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Measurement Of Students Performance And Evaluation Between Medical Sociology And Modeling Techniques

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ABSTRACT

This research were tried to evaluate students' academic performance through the use of the relationship between Medical Sociology Statistics and Modeling Courses and also tried to verify the courses that contribute significantly to the variation among them. We look at correlation matrix between the pairs of variables and the result indicates that there are fairly positive correlations among some variables. Canonical correlation analysis was also employed to analyze the relationship between Medical Statistics and Modeling Statistics Courses and to also test the significance of canonical variate and the homogeneity of variance among the variables obtained with the use of Wilk's Lambda and Bartlett's test respectively. Factor analysis was used to investigate the variability among the subjects and find out the variables that contribute

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significantly to the percentage of variance obtained. The data used for the study is 400 level students', University of Ilorin, Department of statistics for 2011 to 2013 sections respectively. The data consists of results of 50 students in six courses. Two sets were formed; set-1 which consists of Demography, Bio-Statistics and Biometrics; was classified as the Medical Sociology courses, while set-2 which consists of Time Series Analysis, Econometrics and Regression; was classified as applied courses. The data was analyzed and structured into Medical Sociology and Modeling Courses. The NCSS 2007 and SPSS packages were used. The purpose of the structuring was that of gathering information needed to quantify elements which were considered in order to construct determinant factors and to as well check which of the variables contributed significantly to the variance. The results showed that Medical Sociology Courses have significant impact on determining students' academic performance. Three canonical roots were obtained and two are statistically significant showing a strong correlation between the two sets.

Keyword:Canonical Correlation,Correlation Matrix, Factor Analysis and Medical Sociology.

1.0 INTRODUCTION

However, as a measure of academic performance, teacher-given grades have well-known limitations. Grades are composite measures that account not only for students' content mastery but often for other factors such as their class participation, attitudes, progress over time, and attendance *(Blackorby, Wagner, Levine, Cameto, & Guzman, 2003).*

This study work presents canonical correlation analysis on the type of relationship that may exist between medical statistic course and modeling statistic course. Performance indicators are a means to focus on specific expectations of a program. They facilitate the curriculum delivery strategies, and assessment procedures. There is an important first step that must come before the development of performance indicators, and that is deciding on student outcomes. These are usually communicated to students in the program description, and are stated in terms that inform the students about the general purpose of the program and expectations of the faculty. The primary difference between student outcomes and performance indicators is that student

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outcomes are intended to provide general information about the focus of student learning and are broadly stated of the outcome, not measurable, while performance indicators are concrete measurable performances students must meet as indicators of achievement. Performance indicators are developed from program outcome.

1.1 FACTOR ANALYSIS OF STUDENTS' PERFORMANCE

Factor analysis is a form of exploratory multivariate analysis that is used to either reduce the number of variables in a model or to detect relationships among variables. Richard and Dean (1992) declared that the essential purpose of factor analysis is to describe, if possible, the covariance relationships among many variables in terms of a few underlying but unobservable random quantities called factors. Basically, the factor model is motivated by the following argument; suppose variables can be grouped by their correlations. That is, all variables within a particular group are highly correlated among themselves but have relatively small correlations with variables in a different group. It is conceivable that each group of variables represents a single underlying construct or factor that is responsible for the observed correlations. For example, correlations from the group of test scores in classes. French, English, Mathematics and Music collected by Spearman suggested an underlying "intelligence" factor. A second group of variables representing physical-fitness scores, if available, might correspond to another factor. It is this type of structure that factor analysis seeks to confirm.

2.0 LITERATURE REVIEW

The concept of academic failure varies in its definition. Bonaciet al. (2010) considered academic failure as the situation in which, a student does not attain the expected achievement

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according to his or her abilities, resulting in an altered personality which affects all other aspects of life. Similarly, Tapia (2002) noted that, while the current Educational System perceives that the student fails if he or she does not pass, a more appropriate way of determining academic failure is whether the student performs below his or her potential.

