to find out the level of anxiety of B.Sc mathematics students;
II. to find out the level of academic achievement of B.Sc mathematics students;
III. to find out the relationship between anxiety and academic achievement of B.Sc mathematics.

2. METHODOLOGY, PARAMETER/TOOLS AND DATA PRESENTATION

2.1 METHODOLOGY

The study was conducted using the following statistical techniques: Multiple regression, Partial correlation, and Chi-square analysis.

2.2 PARAMETER/TOOLS

The study used ten (10) different students of six (6) different academic sessions ranging from 2010/2011 to 2015/2016 studying the mathematics courses i.e ($MTH202, MTH201 and MTH104$).

2.2.1 MULTIPLE REGRESSION

The multiple regression model for two independent variables is given by

$$\hat{Y} = \beta_o + \beta_1 X_1 + \beta_2 X_2 + e_i$$

Where $\hat{y}$ is the predicted value of y.

$x_i = (x_{i1}, x_{i2})$, for $i = 1,2,3, \ldots, n$ is called the independent variable e_i is the error term

$\overline{Y} = \overline{X\beta}$, and

$$\overline{X} = \begin{bmatrix} X_{11} & X_{12} & X_{13} & & X_{1n} \\ X_{21} & X_{22} & X_{23} & \cdots & X_{2n} \\ X_{31} & X_{32} & X_{33} & & X_{3n} \\ \vdots & & & \ddots & \vdots \\ X_{n1} & X_{n2} & X_{n3} & \cdots & X_{nn} \end{bmatrix}, \quad \beta = \begin{bmatrix} \beta_o \\ \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \\ \vdots \\ \beta_n \end{bmatrix}$$

Since n = 3; i.e. the number of courses selected. By appeal to Journal of Multivariate Analysis 7, 82-88 (1977) it follows that:

$$X'X = \begin{bmatrix} n & \sum X_1 & \sum X_2 \\ \sum X_1 & \sum X_1^2 & \sum X_1 X_2 \\ \sum X_2 & \sum X_1 X_2 & \sum X_2^2 \end{bmatrix}, X'Y = \begin{bmatrix} \sum Y \\ \sum X_1 Y \\ \sum X_2 Y \end{bmatrix}$$

Therefore $\beta = (X'X)^{-1} \times (X'Y)$, $SST = Y'Y - \mu$

Where xi, xi1 and xi2 gives the raw data, their fitted values, and residuals.

Yi outcome (response, dependent)

X'X is for taking the transpose

Σ is the sum of all values

variable Xi : predictor (explanatory, independent) variable and covariate parameters α: intercept β: slope [S]

2.2.2 PARTIAL CORRELATION COEFFICIENT

This is the correlation coefficient between any two variables, holding the third constant, thus the partial correlation can be any of the followings.

$$r_{12.3} = \frac{r_{12} - r_{13} r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$$

Where

$$r_{12} = \frac{\sum X_1 X_2 - \frac{(\sum X_1)(\sum X_2)}{n}}{\sqrt{\left[\sum X_1^2 - \frac{(\sum X_1)^2}{n}\right]\left[\sum X_2^2 - \frac{(\sum X_2)^2}{n}\right]}}$$

It is important to know that $r_{12} = r_{21}, r_{13} = r_{31} and r_{23} = r_{32}$

where r_{123} is the Student statistic for the kth term in the linear model

2.2.3 CHI-SQUARE

A statistical analysis used to test how well the distribution of a set of observed data matches a theoretical probability distribution

Hypothesis: Is an assertion or statement that may be true or false, we have the null hypothesis denoted by H_0 and also the alternative hypothesis denoted by H_A.

$\alpha = 0.05$

Test statistics: $\chi^2_{cal} = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$

Where E_{ij} is the Expected frequency and O_{ij} is the observed frequency.
Critical region: if $\chi^2_{cal} > \chi^2_{\alpha}$, reject H_o otherwise accept it.

