

## **Analysis on Mathematics Success of Students in Vocational School Evening Classes in terms of Certain Variables**

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**ABSTRACT:** *This study aims to analyze the mathematics success of students in Vocational Schools' evening classes in terms of certain variables. For this purpose, personal information forms prepared by the researcher were used to collect the necessary information about the students. This information form contained such questions as the students' gender, type of school they graduated from, name of program they are enrolled to and the type of their enrollment. The academic success points of the students were obtained from their relevant departments. The sample group of the study is 142 students attending the evening classes of Tatvan Vocational School of Bitlis Eren University. The research was applied in 2015-2016 academic year. The data collected were analyzed by ANOVA and t-Test methods. The findings revealed that the mathematics success of students admitted through the exam is higher than that of students enrolled through open admission (without exam) and that there is significant difference of students' mathematics success depending on their gender, type of high school they graduated from and the program they are enrolled to.*

**Keywords:** *Vocational School Students, mathematics success, admission through exam – free admission*

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### **I. INTRODUCTION**

Because of the rapid developments in the field of science and technology, the developed and developing countries review their education systems and make necessary changes at times to adapt to such developments and to meet the need for skilled labor. It is of vital importance for an education system to include a high quality vocational training which embraces technology. The vocational training is still more important for maintaining our competitive power in international markets. Vocational Schools are the leading institutions in our country in the field of vocational training.

Article 3, paragraph (i) of Law No. 2547 on Higher Education defines Vocational Schools as “An institution of higher education carrying out four-semester education aimed at training human power in specific areas.” (Keskin et al., 2010). The vocational education aims to provide the individuals with applied training as well as the theoretical information necessary for a vocation, thereby, ensures that the individual acquires the skills, attitudes and practices required for a vocation (Vural, 2013).

The associate degree programs originated in the twentieth century in the USA to meet the human power needs of the world's developing technology and they have gained widespread implementation in many countries in 1960's (Akpınar, 2003:10). The technicians and higher technician schools were established in 1954 in Turkey with a view to train the intermediate human power and they continued education until 1973. In the process of restructuring education and training in 1973, pre-baccalaureate level higher education programs were introduced and Vocational Schools were established to train the intermediate human power (Official gazette, Basic Law on National Education, No 1739,1973). With the restructuring of higher education, these schools were included into the universities (Official gazette, No 17760, 198).

With a view to encourage the students to continue vocational and technical schools after elementary school and to ensure the integrity and continuity of curriculum between vocational/technical secondary schools and vocational schools, Ministry of National Education (MEB) and the Council of Higher Education (YÖK) developed the project of “open admission to vocational schools”, which became effective after 2001. As per the relevant law and beginning from the academic year 2002-2003, the students graduating from vocational/technical secondary schools can continue through open admission (without exam) to vocational school program in their branches or the one closes to their branches (MEB-YÖK, 2002 : YÖK, 2004). The education for training intermediate personnel, which is an important problem in today's world, has been developing and improving continuously. In today's age of rapid development in science and technology, the humankind is endeavoring to adapt such transformation. The skills of creativity, reasoning and problem solving become prominent in this process of adaption. Mathematics education plays a major role in providing the individuals with such skills (Turanlı, Türker and Keçeli, 2008).

These facts make it necessary and important to carry out a study on the mathematics success of students attending to the evening classes of Vocational Schools (evening classes are courses conducted with the same curriculum after the normal education hours). In this context, this study aims to analyze the mathematics success of students in Vocational Schools' evening classes in terms of certain variables.

## II. RESEARCH

### 2.1. Research Objective

This research aims to analyze the successes of Vocational School students attending to evening classes in mathematic courses in terms of certain variables as gender, type of high school they graduated from, the program they are enrolled to and the type of their enrollment (open enrollment or through exam). For this purpose, the study seeks answers to following questions:

1. Is there a significant difference between the students' success in mathematics courses depending on their type of enrollment?
2. Is there a significant difference between the students' success in mathematics courses depending on their gender?
3. Is there a significant difference between the students' success in mathematics courses depending on type of high school they graduated from?
4. Is there a significant difference between the students' success in mathematics courses depending on the program they are attending to?

