

## The Effect of Technological Devices on Student's Academic Success: Evidence from Denizli

### Teknolojik cihazların öğrenci başarısı üzerindeki etkileri: Denizli örneği

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Bu çalışmada teknolojik cihazların öğrenci başarısına katkısı analiz edilmiştir. Denizli'de lise son sınıf öğrencilerinin cep telefonu sahipliği, cep telefonundan internete bağlanıp bağlanmadıkları, bilgisayar sahipliği, evden internete bağlanıp bağlanmadıkları ve evde bulunan TV sayısının öğrenci başarısını temsil eden üniversiteye giriş sınavından aldıkları puanlar üzerinde etkisinin belirlenebilmesi için parametrik testlerden yararlanılmıştır. Sonuç olarak sadece bilgisayarı olan öğrencilerin olmayanlara göre ve evden internete bağlananların bağlanmayanlara göre daha başarılı olduklarına ilişkin kanıt bulunmuştur.

**Anahtar kelimeler:** Eğitim, öğrenci başarısı, e-öğrenme, m-öğrenme

**Jel Kodları:** A2, C1

In this study the contribution of the technological devices on students' success has been examined. The effects of the ownership of cell phones, the connection to internet from cell phones, the ownership of computers and the connection to internet from their computers and the numbers of TVs at home on the attendance exam which represents the success of the students have been investigated with parametric tests in the province of Denizli. As a result the students who have computers and have connection to internet at home have been found more successful.

**Keywords:** Education, students' success, e-learning, m-learning

**Jel Codes:** A2, C1

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## 1. INTRODUCTION

The development of new technologies such as cell phones, the internet and computers, has raised a new question. Does the use of new technologies have any effect on student's academic success? This question is not easy to answer because these new technologies interact with students in several ways. This developing field of educational economics is growing day by day. In particular, the researchers who follow mobile learning theory believe that mobile learning contributes to students' learning in two ways (Valk et al. 2010). First, technological devices influence the access to educational outcomes (Visser & West 2005, Motlik 2008). Second, they improve the quality and types of instructional methods (Kukulska-Hulme & Traxler 2007, pp.184-86; Traxler, 2007, p. 7). However, there is some evidence that these devices are also a source of distraction, and different results are found depending on the family type. For example, the higher the income and cultural level of the families are, the more supportive learning is obtained from these devices. Tsikalas et al. (2007) found that every type of computer use increases student success. Subrahmanyam et al. (2000) and Subrahmanyam et al. (2001) found that the use of the internet contributes to the student's development of cognitive and visual skills. Blanton et al. (1997); Cole (1996) and Rocheleau (1995) believe that it is difficult to say that there is a causal relationship between internet use and student success. Shields and Behrman (2000) claim that the relationship is uncertain. Kraut et al., (1996) and the NSF Report (2001) investigated this issue and determined that there is a controversial relationship between student success and internet use.

As a result, in the literature, there is very strong supportive evidence for e-learning and m-learning. The primary source of controversy is that the devices, which are used for e-learning and m-learning by students, are a source of distraction. This paper seeks to contribute to a better understanding of the effects of distraction if there is using data from high school students in Province Denizli, Turkey. Students in Turkey can connect to internet to communicate with their friends or to play games. These activities help students relax, but if they are used during class or if students become addicted to these activities, they may become very distracting. In the other words, there is substantial distance learning materials and online tutoring available for high school students in Turkey. "Online services" or "the internet" may be used for educational purposes, but they may also be used for other aims that may distract from students' learning. Therefore, more research from different countries and periods is needed in this area of study because each culture and country is affected differently. The main purpose of this study was to investigate the effect of technological devices on student's academic success. The effects of technological vehicles could not be separated due to data constraints. Therefore, the overall effect of the devices was measured.

The following research questions should be answered during the research process:

1. Is there a significant difference in university attendance and exam scores between those who own a personal cell phone and those who do not?
2. Is there a significant difference in university attendance and exam scores between those who have an Internet connection from a personal cell phone and those who do not?

3. Is there a significant difference in university attendance and exam scores between those who own a computer at home and those who do not?
4. Is there a significant difference in university attendance and exam scores between those who have an Internet connection from a home computer and those who do not?
5. Does the number of TVs at home significantly affect university attendance and exam scores?

## **2. METHODOLOGY**

In this section, the Research Design, Data Sets, Participants and Analysis Method are described.