2.2.4 HETEROSKEDASTICITY

When trying to estimate the parameters of a mathematical model, i.e $\hat{Y} = \beta_o + \beta_1 X + e_i$ the general linear regression model. In this model the assumption is that the variance of the disturbance terms is a constant, that is $E[e_i^2] = \delta^2$ for all i, and this is called homoskedastic distribution. However, when this assumption fails, then it signifies the existence of heteroskedasticity in the data set. There are two (2) major type of test available:

a. Spearman Rank correlation coefficient.
b. Goldfield Quandit test.

where b1 = β1 = partial slope of the linear relationship between the first independent variable and Y – b2 = β1 = partial slope of the linear relationship between the second independent variab. [9]

3. DATA ANALYSIS

Table 3.1: average values of the three sections

S/N	$MTH202$	$MTH201$	$MTH104$
1	49	61	63
2	61	67	69
3	50	60	57
4	51	66	63
5	50	55	57
6	56	59	62
7	52	59	62
8	44	51	57
9	50	54	58
10	57	59	66

Table 3.2: Summation table for the average computed value for courses $MTH202 = y MTH201 = x_1 and MTH104 = x_2$

S/N	y	x_1	x_2	x_1x_2	x_2^2	x_1^2	x_1y	x_2y
1	49	61	63	3843	3969	3721	2989	3087
2	61	67	69	4623	4761	4489	4087	4209
3	50	60	57	3420	3249	3600	3000	2850
4	51	66	63	4158	3969	4356	3366	3213
5	50	55	57	3135	3249	3025	2750	2850
6	56	59	62	3658	3844	3481	3304	3452
7	52	59	62	3658	3844	3481	3068	3224
8	44	51	57	2907	3249	2601	2244	2508
9	50	54	58	3132	3364	2916	2700	2900
10	57	59	66	3894	4356	3481	3363	3762
Σ	520	591	614	36428	37854	35151	30871	32075

$\sum y = 520, \sum x_1 = 591, \sum x_2 = 614, \sum x_1x_2 = 36428, \sum x_2^2 = 37854, \sum x_1 y = 30871,$
$\sum x_2 y = 32075, \sum x_1^2 = 35151, n = 10,$

$$X'X = \begin{bmatrix} n & \sum X_1 & \sum X_2 \\ \sum X_1 & \sum X_1^2 & \sum X_1X_2 \\ \sum X_2 & \sum X_1X_2 & \sum X_2^2 \end{bmatrix}$$

$$X'X = \begin{bmatrix} 10 & 591 & 614 \\ 591 & 35151 & 36428 \\ 614 & 36428 & 37854 \end{bmatrix}$$

$$(X'X)^{-1} = \frac{1}{det(X'X)} \times Adj(X'X)$$

$$det(X'X) = 10\begin{bmatrix} 35151 & 36428 \\ 36428 & 37854 \end{bmatrix} - 591\begin{bmatrix} 591 & 36428 \\ 614 & 37854 \end{bmatrix} + 614\begin{bmatrix} 591 & 35151 \\ 614 & 36428 \end{bmatrix}$$

$$= 10(1330605954 - 1326999184) - 591(22371714 - 22366792) + 614(21528948 - 21582714)$$

$$= 146474$$

Since the determinant is not zero i.e$|(X'X)| \neq 0$. Then the inverse exist

Therefore the model is

$$\hat{Y} = \beta_o + \beta_1 X_1 + \beta_2 X_2 + e_i$$

$$\hat{Y} = -6.6300 + 0.0542X_1 + 0.9027X_2 + e_i$$

Where a = β0 = the Y intercept, where the regression line crosses the Y axis • b1 = β1 = partial slope for X1 on Y – β1 indicates the change in Y for one unit change in X1, controlling for X2 • b2 = β2 = partial slope for X2 on Y – β2 indicates the change in Y for one unit change in X2, controlling for X1