## III. METHODS

### 3.1. Research Model and Research Group

The research was conducted to analyze the successes of Vocational School students attending evening classes in mathematic courses in terms of certain variables. The research employs relational screening method in descriptive survey model. Screening model aims to describe a past or present situation as it is (Karasar, 1994). The sample group of the study is 145 students attending the evening classes of Tatvan Vocational School of Bitlis Eren University in the departments of Computer Technologies, Electrics and Laboratory Technology. Table 1 and Table 2 below give certain demographic properties of these students.

**Table 1.** Distribution of students according to their type of high school and gender

High S Type	Female	%	Male	%	Total
Common High School	12	48.0	13	52.0	25
Anatolian High School	17	60.7	11	39.3	28
Vocational High School	28	30.4	64	69.6	92
Total	57	39.3	88	60.7	145

**Table 2.** Distribution of students according to programs they are enrolled to

Program	Through Exam	Without examination	Total
Computer Technologies	25 % 53.2	22 % 46.8	47
Electrics	15 % 31.3	33 % 68.8	48
Laboratory Technologies	42 % 84.0	8 % 16.0	50
Total	82 % 56.6	63 % 43.4	145

When Table 1 and Table 2 are examined together, it is seen that 39.3% (N=57) of the students in study group are female and 60.7% (N=88) are male. It is also seen that 25 of them are graduate from common high school, 28 of them from Anatolian High School and 92 of them from Vocational High School. Besides, it is seen that the Computer Technologies program admitted 25 students (53.2 %) through exam and 22 students (46.8 %) through open admission, Electrics program admitted 15 students (31.3%) through exam and 33 students (68.8 %) through open admission and Laboratory Technologies program admitted 42 students (84.0 %) through exam and 8 students (16.0 %) through open admission.

### 3.2. Data Collection Tools

Personal information forms were used to determine the successes of Vocational School students attending evening classes in mathematic courses. This information form contained such questions as the students' gender, type of school they graduated from, name of program they are enrolled to and the type of their enrollment (through exam or open enrollment without exam). The academic success points of the students were obtained from their relevant departments as average of their success points in mathematics courses in two semesters.

### 3.3. Analysis of the Data

In line with the general objective of the study, SPSS17.0 package program was used for the statistical analysis of the data collected through information forms. The analysis of the data employed Single Factor Analysis of

Variance (ANOVA), Independent One Sample t-Test and Scheffe test which is one of the Post Hoc test techniques. The significance level in the statistical analysis was taken as .05.

#### IV. FINDINGS

1. With regards to answering the first sub-question, Table 3 shows the findings of the t-test applied to determine whether there is a significant difference between the successes of Vocational School students attending evening classes in mathematics courses depending on their type of enrollment to their program (through exam or without exam).

**Table 3.** t-Test results on the students' success in mathematics courses depending on their type of enrollment to their program

Enrollment Type	N	$\bar{x}$	ss	sd	t	p
Through Exam	82	56.65	17.70	143	6.10	.001
Without examination	63	39.06	16.50			

When we look at Table 3, we see that the students' success in mathematics courses shows a significant difference depending on the variable of "enrollment type" [ $t_{(143)} = 6.10, p < .05$ ]. The mathematics average success points of students enrolled though exams ( $\bar{x}=56,65$ ) is higher than that of enrolled through open enrollment without exam ( $\bar{x}=39,06$ ). This finding may be interpreted as a significant correlation between mathematics success points and the enrollment type variable.

2. With regards to answering the second sub-question, Table 4 shows the findings of the t-test applied to determine whether there is a significant difference between the successes of Vocational School students attending evening classes in mathematics courses depending on their genders.

