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ROSALYN S. BAYACSAN, JANICE B. DAMULO and LAILANIE WAKAT 2008**.** Regression Analysis on the Academic Performance of the Bachelor of Science in Applied Statistics Students in Statistics. Benguet State University, La Trinidad, Benguet.

Adviser: Cristina B. Ocden

ABSTRACT

This study was conducted to determine the variables that have contributions on the academic performance of Bachelor of Science in Applied Statistics students in Statistics. The study also aimed to construct a regression model for the factors affecting academic performance in Statistics 11 of Bachelor of Science in Applied Statistics students.

The population was represented by 83 Bachelor of Science in Applied Statistics students who responded to the questionnaire administered on February 2008, at Benguet State University, La Trinidad, Benguet.

Statistical analysis revealed that the grades in Statistics 11 was not affected by the student's demographic profile such as gender, type of high school graduated, family annual income, and parents' highest educational attainment. A positive marked correlation existed between Statistics 11 and Mathematics 11. There are also significant but low correlations between Statistics 11 with English 11 and with the IQ scores. However, regression analysis revealed that only the grades in Mathematics 11 had direct

contribution to the performance of respondents in Statistics 11. The regression model obtained is:

$$Y = .540 + .484X1 + .218X2 + .199X3 - .01507X4 + .01776X5 + .05577X6$$
$$(.000) \quad (.203) \quad (.121) \quad (.210) \quad (.250) \quad (.592)$$

$$+.03613X7 - .171X8 - .02033X9 - .192X10 - .08363x11 - .03211X12 - .04404X13$$
$$(.831) \quad (.268) \quad (.871) \quad (.437) \quad (.208) \quad (.615) \quad (.576)$$

The coefficients are the degree of correlation and the values in parenthesis are the p-values associated with the t-test. The only variable that is linearly related to grades in Statistics 11 is the grade in Mathematics 11 since the p-value is less than .05.

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INTRODUCTION

Background of the Study

The ability to present a solution to a problem inside the human mind is knowledge. In a very complex environment where several unknowns are present, one will find a way of dealing with them easily by viewing abstract mathematical structures and drawing conclusions from scientific and logical analyses. Mathematics plays an important role, by sharpening the intellect and developing critical thinking.

One branch of mathematics is Statistics. It is concerned with the collection, organization, and analysis of numerical data. The study in Statistics emerged during the 19th century, when researchers recognized the need to reduce bulky and unmanageable amounts of information in their studies. The solution is to present data in the form of numerical values to avoid the ambiguous verbal description. For this reason, Statistics is very useful in business, economics, sociology, biology, psychology, education, physics, chemistry, agriculture and related fields.

Statistics courses have become an essential part of many programs in higher education. The rationale for teaching Statistics at the college level is to enable students to handle, use, and interpret research or statistical data in their field of study. Furthermore, teaching Statistics aims to prepare students to deal effectively with statistical aspects of the world outside the classroom. However,

despite the effort instructors of Statistics devote in simplifying the subject, many students encounter difficulties in their Statistics subjects. This is the reason why the researchers choose to study the academic performance of BSAS students in Statistics. They believe that the performance of students in Statistics 11 significantly affects their ability to perform well in higher Statistical subjects.

Lastly, multiple regression analysis was used for the purpose of this study. Multiple regression analysis is a method in the explanation of phenomena and prediction of future events. A coefficient of correlation between variables X and Y is a quantitative index of association between these two variables. In its squared form, as a coefficient of determination, it indicates the amount of variance (information) in the criterion variable Y that is accounted for by the variation in the predictor variable X. A multivariate counterpart of the coefficient of determination is the coefficient of multiple determination, (R^2). In multiple regression analysis, the set of predictor variables $X_1, X_2, \ldots, X_k$ is used to explain variability of the criterion variable Y.

Objectives of the study

Specifically the study aimed: 1) to determine the factors that have contributions to the academic performance of Bachelor of Science in Applied Statistics students in Statistics 11. 2) to construct a model for the factors affecting academic performance of Bachelor of Science in Applied Statistics students in Statistics 11.

Importance of the Study

The results of this study could provide point of reference to parents, teachers, and school administrators on factors affecting students' performance in college, particularly in Statistics where most students fail.

The identification of variables that may have a contribution on the academic performance of students in Statistics 11 could be of great help to teachers, they would have better insight on what to prepare, and how to motivate students. Findings of the study would also help administrators to perform their roles in enhancing the strengths and lessening the weaknesses of the students.

To the students, knowledge on the contributory factors to their academic performance may result to a reflection on their study habits and attitudes towards Statistics. Through this study, the students might come to realize that passing Statistics 11 is not as difficult as they think, because it might just be a matter of attitude and habits. The result could also help students to realize and reflect on their weaknesses; thus they would be encouraged to find ways to uplift themselves.

The findings could convince parents to cooperate with the school in guiding their children in their studies. This would also motivate them to devote their time, attention and guidance needed by the students; to inspire them to excel and not to fail in their performance.

Scope and Delimitation of the Study

The focus of the study was to apply the multiple linear regression procedure in analyzing and determining the variables that maybe related to the respondent's academic performance in Statistics 11. The respondents of the study were second, third, and fourth year students enrolled in Bachelor of Science in Applied Statistics, during the second semester of the academic year 2007-2008, at Benguet State University, La Trinidad, Benguet.

REVIEW OF LITERATURE

The process of determining the significant factors affecting students' performance were chosen carefully by the researchers with consideration to the related researches and studies done concerning the issue of students' academic performance.

