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BIVARIATE CORRELATION ANALYSIS FOR ELECTRONICS ENGINEERING PROGRAM IN HIGHER EDUCATION

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ABSTRACT

In this work, we established a statically connection between age, college entrance score and student performance, and between basic science courses of first year like physics, calculus etc. and student performance. We calculated this relationship using bivariate correlation analysis. For all data, score transformation was computed with linear transformation method. Data was extracted from undergrade classes in Electronics Engineering program. We investigated the student performance for all and classifying data with correlation analysis. Additionally we analyzed all data using regression analysis.

Keywords: : *Bivariate correlation, Academic performance*

1. INTRODUCTION

Researchers and educators have been interested in determining factors related to student academic success. Student performance analysis has historically been used as predictors of school success by establishing correlation method in which to compare school achievement with similar schools.

The purpose of this work was to determine the effect of student age, college entrance score with relationship between them and average scales on student achievement courses. The courses examined in this work were as follows; physics I (first year, first semester course), physics II (first year, second semester course), calculus I (first year, first semester course), calculus II (first year, second semester course), chemistry (first year, first or second semester course), first year-first semester average scale and fist year-second semester average scale. The study question, therefore, addresses to what extent these student enrollment status are related to student grades in courses.

Bivariate correlation was used to analyze the relationship between the student enrollment status and last semester average scale, and between lecture grades and semesters average scales. This analysis examines the correlations between these items to determine the prediction of factors that best predict student scores. Additionally, we used the regression analysis to determine if last semester average scale that the dependent variable were significantly influenced by the following independent variables; age, entrance score and scale on courses.

There are several researches on correlation. Patrica Plympton et al. have recently proposed effects of day lighting on student performance [5]. Sherry and Jesse were investigated student solving talent with correlation [7]. Another research has been studied on student experiences, which are related to student achievement

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[2][3][6]. Tinto has found the first year appears to be the most important year in overall degree progression, as most of the students who do not complete their degrees because of not being problems experienced in the first year study [8].

2. Bivariate Correlation

In this study, bivariate correlation analysis was conducted on several variables related to college student's demographic and enrollment status and their student grade performance. All data consisted of all students grades in courses, were extracted from the University's student record system. They have taken from the student mentoring service in Dokuz Eylul University. Specifically, as you known that status variables included age (in years), college entrance score, and grades in courses. Grades were obtained on a 4 point-to-point average scale.

After data was analyzed, they were classified as first, second, third and last grades. Then correlation coefficients calculated for all and classified data.

As a simple fact that the correlation is association between two quantative variables [1]. In this project, we used correlation for our maximum likelihood estimator. Correlation coefficients are calculated from [4]

$$r = \frac{\sum_i (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum_i (X_i - \overline{X})^2 \sum_i (Y_i - \overline{Y})^2}} \quad (1)$$

It would seem natural to use r as a test statistic to test hypotheses about ρ. For testing hypothesis $H_0 : \rho = \rho_0$, it can be employed that

$$z = \frac{1/2 \ln\left(\frac{1+r}{1-r}\right) - 1/2 \ln\left(\frac{1+\rho_0}{1-\rho_0}\right)}{1/\sqrt{n-3}} \quad (2)$$

Table 1 displays the correlation among some variables in the study. The correlation is large in age than in the school entrance score. However, correlation between age and last semester average scale is small. Because of the positivity in it, age has smallest correlation with last semester scale. Calculus II score had the largest correlation with last scale. The positive correlation indicates that students had attained a math grades in their high school class tent to attain higher college grades. It is noted that first year-first semester and first year-second semester average scale are highly related with last average scale. This is indicated that first year-first and second semester courses are the most important in student achievement.

For each class correlation is presented for some courses in Table 2. It is shown the correlation of the basic courses grades with last average scale for each class. All correlation coefficients are positive. When we are looking this table, it is seen that the largest correlation is in physics course. Table 3 shows the relation between age and entrance score with last average scale for class-to-class. Age to last scale in first and second years of University life is negatively related with each other. This means that younger students tented to lower average scale. The last class correlation is highly related with age but entrance score relation is negative. This indicates that the students have highly entrance score tent to lower average scale.

3. Predicting Last Average Scale from Age, School Entrance Score and Basic Course Scales

In this study, we used the regression analysis to determine if last semester average scale was significantly influenced by the following independent variables; age, school entrance score, first and second semester basic courses, first year-first semester average scale and first year-second semester average scale. Bivariate correlations demonstrated that these variables were the most highly correlated with last average scale and all positive correlates. However, the two predictors which age and entrance score are negatively correlated in some classes suggesting that their impact on last average scale might be mitigated. Table 4 displays the results of the regression analysis.