**Table 4.** t-Test results on the students' success in mathematics courses depending on their genders

Gender	N	$\bar{x}$	ss	sd	t	p
Female	57	53.78	23.85	143	2.45	.016
Male	88	45.92	14.90			

When we look at Table 3, we see that the students' success in mathematics courses shows a significant difference depending on the variable of gender. [ $t_{(143)} = 2.45, p < .05$ ]. The mathematics average success points of female students ( $\bar{x}=53,78$ ) is higher than that of males ( $\bar{x}=45,92$ ). Based on this finding, one may suggest that there is a significant correlation between mathematics success points and the gender variable.

3. With regards to answering the third sub-question, Table 5 shows the findings as whether there is a significant difference between the successes of Vocational School students attending evening classes in mathematics courses depending on type of high school they graduated from.

**Table 5.** Students' mathematics success grades and standard deviation depending on the type of school they graduated from

Type of School	N	$\bar{x}$	ss
Common High School	25	57,88	16,08
Anatolian High School	28	64,82	17,06
Vocational High School	92	41,79	16,73
Total	145	49.01	19,24

Table 5 shows the students' average mathematics success grades depending on the type of high school they graduated from. These results show that students graduated from Anatolian High Schools have the highest average mathematics success grades ( $\bar{x}= 64,82$ ). Besides, Anatolian High Schools are followed by Common High Schools with ( $\bar{x}= 57,88$ ) and Vocational High Schools with ( $\bar{x}=41,79$ ).

**Table 6.** Anova test results on students' mathematics success grades depending on the type of school they graduated from

Source of variance	Sum of squares	sd	Mean of Squares	F	P	Significant difference
Between groups	13758.149	2	6879,075	24,69	,000	1 - 3
Within groups	39551.823	142	278,534			2 - 3
Total	53309.972	144				

\*1. Common High School, 2. Anatolian High School, 3. Vocational High School

When we look at Table 6, we see that the students' average mathematics success grades shows a significant statistical difference depending on the variable of the type of school they graduated from [  $F_{(2-142)} = 24,69$ ,  $p < .05$  ]. According to the results of Scheffe test applied to find out among which school types such significant difference exists, mathematics success grades of students graduated from Anatolian high schools ( $\bar{x} = 64,82$ ) and Common high schools ( $\bar{x} = 57,88$ ) are higher than those graduated from Vocational high schools ( $\bar{x} = 41,79$ ).

4. With regards to answering the fourth sub-question, Table 7 shows the findings as to whether there is a significant difference between the successes of Vocational School students attending evening classes in mathematics courses depending on the program they are attending to.

**Table 7.** Students' mathematics success grades and standard deviation depending on the program they are attending to

Program	N	$\bar{x}$	ss
Computer Technologies	47	37,74	17,08
Electrics	48	46,95	12,08
Laboratory Technologies	50	61,58	19,66
<b>Total</b>	145	49,01	19,24

Table 7 shows the students' average mathematics success grades and standard deviation depending on the program they are attending to. According to these results, the students attending Laboratory Technologies program have the highest average mathematics success grades ( $\bar{x} = 61,58$ ). Laboratory Technologies program is followed by Electrics program with ( $\bar{x} = 46,95$ ) and Computer Technologies with ( $\bar{x} = 37,74$ ).

**Table 7.** Anova test results on students' mathematics success grades depending on the program they are attending to

Source of variance	Sum of squares	sd	Average of squares	F	P	Significant difference
Between groups	14066.940	2	7033.470	25.45	.000	3-1, 3-2
Within groups	39243.033	142	276.359			
Total	53309.972	144				

\*1. Computer Technologies Program, 2. Electrics Program, 3. Laboratory Technologies Program.

When we look at Table 7, we see that the students' average mathematics success grades shows a significant statistical difference depending on the variable of the program they are attending to [  $F_{(2-142)} = 25.45$ ,  $p < .05$  ]. According to the results of Scheffe test applied to find out among which program types such significant difference exists, mathematics success grades of students attending to Laboratory Technologies program ( $\bar{x} = 61,58$ ) are higher than those of Electrics program ( $\bar{x} = 46,95$ ) and Computer Technologies ( $\bar{x} = 37,74$ ). Besides, mathematics success grades of students attending to Electrics program are higher than those attending to Computer Technologies but such difference is not statistically significant.