A study of Remmers in 1964 (as cited by Azarcon and Lamsis, 2002) stated that the school plays an important role in the development of a child. Its influence goes far beyond the influence of the classroom learning. Beyond the immediate family, home and environment, the school provides the most important influence in the child's interactions with other children. The child is freed from parental control and is at the same time forced to adjust himself to others as an independent citizen in a child community. He finds himself confronted with attitudes, personality patterns and conduct in his teachers that vary from teacher to teacher and differ from characteristics found in his parents. Next to home, the school plays the most vital role in molding the child's adjustment patterns.

In the study of Azarcon and Lamsis (2003), they researched on the factors affecting students' achievement of Benguet State University. Analysis revealed that from the 19 variables, seven significant factors were extracted by applying factor analysis. These are high school performance; inherited potential; home – school situation; distance of school from home; preference of craft; influence of intellect to organization preference and influence of the people in contact with

them. From these factors, regression analysis revealed that there is only one significant factor affecting the student achievement in the university and that is the inherited potential of the students.

Mathematical ability and background are frequently discussed in relation to achievement in Statistics. Although it is often argued that understanding and applying Statistics in empirical research does not require advanced mathematics, a significant and positive relationship exists between mathematical ability and performance has been consistently reported (Galagedera 1998; Galagedera, Woodward, and Degamboda 2000; Lalonde and Gardner 1993; Nasser 1998, 1999; Wooten 1998). Galagedera (1998) found that first-year business mathematics and Statistics students who were successful in mathematics at the university entry-level examination were more likely to have performed better in elementary Statistics than poor performers at matriculation level.

Studies concerning the effect of gender on performance in Statistics courses delivered, mixed results. Schram's (1996) meta-analysis of gender differences (in applied Statistics) concludes that male-female performance is sensitive to the type of Statistics course, the department offering the course, and how course grades are determined. In general, women outperform men in Statistics courses offered by business departments; however, the bulk of Schram's analysis was based on Statistics taught in education and psychology courses. Johnson and Kuennen (2006) show that female students outperform male students

in an introductory business Statistics course, while Harraway (2002) found no gender difference in performance in an introductory bioStatistics course in New Zealand. Buck (1985) hypothesized that gender affects students' performance in Statistics in several ways: (1) male students may tend to monopolize the inclass attention of professors, (2) female students are more sensitive to role-model effects, (3) professors have gender-specific performance expectations, and (4) gender meaningfully affects academic confidence or math skills. However, in an examination of psychology Statistics students (at both the introductory and advanced undergraduate level), Buck found no significant differences in performance across genders.

Scarr and Wimberg, 1978 (as cited by Laluan (1987), reported the influence of family background on academic achievement. They discussed the long-term effects of family background influences on adult, intellectual, occupational and economic outcomes. Parental education, family income, family size and parents' IQ tend to be more correlated, and family size is unrelated to child's IQ.

THEORETICAL FRAMEWORK

Regression Analysis

Regression analysis is a technique used for the modeling and analysis of numerical data consisting of values of a dependent variable (response variable) and of independent variables (explanatory variables). The model is a function of the independent variables and one or more parameters. The parameters are adjusted so as to give a best fit of the data. Most commonly, the best fit is obtained by using the least squares method, but other criteria have also been used. The dependent variable is assumed to be a random variable, due to the presence of observational errors. The independent variable is assumed to be error-free.

Regression can be used for prediction (including forecasting of time-series data), inference, hypothesis testing, and modeling of causal relationships. These uses of regression rely heavily on the underlying assumptions being satisfied. Regression analysis has been criticized as being misused in many cases where the appropriate assumptions cannot be verified to hold. One factor contributing to the misuse of regression is that, it would take considerable skill to critique a model than to fit a model.

Multiple Linear Regression Analysis

The general purpose of multiple regression is to analyze the relationship between several independent or predictor variable and a dependent or criterion variable. The multiple linear regression model can be written as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon$$

Where:

Y = the response variable that you want to predict

$X_1, X_2, \ldots X_k$ = the explanatory variables

β_0 = the regression constant

$\beta_1, \beta_2, ..., \beta_k$ = the regression coefficients or partial correlation coefficients

ε = the random error term

The intercept β_0 of the regression model is the y-intercept of the regression hyperplane which gives the value of Y at $X_1 = X_2 = \ldots = X_k = 0$. In case 0 is in the scope of all the independent variables, the regression constant reflects the dependent variable when the independent variables are equal to zero. Otherwise β_0 does not have a particular meaning.

The regression coefficient, say β_1 indicates the change (increase if β_1 is positive, decrease if β_1 is negative) in the dependent variable corresponding to a

unit increase in X_1 when all the other independent variables, $X_{1,\ldots,}$ X_k are held constant or fixed to some value.

Definition of Terms

Academic Performance. Refers to the student' school achievements as reflected from their grades.

Correlation. Refers to the degree of correspondence either positively or negatively between variables.

Dependent Variable. Refers to the variable that is determined or explained by one or more explanatory variables.

English 11. Refers to the subject with descriptive title Arts and Communication 1 taken by the Bachelor of Science in Applied Statistics students.

Independent Variable. Refers to a variable used to predict values of the dependent variable in regression analysis.

Information Technology 11. Refers to the subject with the descriptive title Basic Computer Education taken by the Bachelor of Science in Applied Statistics students.

Mathematics 11. Refers to the subject with the descriptive title College Algebra taken by the Bachelor of Science in Applied Statistics students.