Wooten (1998) undertook a study of 271 students taking introductory accounting at a major South Eastern American University of which there were 74 students equal to or older than 25 years age identified as non-traditional, while 127 students were under 25 years age identified as traditional. He found that, for the traditional cohort grade history, motivations and family responsibilities all influenced the amount of effort these students made. However, neither extracurricular activities nor work responsibilities influenced their effort. However for the non-traditional students, motivation was the only variable that significantly influenced effort. Neither grade history nor extracurricular activities, nor work responsibilities, nor family responsibilities had an effect on motivations. Family activities had a significant negative impact on effort for the traditional students, but not for the nontraditional students. It is conjectured by the authors of this paper that these differences in ages may also capture different socio-economic circumstances.

Much research has been done on common predictive factors of academic performance in accounting courses, including gender, prior knowledge of accounting, academic aptitude, mathematical background, previous working experience, age, class size, lecturer attributes and student effort, as documented by Naser and Peel (1998) and Koh and Koh (1999). The findings are not definitive.

3.0 METHODOLOGY

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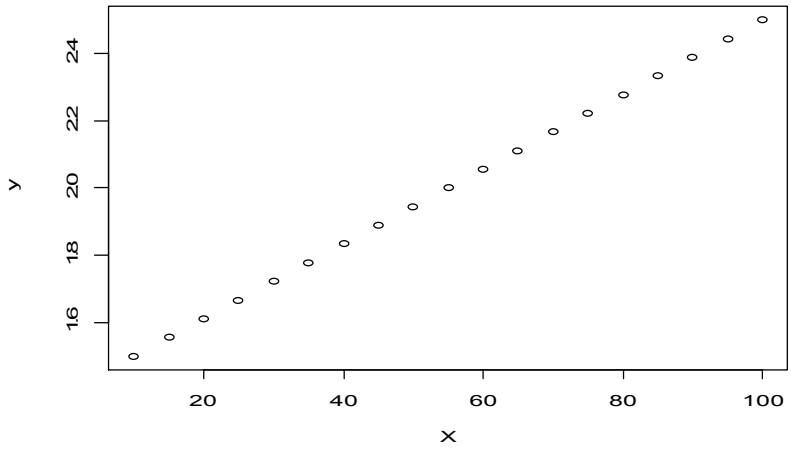
This section discuss the method of canonical correlation analysis which is the approach used in this research to determine the type of relationship that exists between the performance of students in Medical Sociology and Modeling courses.

3.1 THE SCATTER DIAGRAM

The purpose of the scatter diagram is to illustrate diagrammatically any relationships that exist between the dependent and independent variables to the extent that if it succeeds, it can help the analyst in three ways:

1. It indicates generally whether or not there appears to be a relationship between the two variables.
2. If there is a relationship it may indicate whether it is linear or non-linear.
3. If the relationship is linear, the scatter diagram will show whether it is negative or positive.



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In this case, the equation which best fits this is an equation of the form: $\boldsymbol{Y = a + bX + \varepsilon}$; where Y is an estimate of the value of y corresponding to a given values of$X$;

X is the actual value of the independent variable;

a is the constant i.e. the **intercept** of the regression line;

b is the slope of the regression line, also a constant; and

ε is the random error term.

The accuracy of an estimate of this nature naturally depends on the extent to which the regression equation $\boldsymbol{Y = a + bX + \varepsilon}$ and its graph actually fit the data. Thus, we must try to ensure that the regression line is the line of best fit.

4.0 INSTRUCTION

This section deals with analysis and discussion of the data considered in the research work.The Analysis of Canoncal Correlation was adopted.