To solve the associated analysis of variance (ANOVA) under multiple regression. We can see then below table for more analysis

Table 3.3: **The ANOVA table structure of computed values**

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARE	MEAN SUM OF SQUARE	F RATIO
REGRESSION (β)	$3-1=2$	139.7107	$\frac{139.7107}{2} = 69.8554$	
ERROR	$10-3=7$	68.2893	$\frac{68.2893}{7} = 9.7556$	$\frac{69.8554}{9.7556} = 7.1605$
TOTAL	$10-1=9$	208		

$F_\alpha i.e F_{\alpha 1,2,0.05} = 9.55$

Decision: since $F_{cal} < F_\alpha i.e 7.1605 < 9.55 at 0.05$ level of significance, we accept H_o and conclude that there is no significant difference among the courses.

3.1 DATA ANALYSIS USING PARTIAL CORRELATION:

$\sum x_1 = 520, \sum x_2 = 591, \sum x_3 = 614, \sum x_2x_3 = 36428, \sum x_3^2 = 37854, \sum x_1x_2 = 30871,$
$\sum x_1x_3 = 32075, \sum x_2^2 = 35151, \sum x_1^2 = 37854, n = 10.$

$$\therefore r_{12} = \frac{\sum X_1X_3 - \frac{(\sum X_1)(\sum X_3)}{n}}{\sqrt{\left[\sum X_1^2 - \frac{(\sum X_1)^2}{n}\right]\left[\sum X_2^2 - \frac{(\sum X_2)^2}{n}\right]}}$$

$$= \frac{30871 - \frac{(520)591}{10}}{\sqrt{\left[(27248) - \frac{(520)^2}{10}\right]\left[35151 - \frac{(591)^2}{10}\right]}}$$

$$= \frac{139}{215.32} = 0.6455$$

Where: central concept in partial correlation analysis is the partial correlation coefficient r12 and x between variables x, adjusted for a third variable x. Both x values are presumed to be linearly related to x and partial correlation coefficient between x and y adjusted for x may be computed from the pairwise values of the correlation between variables x (x1x3, x1 x2)

INTERPRETATION:
There exist a strong positive relationship between only the two courses *MTH*202and *MTH*201.

3.2 DATA ANALYSIS USING CHI-SQUARE:
H_0: The performance of the students depends on the understanding of the courses.
H_A: The performance of students is independent of the understanding of the courses.
$\alpha = 0.05$.
Test statistics: $\chi^2_{cal} = \sum \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$
where: here the summation of the population mean is a parameter, while the sample mean is a statistic ... The opposite is a nonparametric test, which doesn't assume anything about the population parameters. [10]

Table 3.4: Table of expected frequency

S/N	*MTH*104	*MTH*201	*MTH*202	*TOTAL*
1	52.15	59.27	61.57	173
2	59.38	67.49	70.12	197
3	50.34	57.21	59.44	167
4	54.26	61.66	64.06	180
5	48.83	55.50	57.66	162
6	53.35	60.64	63.00	177
7	52.15	59.27	61.57	173
8	45.82	52.07	54.10	152
9	48.83	55.50	57.66	162
10	54.86	62.35	64.78	182
TOTAL	520	591	614	1725

Therefore $\chi^2_{cal} = 1.9382$
And $\chi^2_{\alpha(c-1)} = \chi^2_{0.05(9)} = 16.919$
Decision:
Since $\chi^2_{cal} < \chi^2_{tab}$ i.e $1.9382 < 16.919$ we accept H_0, and conclude that the performances of students depend on the understanding of the courses.