Multiple Regression. Refers to a method of taking into account simultaneously the relationship between all the variables when two or more independent variables are used in making estimates of the dependent variable.

Regression Analysis. Refers to a set of statistical technique used to assess the relationship between dependent and several independent variables.

Statistics 11. Refers to the subject with the descriptive title Principles and Methods of Statistics taken by the Bachelor of Science in Applied Statistics students.

Variable. Refers to a characteristic of interest, which is measurable and observable in every aspect in study.

METHODOLOGY

Locale and Time of the Study

The study was conducted in the College of Arts and Sciences at Benguet State University, La Trinidad, Benguet in November 2007 to March 2008.

Respondents of the Study

The respondents of the study were second, third, and fourth year students enrolled in Bachelor of Science in Applied Statistics from the College of Arts and Sciences at Benguet State University during the school year 2007 – 2008. Twenty two were second years, thirty-two were third years, and twenty-nine were fourth years with an overall total of eighty-three respondents.

Instrumentation

This study utilized a questionnaire as the main data – collection tool. It consisted of the respondent's demographic profile, which includes the following: gender, type of high school graduated from, father's highest educational attainment, mother's highest educational attainment, average family annual income, and the grades in Statistics 11, Mathematics 11, English 11, IQ, and high school average.

Data Gathering Procedure

The permission of the Dean of the College of Arts and Sciences of Benguet State University was first sought for the floating of questionnaires. The questionnaires were distributed to the respondents with directions and instructions for the respondents to follow.

Data Analysis

The data collected were analyzed using Statistical Packages for Social Sciences. Multiple linear regression analysis technique was employed on the data using grades in Statistics 11 as the dependent variable and the respondent's demographic profile such as gender, type of high school graduated, parents' highest educational attainment, grades in Mathematics 11, English 11, Information Technology 11, IQ, and high school average were treated as the independent variables.

RESULTS AND DISCUSSION

Profile of the Respondents

The descriptive Statistics was used in the study for the purpose of giving an initial perspective on which variable contributes to the academic performance of students in Statistics 11.

Table 1 presents the distribution of respondents according to their demographic profile with their corresponding frequency and percentages. The table indicates a total of 62.7 percent female and 37.3 percent male. 21.0 percent graduated from a barangay high school, 13.3 percent from a city high school, 19.3 percent from a state college or university, 42.2 percent from a national high school and 4.8 percent from a private high school.

In terms of parents' highest educational attainment, 19.3 percent have fathers who attended elementary, 39.8 percent in high school and some with vocational courses and 41 percent in college. In the highest educational attainment of mother, 18.1 percent have attended elementary, 32.5 percent have attended high school and some with vocational courses and 49.4 percent have attended college.

Under the respondents' family annual income, 43.4 percent reported to receive an income of below 60,000 pesos, 49.4 percent derive an income of 60, 000 to 100, 000 pesos, and 7.2 percent are lucky to gain an income of above 100,000 pesos.

Table 1. Distribution of respondents according to their demographic profile

Variables		Frequency	Percentage
Gender			
	Female	52	62.7
	Male	31	37.3
Type of High School Graduated	Barangay	17	20.5
	City	11	13.3
	State College or University	16	19.3
	National	35	42.2
	Private	4	4.8
Fathers' Highest Educational Attainment	Elementary	16	19.3
	High School or Vocational	33	39.8
	College	34	41
Mothers' Highest Educational Attainment	Elementary	15	18.1
	High School or Vocational	27	32.5
	College	41	49.4
Average Family Income	Below 60,000	36	43.4
	60,000-100,000	41	49.4
	100,001-Above	6	7.2

Table 2 presents the distribution of respondents according to their grades in Statistics 11. In this study grades ranging from 1 to 1.75 were referred to as high grades. The table indicates that from the 50 female respondents, 9 have high grades in Statistics 11 while from the 31 male respondents 4 obtained high grades. Under the type of school graduated, respondents who graduated from a state

Table 2. Distribution of respondents according to their grades in Statistics 11

Independent Variables	Grades in Statistics 11							Total	Percentages	Mean
	1.5	1.75	2	2.25	2.50	2.75	3			
A. Gender										
Female	2	7	5	5	10	10	13	52	62.7	2.46
Male	1	3	4	4	1	8	10	31	37.3	2.52
B. Type of high school graduated										
Barangay	0	2	2	2	3	4	4	17	20.5	2.5
City	1	2	0	1	0	4	3	11	13.3	2.48
National	1	2	2	1	3	4	3	16	19.3	2.42
State College/ University	1	3	4	5	5	6	11	35	42.2	2.51
Private	0	1	1	0	0	0	2	4	4.8	2.44
C. Fathers' Highest Educational Attainment										
Elementary	0	2	0	3	1	7	3	16	19.3	2.56
High School/ Vocational	1	5	5	2	2	5	13	33	39.8	2.5
College	2	3	4	4	8	6	7	34	41	2.43
D. Mothers' Highest Educational Attainment										
Elementary	0	3	0	1	2	4	5	15	18.1	2.57
High School/ Vocational	2	4	2	3	2	6	8	27	32.5	2.45
College	1	3	7	5	7	8	10	41	49.4	2.48
E. Annual Income										
Below 60,000	1	4	5	4	5	5	12	36	43.4	2.49
60,000-100,000	2	6	4	4	6	11	8	41	49.4	2.43
100,001-Above	0	0	0	1	0	2	3	6	7.2	2.79

college or university and barangay high school obtained the lowest average of 2.5 and the rest have average of 2.42 to 2.48. Students whose fathers attended college have higher average of 2.43 compared to those fathers who attended high school and elementary with an average of 2.5 and 2.56 respectively. In the mothers'

highest educational attainment, respondents with mothers who have attended high school or vocational have an average of 2.45, higher than those respondents whose mothers have attended college and elementary. Under family income, students with an average family annual income of 60,000 to 100,000 have higher average of 2.43 than those who have an income of below 60,000 and above 100,001.