Matrix Scatter Plot

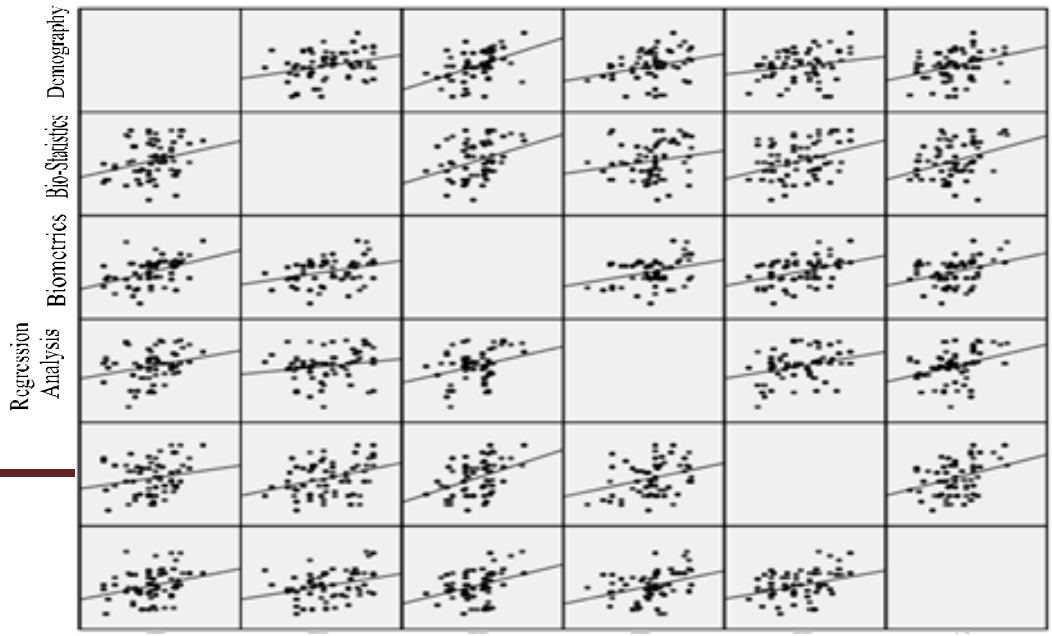

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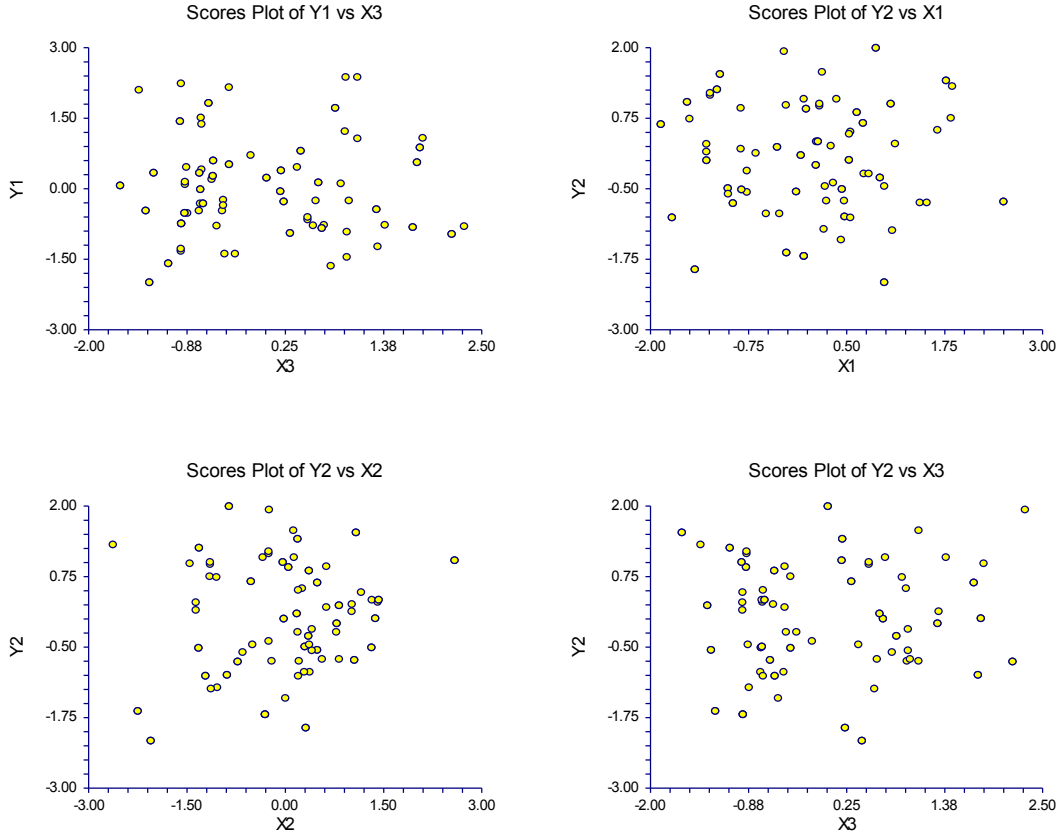
Fig. 1 Graph of correlation Matrix for the set-X and Set-Y