4. Conclusion

The overall regression model in this work has highly statistically significant with r^2. The regression coefficients were also highly significant for each predictor. The resulting model suggests that a student last average scale

will increase for each additional year in age and will decrease entrance score added with each additional year.

The statistical relationship uncovered in this analysis, is qualified by the very large sample size. That is the large size makes it possible to uncover very weak associations.

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Table 1.Bivariate correlations among student enrollment status variables

	Age(in years)			
All Semesters	**Pearson Correlation**	**Rank Correlation**	**Two-tailed**	**N**
College Entrance Score	-0.7258	-224.6552	20.5043	323
Last Semester Average Scale	0.3324	-506.8153	5.0309	215
	College Entrance Score			
	Pearson Correlation	**Rank Correlation**	**Two-tailed**	**N**
Last Semester Average Scale	-0.2364	0.9991	16.6893	215
	Last Semester Average Scale			
	Pearson Correlation	**Rank Correlation**	**Two-tailed**	**N**
Physics I	0.5944	0.9999	10.1288	222
Physics II	0.5390	0.9999	8.9198	222
Calculus I	0.5821	0.9999	9.0009	226
Calculus II	0.6285	0.9999	11.0346	226
Chemistry	0.3961	0.9999	19.7339	212
First Year-First Semester Average Scale	0.8220	1.0000	17.3666	226
First Year-Second Semester Average Scale	0.8701	1.0000	19.9133	226

Table 2.Class-to-class bivariate correlations for basic courses

	Second Year			
	Correlation	**Rank Correlation**	**Two-tailed**	**N**
Physics I	0.5908	0.9992	3.3958	71
Physics II	0.7970	0.9993	3.4207	71
Calculus I	0.4683	0.9991	3.4454	73
Calculus II	0.6307	0.9991	6.2129	73
First year-first semester average scale	0.8566	0.9998	10.7129	73
First year-second semester average scale	0.8987	0.9998	12.2606	73
	Third Year			
	Correlation	**Rank Correlation**	**Two-tailed**	**N**
Physics I	0.5083	0.9993	12.4345	75
Physics II	0.7058	0.9996	7.4566	75
Calculus I	0.4226	0.9990	3.8784	77
Calculus II	0.3490	0.9988	3.1337	77
First year-first semester average scale	0.8188	0.9998	9.7849	75
First year-second semester average scale	0.8832	0.9999	11.7957	75
	Fourth Year			
	Correlation	**Rank Correlation**	**Two-tailed**	**N**
Physics I	0.6905	0.9993	3.0697	74
Physics II	0.3367	0.9987	2.9522	74
Calculus I	0.6909	0.9991	7.1595	74
Calculus II	0.7444	0.9993	8.0914	74
First year-first semester average scale	0.7851	0.9996	8.9193	74
First year-second semester average scale	0.8165	0.9996	9.6583	74

Table 3.Class-to-class correlations with student enrollment status

	Second Year		
	Correlation	**Rank Correlation**	**Two-tailed**
Age-Last Average Scale	-0.0327	$-4.9356.10^3$	-0.2658
Entrance score-Last Average Scale	0.0574	0.9914	0.4668
	Third Year		
	Correlation	**Rank Correlation**	**Two-tailed**
Age-Last Average Scale	-0.0402	$-4.2854.10^3$	-0.3389
Entrance score-Last Average Scale	-0.0827	0.9922	-0.6984
	Fourth Year		
	Correlation	**Rank Correlation**	**Two-tailed**
Age-Last Average Scale	0.5271	-45243.10^3	4.8687
Entrance score-Last Average Scale	-0.5340	0.9930	-0.3341

Table 4.Regression model summary for basic courses and for classes

	Second Year	
	r^2	**Information Error**
Physics I	36.9909	0.5361
Physics II	121.884	1.7412
Calculus I	19.9439	0.2809
Calculus II	46.9026	0.6606
First year-first semester average scale	195.7186	2.7566
First year-second semester average scale	298.2142	4.2002
	Third Year	
	r^2	**Information Error**
Physics I	25.4332	0.3484
Physics II	72.4744	0.9928
Calculus I	16.3050	0.2174
Calculus II	10.4025	0.1387
First year-first semester average scale	148.4820	2.0340
First year-second semester average scale	258.8215	3.5455
	Fourth Year	
	r^2	**Information Error**
Physics I	65.6136	0.9113
Physics II	9.2088	0.1279
Calculus I	65.7432	0.9131
Calculus II	89.4744	1.2427
First year-first semester average scale	115.6968	1.6069
First year-second semester average scale	144.0216	2.0003