Correlation and Test of Significance Between Grades in Statistics 11 and the Respondent's Personal Profile

The grades in Statistics 11 were correlated with the non-intellective factors such as personal profile of the respondents which includes gender and type of high school graduated namely: Barangay, City, National, State college/ University and Private to find out if these areas would serve as indicators of success or failure in Statistics 11.

Table 3 presents the Pearson correlation (r) and the test of significance using the 1-tailed test statistics (p). Results revealed no significant correlation between grade in Statistics 11 and personal profile such as gender and type of high school graduated. This implies that male and female perform equally in Statistics 11 and in the type of high school graduated, although those from national schools obtained higher average of 2.42 as compared to the other type of schools, the test showed no significant correlation between the type of high school graduated and grade in Statistics 11. This means that students who came from

Table 3. Correlation and test of significance between Statistics 11 grades and the personal profile of respondents

Dependent variable	Independent variable					
Statistics 11 Grade	Gender	Type of High School Graduated				
		Barangay	City	National	State college/ University	Private
r (Pearson Correlation)	.068	.018	.002	-.067	.050	-.028
p-value	.269^{ns}	.436^{ns}	.494^{ns}	.274^{ns}	.327^{ns}	.402^{ns}

barangay, city, national, state college or university, and private schools have equal performance in Statistics 11.

Correlation and Test of Significance Between Grades in Statistics 11 and the Parents' Status of Respondents

The grades in Statistics 11 were also correlated with the parents' status such as fathers' highest educational attainment, mothers' highest educational attainment, and annual family income.

Table 4 presents the Pearson correlation (r) and the test of significance using the 1-tailed test statistics (p). It shows that there is no significant correlation between grade in Statistics 11 and parents' status. That is, the college students are of the same level of performance in Statistics 11, regardless of parents' level of education and family income.

Table 4. Correlation and test of significance between Statistics 11 grade and the parents' status

Dependent Variable	Independent Variable		
Statistics 11 Grade	Fathers' Highest Educational Attainment	Mothers' Highest Educational Attainment	Family Annual Income
r	-.116	-.061	-.073
p	.257^{ns}	.292^{ns}	.148^{ns}

Correlation Between Grades in Statistics 11 and the Intellective factors

The grades in Statistics 11 were also correlated with the intellective factors such as college grades in Mathematics 11, English 11, IT 11, IQ, and high school average.

Table 5 presents the Pearson correlation (r) and the test of significance using the 1-tailed test statistics, between college grades in Mathematics 11, English 11, IT 11, IQ, and high school average with Statistics 11. Analysis showed that a marked or substantial relationship exists between Statistics 11 and Mathematics 11. There are also significant but low correlations between Statistics 11 with English 11 and with the IQ scores. It is then inferred that students with

Table 5. Correlation and test of significance between Statistics 11 grade and the respondent's Intellective factors

Dependent Variables	Independent Variables				
Statistics 11 Grade	Math11	English 11	IT 11	IQ	High school average
r (Pearson Correlation)	.448	.236	.174	-.239	.009
p - value	.000**	.016*	.058ns	.015*	.467ns

high grades in Mathematics 11, English 11 and high scores in IQ were likely to have high grades in Statistics 11. It was found out that there is a negligible correlation between Statistics 11 grade and IT 11 and between Statistics 11 grade and high school average. This means that grade in IT 11 and high school average whether high or low do not affect the student's grades in Statistics 11.

Analysis of Variance

The analysis of variance tests the overall significance of the regression model. It presents the value of the F-statistic and its significance. Table 6 shows that the significance of the F value is below .05, so the model is significant implying that there is a linear relationship between the grades in Statistics 11 and the entire set of independent variables since F = 2.888 and p = .002. The value 6.300 represents the amount of variation in Statistics 11 grade explained by the independent variables. The value 11.576 represents the unexplained variation in Statistics 11 grade. And the value 17.876

Table 6. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.300	13	.485	2.888	.002
	Residual	11.576	69	.168		
	Total	17.876	82			

represents the total variation in the grades in Statistics 11, which is simply the sum of the explained and the unexplained parts.

Parameter Estimates

In the study, the variables considered that have contributions on the academic performance of Bachelor of Science in Applied Statistics students in Statistics 11 were gender, type of high school graduated (Barangay, city, national, state college/university and private), father's highest educational attainment (elementary, high school/vocational, and college), mother's highest educational attainment (elementary, high school/vocational, and college), family annual income, grades in Mathematics 11, English 11, IT 11, IQ, and general high school average. For the students in the data set, grade in Statistics 11 can be represented by the regression equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + ... + \beta_n X_n + \varepsilon_{ij}$$

where the errors are independent normal variables with mean 0 and standard deviation σ, unknown. Y is the dependent variable, and the X's are the

independent variables. The $\beta's$ represents unknown parameters that were estimated from the data through the process called model fitting. Y = grade in Statistics 11; X1 = Mathematics 11, X2 = English 11, X3 = IT 11, X4 =IQ, X5 = High school average, X6 = Gender, X7 = Barangay, X8 = City, X9 = National, X10 = State college/ University, X11 = Private X12 = Father's highest educational attainment, X13= Mother's highest educational attainment, X14 = Family annual income. The regression equation obtained is:

Y = .540 + .484X1 + .218X2 + .199X3 - .01507X4 + .01776X5 + .05577X6
(.000) (.203) (.121) (.210) (.250) (.592)

+.03613X7-.171X8-.02033X9-.192X10-.08363x11-.03211X12-.04404X13
(.831) (.268) (.871) (.437) (.208) (.615) (.576)

The coefficients are the degree of correlation and the values in parenthesis are the p-values associated with the t-test. The hypothesis being tested in each case is whether each of the independent variables is linearly related to the dependent variable. The only variable that is linearly related to grades in Statistics 11 is the grade in Mathematics 11 since the p-value is less than .05. On the other hand, the factors that have no significant effect on the grades in Statistics 11 but are accounted for in the model were gender, type of high school graduated (Barangay, city, national, state college/university and private), father's highest educational attainment, mother's highest educational attainment, income, high school average, English 11, IT 11, IQ, and high school average.

The value 0.540 represents the estimated mean Statistics 11 grade of the respondents when all the independent variables are set to 0. The value .484 represents the estimated increase in Statistics 11 grade when Mathematics 11 is increased by 1 unit while holding the value of the other variables constant. However, in the grading system of the university where 1 is the highest grade, while 5 is the lowest, and 3 is the passing grade, increase in the value of coefficients while other variables are held constant would mean a decrease in Statistics 11 grade.

Coefficient of Multiple Determination

Table 7 shows the contribution of the independent variables treated as one, to the variation of grades in Statistics. The table shows that 36.4 percent of the variation are explained by the regressor variables. The remaining 63.6 percent of the variation of grades in Statistics 11 can be attributed to factors not included in the study.

Table 7. Coefficient of Multiple Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.594	.352	.230	.410

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary and Conclusion

This study was conducted to identify the factors affecting academic performance of BSAS students in Statistics and to construct a model for the academic performance of Bachelor of Science in Applied Statistics in Statistics 11.

The variables collected are information about their personal profile that includes gender and type of high school graduated, parents' highest educational attainment and family annual income, their grades in Statistics 11, Mathematics 11, English 11, Information Technology 11, IQ scores, and general high school average annual income. A total of 83 Bachelor of Science in Applied Statistics students were selected as respondents to this study.

Multiple linear regression technique was employed in analyzing variables that have a significant contribution to the obtained grades of the respondents in Statistics. The data were analyzed using SPSS and the computer output were printed and analyzed.

Statistical analysis revealed that the grades in Statistics 11 was not affected by students' demographic profile such as gender, type of school graduated, and family annual income, and parents' highest educational attainment. A positive marked correlation existed between Statistics 11 and Mathematics 11, There are also significant but low correlations between Statistics 11 with English

11 and with the IQ scores. However, regression analysis revealed that only the grades in Mathematics 11 had direct contribution to the respondents' performance in Statistics 11.

Recommendations

The results of this study could be of great help to the students. It may be essential in the counseling and testing activities of the students. It maybe of help in fostering awareness among students about factors that might affect their academic performance especially in Statistics 11. To the teachers, the knowledge of the students' background will guide them in structuring their strategies to suit the needs of their students.

A similar study could be conducted relating Statistics 11 with other variables not included in the study such as students' study habits, motivation and attitude. If possible more subjects should be added and more respondents be included. Other Statistics subjects could also be studied.

Mathematics 11 should be given focus or attention since it has significant relationship to grades in Statistics 11.

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Appendix A. Letter of Communication

Benguet State University
College of Arts and Sciences
Math-Physics-Statistics Department
La Trinidad, Benguet

Letter of Permission

Madam Aurea Marie Sandoval
CAS Dean
Benguet State University

Madam:

The undersigned are conducting a research for their thesis entitled "Regression Analysis on the Academic Performance of Bachelor of Science in Applied Statistics in Statistics" as a requirement for the degree Bachelor of Science in Applied Statistics for the subject Stat 200.

In this connection, may we ask your kind consideration to allow us to gather information through a survey questionnaire among the College of Arts and Sciences students of Benguet State University.

Your favorable action to this request is highly acknowledged.
Thank you very much and God bless.

Sincerely Yours,

Rosalyn Bayacsan

Janice Damulo

Lailanie Wakat

Noted:

Cristina B. Ocden
Adviser

Maria Azucena B. Lubrica
MPS Chairman

Approved: Aurea Marie Sandoval
CAS Dean

Appendix B. SAMPLE SURVEY QUESTIONNAIRE

Benguet State University
College of Arts and Sciences
Math-Physics-Statistics Department
La Trinidad, Benguet

Dear Fellow Students,

The undersigned are conducting a study entitled "Regression Analysis on the Academic performance of Bachelor of Science in Applied Statistics students in Statistics." In this connection, may we request your kind assistance by answering this questionnaire.

Your accurate and complete answers will help the success of this study. Rest assured that answers would be treated confidentially.

Heartfelt thanks for your anticipated cooperation.

Yours truly,

Rosalyn S. Bayacsan

Janice B. Damulo

Lailanie L. Wakat

Noted:

Cristina B. Ocden
Adviser

DIRECTION: Please check or write on the blank that corresponds to your answers.