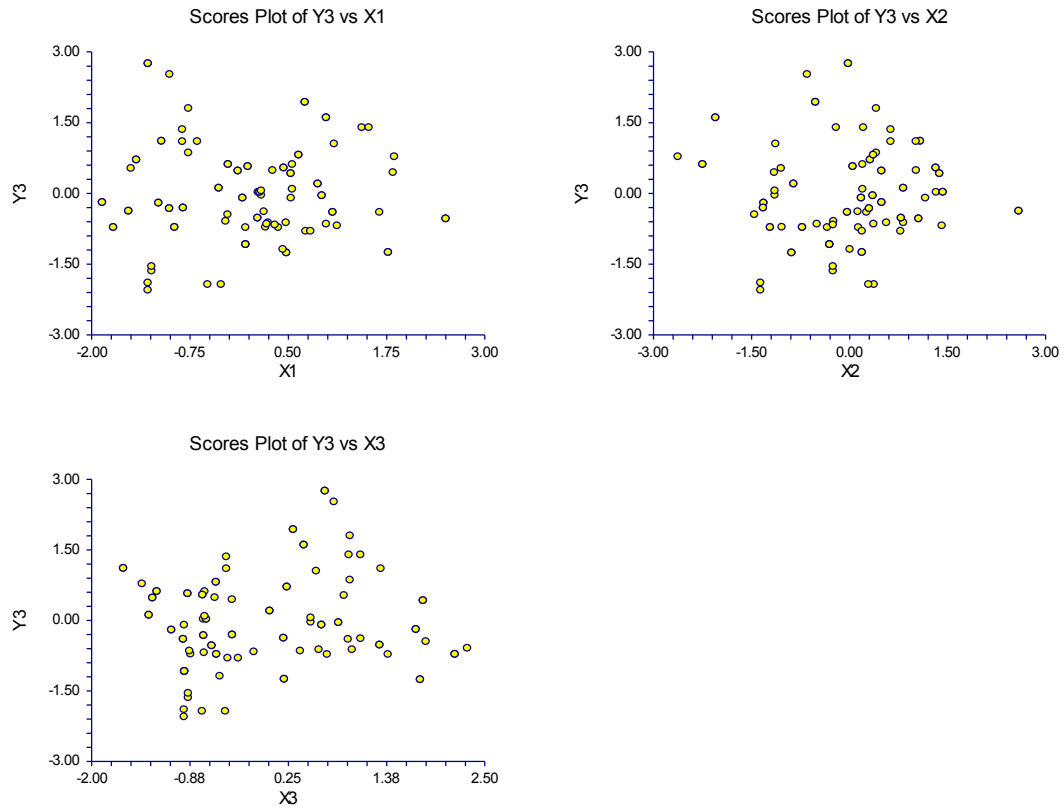


Fig. 4.2 Screen plot for canonical correlation

The figures 4.2 above show the relationship between each pair of canonical variates. The correlation coefficient of the data in the first plot (Y1 versus X1) is the first canonical correlation coefficient; the second plot (Y2 versus X2) is the second canonical correlation coefficient and so on. The results show that there are relationships between their pair.