3.3 HETEROSKEDASTICITY ANALYSIS USING SPEARMAN RANK CORELATION
$MTH202 = y$, $MTH201 = x_1$ and $MTH104 = x_2$
$\sum y = 520, \sum x_1 = 591, \sum x_2 = 614, \sum x_1 x_2 = 36428, \sum x_1^2 = 37854, \sum x_1 y = 30871,$
$\sum x_2 y = 32075, \sum x_2^2 = 35151, n = 10.$

$$X'X = \begin{bmatrix} n & \sum X_1 & \sum X_2 \\ \sum X_1 & \sum X_1^2 & \sum X_1 X_2 \\ \sum X_2 & \sum X_1 X_2 & \sum X_2^2 \end{bmatrix}$$

$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e_i$

$\hat{Y} = -6.6300 + 0.0542X_1 + 0.9027X_2 + e_i$

Thus we have:

$\hat{Y}_i = -6.6300 + 0.0542X_1 + 0.9027X_2 + e_i$

For $i = 1$

$\hat{y}_1 = -6.6300 + 0.0542(61) + 0.9027(63)$

$\hat{y}_1 = 53.5463$

For $i = 10$

$\hat{y}_{10} = -6.6300 + 0.0542(59) + 0.9027(66)$

$\hat{y}_{10} = 56.146$

To obtain the associated error

We have

$e_i = y_i - \hat{y}_i$

for $i = 1, 2, 3, \ldots, 10$

for $i = 1$

$e_1 = y_1 - \hat{y}_1$

$e_1 = 49 - 53.5463$

$e_1 = -4.5463$

for $i = 10$

$e_{10} = y_{10} - \hat{y}_{10}$

$e_{10} = 57 - 56.146$

$e_{10} = 0.854$

Table 3.4.2: **The breakdown table for the standard averaging of the courses**

S/N	$\lvert e_i \rvert$	x_1	x_2	Re_i	Rx_1	Rx_2
1	4.5463	61	63	10	8	7.5
2	1.7123	67	69	4	10	9
3	1.9541	60	57	5	7	2
4	2.8173	66	63	7	9	7.5
5	2.1951	55	57	6	3	2
6	3.4648	59	62	8	5	5.5
7	0.5352	59	62	1	5	5.5
8	3.5881	51	57	9	1	2
9	1.3466	54	58	3	2	4
10	0.854	59	66	2	5	8

Table 3.4.2: Continuation of the average table of the summed and subtracted values

S/N	Re_i	Rx_1	Rx_2	$Dx_1 = Re_i - Rx_1$	$Dx_2 = Re_i - Rx_1$	${Dx_1}^2$	${Dx_2}^2$
1	10	8	7.5	2	2.5	4	6.25
2	4	10	9	-6	-5	36	25
3	5	7	2	-2	3	4	9
4	7	9	7.5	-2	-0.5	4	0.25
5	6	3	2	3	4	9	16
6	8	5	5.5	3	2.5	9	6.25
7	1	5	5.5	-4	-4.5	16	20.25
8	9	1	2	8	7	64	49
9	3	2	4	1	-1	1	1
10	2	5	8	-3	-6	9	36
Total						156	169

$Rx_1 = 1 - \frac{6\sum {Dx_1}^2}{n^3 - n}, Rx_1 = 1 - \frac{6(156)}{10^3 - 10},$
$Rx_1 = 0.0545 similarly:$
$Rx_2 = 1 - \frac{6\sum {Dx_2}^2}{n^3 - n}, Rx_2 = 1 - \frac{6(169)}{10^3 - 10}$
$Rx_2 = -0.0242$

INTERPRETATION

From the above analysis $Rx_1 = 0.0545$ (ie $MTH201$) is a major contributor to the heteroskedasticity and$Rx_2 = -0.0242$ (ie $MTH104$)indicates that $Rx_2$is the element of heteroskedasticity in the data.

Table 3.5: **DATA ANALYSIS of the study USING S.P.S.S (Regression) Coefficients**[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	(Constant)	-6.630	15.440		-.429	.681
	MTH201	.054	.319	.056	.170	.870
	MTH104	.903	.384	.778	2.352	.051

a. Dependent Variable: MTH202
b. Predictors: (Constant), MTH104, MTH201

INTERPRETATION

From table of coefficients the trend is the same as that of manual computation: i.e.