1. Name (Optional): _____
2. Sex: ____Male ____Female

3. Type of High School Graduated

____Barangay High School ____State College/ University High School

____City High School ____Vocational/ Technical High School

____National High School ____Private High School

4. Parents' Highest Educational Attainment

   Father _____

   Mother _____

5. Average Family Annual Income

   ____Below 60, 000

   ____60,000 – 100,000

   ____100,000 - Above

6. Grades, Please specify

   ____IQ

   ____General High School Average

   ____Statistics 11

   ____Mathematics 11

   ____English 11

   ____Information Technology 11

Appendix C. Variable Coding

	Variables	Code
Dependent		
	Statistics 11	Y
Independent		
	Mathematics 11	X1
	English 11	X2
	IT 11	X3
	IQ	X4
	High School Average	X5

Gender		Code	
	Male	1	X6
	Female	0	

Type of High School Graduated	Barangay	City	National	Code State College/ University	Private	
Barangay	1	0	0	0	0	X7
City	0	1	0	0	0	X8
National	0	0	1	0	0	X9
State College/ University	0	0	0	1		X10
Private	0	0	0	0	1	X11

Fathers' Highest Educational Attainment	Code	
Elementary	1	
High School/ Vocational	2	X12
College	3	

Fathers' Highest Educational Attainment	Code	
Elementary	1	
High School/ Vocational	2	X13
College	3	

Annual Income	Code	
Below 60,000	1	
60,000 – 100,000	2	X14
100,000 - Above	3	

Appendix D. Raw Data

Respondents	Stat 11	Math 11	English 11	IT 11	IQ	HS. Ave.	Gender	Barangay	City	University	National	Private	Fathers' Highest Educational Attainment	Mothers' Highest Educational Attainment	Annual Income
1	2.5	1.5	1.75	2.25	87	87	0	0	0	0	1	0	3	3	1
2	1.5	1.8	1.75	1.75	89	89	1	0	1	0	0	0	3	2	2
3	3	2.3	1.75	2.25	80	83	1	0	0	0	0	1	2	3	1
4	2	1.5	2	3	85	88	1	0	0	0	0	1	3	3	2
5	2.5	2.5	2	2.5	82	85	0	0	0	0	1	0	3	3	2
6	1.8	1.5	2.25	2.75	84	88	0	0	0	0	1	0	3	2	2
7	1.8	1.3	2	2.25	85	85	0	0	0	0	1	0	2	2	2
8	1.5	1.3	1.75	1.75	88	86	0	0	0	1	0	0	3	2	2
9	1.5	2	2	2.5	87	87	0	0	0	0	1	0	2	3	1
10	3	2.8	2	3	80	85	0	0	0	0	1	0	2	3	1
11	1.8	2.3	2	2	86	84	0	0	0	1	0	0	2	3	1
12	2.3	2	2	2	83	85	1	0	0	0	1	0	2	2	2
13	2.5	2	2.5	2.5	82	85	0	1	0	0	0	0	3	3	2
14	1.8	1.5	2.25	2.25	83	87	1	0	0	1	0	0	1	2	1
15	2	2	2.5	2.5	81	82	0	1	0	0	0	0	2	3	2
16	1.8	1.8	2	2.25	85	85	0	1	0	0	0	0	1	1	1
17	2	1.5	2.5	2.5	85	87	0	0	0	0	1	0	3	3	1

18	2.3	2	2	3	84	84	0	0	0	0	1	0	3	3	1
19	3	2.3	3	2.75	79	84	1	0	0	1	0	0	2	3	1
20	2.3	2	2.5	2.25	80	86	1	0	1	0	0	0	2	2	3
21	3	2.3	2.25	1.75	81	85	0	1	0	0	0	0	3	1	2
22	3	1.3	2	2.25	79	87	1	0	1	0	0	0	2	3	1
23	2.8	2.8	2.25	2.5	82	87	0	1	0	0	0	0	2	1	2
24	2.8	2.3	2	1.75	85	89	0	0	1	0	0	0	2	2	1
25	3	2.5	2	2	80	88	0	0	0	0	1	0	2	2	3
26	3	2	1.75	2.75	83	84	0	1	0	0	0	0	2	1	1
27	2.5	2.5	2	2	86	87	0	0	0	0	1	0	2	3	2
28	3	3	2	2.5	85	90	0	0	0	1	0	0	1	1	2
29	2.8	3	2	2	87	87	0	0	0	0	1	0	1	1	2
30	2.8	3	2.5	2.25	82	89	0	0	0	1	0	0	3	3	2
31	2.8	2.5	2	1.75	86	92	0	0	0	0	1	0	3	3	1
32	3	3	2.25	2.75	78	85	0	0	0	0	1	0	2	2	2
33	2.8	2.5	2	2	85	90	1	1	0	0	0	0	2	2	2
34	2.3	2	1.75	1.75	88	93	1	0	0	0	1	0	1	3	2
35	2.5	2	1.75	1.75	83	92	0	1	0	0	0	0	3	3	1
36	2.8	2.5	2.25	2.5	82	85	0	1	0	0	0	0	1	3	2
37	2.8	3	2.25	2.75	85	87	1	0	0	1	0	0	3	3	2
38	3	3	2.25	2	85	89	0	0	0	0	1	0	2	3	1
39	2.3	2.3	1.75	1.75	85	93	0	0	0	0	1	0	1	1	2
40	2.8	2.8	2.25	2	79	85	0	0	0	0	1	0	3	1	3
41	2.3	2	1.75	1.75	89	93	0	0	0	1	0	0	3	3	1
42	2.5	2	1.75	1.75	87	92	0	0	0	0	1	0	3	1	1
43	2.3	2.8	2.5	2	85	85	0	0	0	0	1	0	3	3	1
44	2.8	2.5	2.25	2	86	88	1	0	0	0	1	0	1	3	2
45	3	2.8	2.7	2.5	82	85	1	0	0	1	0	0	2	1	1