Table 4.1: Correlation Matrix for Set-X and Set-Y

Variables	Demography X_1	Bio-Statistics X_2	Biometrics X_3	Regression Analysis Y_1	Econometrics Y_2	Time Series Analysis Y_3
Demography X_1	1.000	0.283**	0.437**	0.270**	0.198*	0.315**

Sig. value		0.004	0.000	0.007	0.049	0.001
Bio-Statistics X_2		1.000	0.334**	0.182	0.347**	0.325**
Sig. value			0.001	0.070	0.000	0.001
Biometrics X_3			1.000	0.300**	0.387**	0.348**
Sig. value				0.002	0.000	0.000
Regression Y_1				1.000	0.290**	0.341**
Analysis					0.003	0.001
Sig. value						
Econometrics Y_2					1.000	0.330**
Sig. value						0.001
Time Series Y_3						1.000
Analysis						

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 SUMMARY FROM THE OUTPUT OF CANONICAL CORRELATION ANALYSIS

The study aimed at analyzing the performance ofmedical and modeling statistics courses. A set of weight for each set of medical and modeling courses were determined so that linear combination of each set are maximally correlated and explain the nature of whatever relationship exist between the two variable set.

The canonical correlation analysis generated three correlations coefficient which were tested and found one of three correlations statistically different from zero. it can be seen that the first canonical pair capture the variability of about 89.8% the second canonical pair capture the variability of about 8.5% and the third canonical pair capture the variability of about 1.7%. Hence the total variability captured by the three canonical pair is 100%. The 89.8% variability is

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due to the individual contribution of the composite of Demography,Bio-Statistics, Biometrics, Regression, Econometrics and Time Series Analysis.

It shows that, there is directly related between medical and modeling statistics courses, that is an increase in performance of students in medical statistics courses as a result of an increase in modeling Statistics courses.

5.1 SUMMARY FROM OUTPUT OF FACTOR ANALYSIS

Factor Analysis was non on the whole data. Based on the decision of any factors that cover a certain percentage say 90% and the screen plot test, five factors were considered the first, second third, fourth and fifth factors capture variability 42.857, 13.920 13.601, 11.272 and 10.041 respectively. The total variability captured due to the five factors is 91.691. each factor represents a group of closely related courses.

The contribution of the first group is due to Demography and Biometrics that are significantly contributed. The second is due to contribution of regression analysis and econometrics. The third, fourth and the fifth are due to regression analysis, biometrics and time series analysis.

5.2 CONCLUSION

It is clearly shown that set-x and set-y are correlated as sought for: canonical correlation analysis measured the strength of relationship of the canonical pair and the courses that strongly contributed. The first pair with a measure of correlation 0f 0.5509 with the proportion of

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variability about 8.5 and the third canonical pair with a measure of correlation 0.0767 having a proportion of variability about 1.7%.

Base on the result of the analysis performed, the canonical correlation are significantly different from zero. This result is based on the canonical correlation of the combined session. Thus it indicates rejection of null hypothesis that there is relationship between the two sets of variables (medical and modeling statistics) and since the canonical correlation are ordered from largest to smallest, we can conclude that at least Exy ≠o therefore, we conclude that the student's performance in Modeling Statistics has influenced their performance in the Medical Sstatistics Courses.

Factor analysis was applied and showed five groups of closely interrelated courses base on the fact that five factors were used. Also, the, value is closeed to zero correlating a variable was droped. Which indicates variable reduction. The strongest inter-related courses were found in the beginning column and decrease through the last column. The 42.857% is the variability captured by the inter-related variables is due to the contribution of all the courses.

5.3 RECOMMENDATION

The following recommendation were made:

1. Students should pay more attention to their modeling courses as it positively influences their performance on the medical courses, likewise pay as much attention to their medicals course.

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