## V. RESULTS

The mathematics success of students in Vocational Schools' evening classes was analyzed based on Tatvan Vocational School of Bitlis Eren University and the following findings were reached. With regards to answering the first sub-problem, it is seen that students' average mathematics success grades show a significant difference depending on the variable of "admission type" [  $t_{(143)} = 6,10$ ,  $p < .05$  ]. It is determined that the mathematics average success grades of students enrolled through exam ( $\bar{x} = 56,65$ ) is higher than that of enrolled through open enrollment without exam ( $\bar{x} = 39,06$ ). These findings suggest that there is a meaningful correlation between students' mathematics success grades and the variable of enrollment type. This finding shows similarities with the findings of some other studies (Çağlar, Türeli, 2005; Kellecioğlu, 2006; Akyurt et al., 2008; Akt. Leylek and Gürten, 2015).

The study also revealed that the students' average mathematics success grades show a significant difference depending on the variable of gender [  $t_{(143)} = 2.45$ ,  $p < .05$  ]. It was concluded that the mathematics average success grades of female students ( $\bar{x} = 53,78$ ) is higher than that of males ( $\bar{x} = 45,92$ ). Based on this finding, one may suggest that there is a significant correlation between mathematics success grades and the gender variable. The reasons of such meaningful correlation may be the difference between female and male students' confidence in their sufficiency dealing with mathematical concepts, their reliance on their competencies and their attitude, interest and confidence self-adequacy.

Based on research, the students' average mathematics success grades show a significant difference depending on the type of high school they graduated from. [  $F_{(2-142)} = 24,69$ ,  $p < .05$  ]. Among the school types, students graduated from Anatolian High Schools have the higher average mathematics success grades than those graduated from other schools. One of the reasons that the students graduated from Anatolian High Schools have the higher average mathematics success grades than those graduated from other schools is closely related to the qualifications of students graduating from these schools. It may stem from the results of information, skills and academic performance that the students acquired throughout their education process at the schools. Besides, among the students taking the University Entrance Exam for the first time, the distribution of net correct answers to 45 mathematic questions between the types of high schools that the students graduated from is as follows; Common high school 5.72, Anatolian high school 27,86, Vocational high school 0.98... (YÖK, 2007). The study reveals that there is a significant difference in the students' average mathematics success grades depending on the type of program they are attending to [  $F_{(2-142)} = 25.45$ ,  $p < .05$  ]. According to the results of Scheffe test applied to find out among which program types such significant difference exists, average mathematics success grades of students attending to Laboratory Technologies program are higher than those of Electrics program and Computer Technologies program. Besides, average mathematics success grades of students attending to Electrics program are higher than those attending to Computer Technologies but such difference is not statistically significant. One of the reasons why the average mathematics success grades of students attending to Laboratory Technologies program are higher than those of other programs may be the fact that the number of students admitted to this program through exam is higher when compared to the other programs (Table 2). Certain studies carried on the students admitted to the Vocational Schools through exam or open enrollment without exam confirm the findings of our study. In a study conducted by Handen and Tunç (2005); the open enrollment method has changed the student profile of Vocational Schools. Almost all students come from Vocational high schools. Most of the students are those who could not achieve 105 or higher scores in University Entrance Exams. Because of the system for passing class in vocational intermediate schools, the students pass to a higher class based on their skills and competencies. They have lesser interest in lessons such as Mathematics, Physics, and Chemistry etc. Accordingly, students enrolled to Vocational Schools are not successful in the abovementioned lessons which require processing and interpreting. Experienced academic staff agree that students enrolled through exam are more willing and interested. The same academic staff states that they have difficulty in motivating the students enrolled through open enrollment without exams and, therefore, that they lose their passion for teaching lessons. The academic staff also states that the students enrolled through open enrollment without exams lack the information and skills required for the lessons.

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