			5												
46	2.8	2.8	2	2	85	89	1	1	0	0	0	0	1	3	1
47	3	2.3	1.7 5	2.5	85	90	0	0	1	0	0	0	3	3	1
48	3	3	2.2 5	2	87	85	0	0	0	0	1	0	3	2	1
49	3	3	1.7 5	1.7 5	83	88	0	0	0	0	1	0	1	2	2
50	2.8	2.3	2.2 5	2	81	89	0	0	1	0	0	0	2	1	2
51	3	3	2.5	2.5	83	88	1	0	0	0	1	0	2	2	1
52	2.8	2.8	1.7 5	2	85	85	0	0	0	1	0	0	2	3	3
53	3	2.5	2.5	2.5	52	86	0	0	1	0	0	0	3	3	3
54	2.8	1.5	2	1.7 5	78	87	1	0	0	0	1	0	1	2	1
55	2.5	2.8	2.2 5	1.7 5	80	88	1	0	0	0	1	0	3	2	2
56	2	2.5	2.2 5	2	81	85	0	0	0	1	0	0	2	3	2
57	2.8	2.8	2.7 5	2	83	83	1	0	0	1	0	0	1	2	2
58	3	2.3	2.5	2.2 5	83	82	1	0	0	0	1	0	2	3	1
59	3	2	1.5	2.7 5	82	84	1	0	0	0	0	1	2	2	2
60	3	2	1.7 5	3	81	89	0	0	0	0	1	0	2	2	2
61	2	2.8	1.7 5	2.5	85	88	0	1	0	0	0	0	2	2	2
62	3	2.3	2.2 5	3	79	90	1	1	0	0	0	0	3	3	2
63	1.8	2	2	2.2 5	78	95	0	1	0	0	0	0	3	1	2
64	1.8	1.8	2.5	2.5	79	86	1	0	1	0	0	0	2	1	1
65	3	1.8	2.5	2.7 5	85	85	0	0	0	0	1	0	3	1	1
66	2.8	1.8	2.5	2	86	83	1	0	1	0	0	0	1	3	1
67	2.5	3	2.2 5	1.7 5	82	85	0	0	0	1	0	0	3	3	1
68	2.5	2.8	2	1.7 5	85	85	0	0	0	1	0	0	3	3	2
69	1.8	2.5	1.7 5	2	83	82	1	0	1	0	0	0	3	3	2
70	2.3	2.5	1.7 5	2	82	82	0	1	0	0	0	0	3	3	2
71	2	2.8	1.5	1.7 5	85	80	1	0	0	0	1	0	2	3	1

72	2	2.8	2	2.75	86	81	0	0	0	1	0	0	3	3	1
73	2.8	2.3	2.25	3	84	82	1	0	1	0	0	0	3	2	2
74	2.3	1.8	1.5	1.75	81	83	1	1	0	0	0	0	1	2	1
75	2.5	2.3	2.25	2	80	83	0	1	0	0	0	0	1	2	2
76	3	1.8	2	2.25	84	85	1	1	0	0	0	0	1	2	2
77	1.8	1.8	2	2.5	83	82	0	0	0	0	1	0	2	3	2
78	2.8	2.3	2.5	2	86	80	0	0	0	0	1	0	3	2	2
79	3	2.8	1.75	2.75	85	81	1	0	0	0	1	0	3	3	3
80	2	2.5	1.75	1.75	82	85	1	0	0	0	1	0	3	2	1
81	2	2.3	1.75	2	81	86	1	0	0	0	1	0	2	3	1
82	1.8	1.5	1.75	1.75	85	88	0	0	0	0	0	1	2	2	2
83	2.5	2.3	2	2	83	89	0	0	0	1	0	0	2	1	1

Appendix E. Regression Analysis Printouts

Correlations

		Statistics 11	Mathematics 11	English 11	IT 11	IQ	High School Average	Gender	Barangay	City	University	National	Private	Fathers' Highest Educational Attainment	Mothers' Highest Educational Attainment	Annual Income
Pearson Correlation	Statistics 11	1.000	.448	.236	.174	-.239	.009	.068	.018	.002	-.067	.050	-.028	-.116	-.061	.073
	Mathematics 11	.448	1.000	.152	-.050	-.069	-.077	-.090	-.050	-.172	.218	.079	-.218	.016	.056	.152
	English 11	.236	.152	1.000	.256	-.279	-.183	.058	-.061	.098	.192	-.066	-.240	.028	-.031	.012
	IT 11	.174	-.050	.256	1.000	-.198	-.214	.028	.039	.007	-.060	-.043	.125	.157	.083	.055
	IQ	-.239	-.069	-.279	-.198	1.000	.097	-.032	-.088	-.245	.114	.149	.001	-.040	.008	-.274
	High School Average	.009	-.077	-.183	-.214	.097	1.000	-.154	.027	-.004	-.028	.019	-.040	-.007	-.197	-.031
	Gender	.068	-.090	.058	.028	-.032	-.154	1.000	-.083	.212	-.062	-.105	.175	-.225	.108	-.073
	Barangay	.018	-.050	-.061	.039	-.088	.027	-.083	1.000	-.198	-.248	-.433	-.114	-.148	-.131	.056
	City	.002	-.172	.098	.007	-.245	-.004	.212	-.198	1.000	-.191	-.334	-.088	.077	-.021	.057
	University	-.067	.218	.192	-.060	.114	-.028	-.062	-.248	-.191	1.000	-.417	-.110	.022	.080	-.061
	National	.050	.079	-.066	-.043	.149	.019	-.105	-.433	-.334	-.417	1.000	-.192	.046	.033	-.054
	Private	-.028	-.218	-.240	.125	.001	-.040	.175	-.114	-.088	-.110	-.192	1.000	.010	.055	.041
	Fathers' Highest Educational Attainment	-.116	.016	.028	.157	-.040	-.007	-.225	-.148	.077	.022	.046	.010	1.000	.199	.040
	Mothers' Highest Educational	-.061	.056	-.031	.083	.008	-.197	.108	-.131	-.021	.080	.033	.055	.199	1.000	-.093