$\hat{Y} = -6.630 + 0.054X_1 + 0.903X_2 + e_i$

Correlations

Control Variables			MTH201	MTH104
MTH202	MTH201	Correlation	1.000	.523
		Significance (2-tailed)	.	.149
		Df	0	7
	MTH104	Correlation	.523	1.000
		Significance (2-tailed)	.149	.
		Df	7	0

Table 3.6: **PARTIAL CORRELATION HOLDING MTH 202 CONSTANT**

INTERPRETATION

There exist strong positive relationship between the two courses $MTH202$ and $MTH201$, holding $MTH104$ constant.

4. RESULTS AND DISCUSSION:

This research work was carried out to determine the performance of student in some selected courses i.e. (MTH202, MTH201$andMTH104$). The data was collected secondarily from the examination and record offices, department of Mathematics and Computer Sciences, with the sample size of ten (10) students for six (6) different academic sessions that studied MTH202, MTH201$andMTH104$. The students were randomly selected using random sampling table. [11] [12]

The statistical techniques used are multiple regression, partial correlation and chi-square. And also comparing the result of the multiple regression and partial correlation using statistical package for social sciences (S.P.S.S) to the manual computation method [13] [14].

Based on the finding of the study using the given information, the regression analysis gives a standard trend for MTH202, MTH201$andMTH104$. Where MTH202 is the subordinate variable and both MTH201$andMTH104$ are Auxiliary variables. And the regression model is given by:

$Y = -6.6300 + 0.0542X_1 + 0.9027X_2 + e_i$, this model can be used in predicting for $MTH202$since it is the dependent variable. The partial correlation also reveals that there exist weak positive relationship between $MTH202$and $MTH201$, holding $MTH104$ constant, there also exist strong positive relationship between $MTH202$ and$MTH104$, holding $MTH201$ constant and there exist strong positive relationship between$MTH201$and $MTH104$, holding $MTH202$ constant [15] [16]. The chi-square analysis also deduce that the performances of students depend on the understanding of the courses. The heteroskedasticity revels that $Rx_1 = 0.0545$ (ie $MTH201$) is a major contributor and$Rx_2 = -0.0242$ (ie $MTH104$)indicates that $Rx_2$is the element of heteroskedasticity in the data set.

5. RECOMMENDATION

From the findings, the following recommendations are drawn from this research work: - [17] [18]

1. Students should put more effort in their course of study likewise; Lecturers should put all efforts in teaching the student since they have influence on the students performance in their course of studies.
2. Most mathematical courses are prerequisite courses to various area of study, the researcher notice that other department do borrow mathematical courses at higher level without understanding the basis, which is a setback to some students whom might have understood the basis, i.e. the related course at the lower level, and also a setback to the lecturer that is assign with the course at higher level, in this regard the department should place a restriction, any department that wants to borrow any mathematical course, should start from the basis i.e. at the lower level courses, otherwise they should not borrow any mathematical course that is a prerequisite course.

6. Conclusion

In practice, statistics is the idea we can learn about the properties of large sets of objects or events (a population) by studying the characteristics of a smaller number of similar objects or events (a sample). Because in many cases gathering comprehensive data about an entire population is too costly, difficult, or flat out impossible, statistics start with a sample that can conveniently or affordably be observed. The output of a regression model can be analyzed for statistical significance, which refers to the claim that a result from findings generated by testing or experimentation is not likely to have occurred randomly or by chance but are instead likely to be attributable to a specific cause elucidated by the data. Having statistical significance is important for academic disciplines or practitioners that rely heavily on analyzing data and research.

The mathematical theories behind statistics rely heavily on differential and integral calculus, linear algebra, and probability theory. Statisticians, people who do statistics, are particularly concerned with determining how to draw reliable conclusions about large groups and general phenomena from the observable characteristics of small samples.

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