	Attainment															
	Annual Income	.073	.152	.012	.055	-.274	-.031	-.073	.056	.057	-.061	-.054	.041	.040	-.093	1.000
Sig. (1-Tailed)	Statistics 11	.	.000	.016	.058	.015	.467	.269	.436	.494	.274	.327	.402	.148	.292	.257
	Mathematics 11	.000	.	.085	.327	.269	.243	.210	.326	.060	.024	.240	.024	.442	.307	.085
	English 11	.016	.085	.	.010	.005	.049	.300	.293	.189	.041	.275	.014	.401	.389	.457
	IT 11	.058	.327	.010	.	.037	.026	.402	.363	.474	.295	.348	.129	.078	.229	.310
	IQ	.015	.269	.005	.037	.	.191	.386	.214	.013	.152	.090	.498	.359	.470	.006
	High School Average	.467	.243	.049	.026	.191	.	.082	.403	.487	.403	.432	.361	.474	.037	.390
	Gender	.269	.210	.300	.402	.386	.082	.	.227	.027	.290	.174	.057	.021	.166	.256
	Barangay	.436	.326	.293	.363	.214	.403	.227	.	.036	.012	.000	.152	.091	.119	.308
	City	.494	.060	.189	.474	.013	.487	.027	.036	.	.042	.001	.215	.245	.426	.306
	University	.274	.024	.041	.295	.152	.403	.290	.012	.042	.	.000	.161	.423	.236	.293
	National	.327	.240	.275	.348	.090	.432	.174	.000	.001	.000	.	.041	.339	.383	.315
	Private	.402	.024	.014	.129	.498	.361	.057	.152	.215	.161	.041	.	.464	.310	.357
	Fathers' Highest Educational Attainment	.148	.442	.401	.078	.359	.474	.021	.091	.245	.423	.339	.464	.	.035	.361
	Mothers' Highest Educational Attainment	.292	.307	.389	.229	.470	.037	.166	.119	.426	.236	.383	.310	.035	.	.201
	Annual Income	.257	.085	.457	.310	.006	.390	.256	.308	.306	.293	.315	.357	.361	.201	.
N		83	83	83	83	83	83	83	83	83	83	83	83	83	83	83

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Annual Income, English 11, Fathers' Highest Educational Attainment, National, High School Average, Mathematics 11, Gender, Mothers' Highest Educational Attainment, IT 11, IQ, Private, City, University	.	Enter

a Tolerance = .000 limits reached.
b Dependent Variable: Statistics 11

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.594	.352	.230	.410

a Predictors: (Constant), Annual Income, English 11, Fathers' Highest Educational Attainment, National, High School Average, Mathematics 11, Gender, Mothers' Highest Educational Attainment, IT 11, IQ, Private, City, University

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.300	13	.485	2.888	.002
	Residual	11.576	69	.168		
	Total	17.876	82			

a Predictors: (Constant), Annual Income, English 11, Fathers' Highest Educational Attainment, National, High School Average, Mathematics 11, Gender, Mothers' Highest Educational Attainment, IT 11, IQ, Private, City, University
b Dependent Variable: Statistics 11

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.540	1.896		.285	.777
	Mathematics 11	.484	.102	.507	4.762	.000
	English 11	.218	.170	.146	1.287	.203
	IT 11	.199	.127	.168	1.568	.121
	IQ	-1.507E-02	.012	-.141	-1.266	.210
	High School Average	1.776E-02	.015	.120	1.159	.250
	Gender	5.577E-02	.104	.058	.539	.592
	City	3.613E-02	.169	.026	.214	.831
	University	-.171	.153	-.145	-1.117	.268
	National	2.033E-02	.125	.022	.163	.871
	Private	.192	.245	.088	.783	.437
	Fathers' Highest Educational Attainment	-8.363E-02	.066	-.134	-1.271	.208
	Mothers' Highest Educational Attainment	-3.211E-02	.063	-.053	-.506	.615
	Annual Income	-4.404E-02	.078	-.058	-.561	.576

a Dependent Variable: Statistics 11

Excluded Variables

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	Barangay	.	.	.	.	.000

a Predictors in the Model: (Constant), Annual Income, English 11, Fathers' Highest Educational Attainment, National, High School Average, Mathematics 11, Gender, Mothers' Highest Educational Attainment, IT 11, IQ, Private, City, University

b Dependent Variable: Statistics 11