### **2.1. Research Design**

The survey research design was used in this study (Babbie 1995 and Karasar 1999). According to Babbie (1995), survey research is most likely the best method available to the social scientist interested in collecting original data to describe a population too large to observe directly.

### **2.2. Data Sets**

In this section, the educational system in Turkey and the use of technology within the educational system are presented.

The university entrance system in Turkey is based on two exams<sup>5</sup>. The first exam selects and ranks the students, and the second exam directs the students to the appropriate departments based on their scores, using part of the score from the first exam. The university entrance exam in Turkey attempts to match the student's skills with the requirements of the department of interest. Therefore, students take the appropriate classes in high school depending on which department they want to enter. In the entrance exams, there are different scores associated with the requirements of each department. Questions from different lessons in these exams have different weights for each score type. In the first exam, six different scores are publicised, and the students who want to enter social and human science departments target the third or fourth score type<sup>6</sup>. In the second exam, there are 16 different scores. The second exam provides less opportunity to evaluate students' academic access because they are not comparable to each other. Using the first exam scores may be more acceptable and makes the analysis easier. After selecting the exam, a decision should be made as to what type of exam score from the first exam should be used for the analysis. In the current paper, the data sets are based on the third type of score from the university entrance exam.

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<sup>5</sup> The first exam is called "The Access to Higher Education" (AHE), and the second exam is called the "University Attendance Exam" (UAE)

<sup>6</sup> In this study, the students who target the third type of the six scores from YGS (The Access to Higher Education) were subject to the analysis

### 2.3. Participants

The participants in this study are 533 students from 27 different high schools located in different towns of Denizli Province. The data sets include scores from the exam, which is called the AHE (The Access to Higher Education, YGS in Turkish). The data set includes some dummies: if the student has a cell phone, if the student connects to the internet via cell phone, the number of TVs at home, if the student has a computer at home and if the student connects to the internet at home via computer.

### 2.4. Analysis Method

First, a One Sample Kolmogorov-Smirnov (K-S) Test was used to test whether the dependent variable used in this study, AHE, is normally distributed (Baştürk, 2010). According to the results of the analyses, it is determined that the AHE variable shows a normal distribution ( $K-S(z) = 0.784$ ;  $p > 0.05$ ). Therefore, parametric tests (independent samples t-tests and analysis of variance (ANOVA)) were used in this study. ANOVA test was introduced by Fisher (1918 and 1925). After that it has been used by researchers' especially experimental analysts. It is usually compared to regression analysis. According to the literature both are useful and powerful methods, and they can be used instead of each other in most case. In the other words, it tests if the value of a single variable differs significantly among three or more levels of a factor. In this study, we focus on to compare the groups, who have different features; because of that independent samples t-tests and ANOVA is the very suitable method for this aim.

## 3. RESULTS

Before presenting results about the research question, descriptive statistics are addressed in Section 3.1. The results are given and their connection with literature is discussed the in conclusion section.

### 3.1. Descriptive Statistics

Table 1 shows the descriptive statistics that were compiled from raw scores. Table 1 show that 92% of the participants have a personal cell phone. However, 62% of the participants do not have an Internet connection from their personal cell phone. A total of 68% of the participants stated that they have a computer at home, and 56% of the participants stated that they have an Internet connection from their personal cell phone. According to Table 1, 51% of the participants stated that they have at least 1 or 2 TVs at home.

**Table 1:** Descriptive statistics about variables used in this study.

Variables	Category	n	%
Personal Cell phone	Yes	489	92
	No	44	08
Internet connection from personal cell phone	Yes	205	38
	No	328	62
Computer at home	Yes	365	68
	No	168	32
Internet connection from the computer at home	Yes	297	56
	No	236	44
Number of TV at home	1 and 2	271	51
	3	204	38
	4 and 5	58	11

### 3.2. The Results About The First Research Question

To examine whether students' cell phone ownership affects their AHE scores, an independent samples t-test was used. The results of the analysis are shown in Table 2.

**Table 2:** AHE Analysis by Cell Phone Condition

Variable	Category	N	X	Ss	t	p
Cell Phone Condition	Yes	489	236,64	50,94	0,939	0,348
	No	44	229,16	47,03		

Table 2 shows that there is no significant difference between the students who have a personal cell phone and those who do not have one in terms of their AHE scores ( $t = 0.939$ ;  $p > 0.05$ ). In other words, as shown in Table 2, both the students who have a personal cell phone ( $M = 236,64$ ) and those who do not ( $M = 229,16$ ) have similar AHE mean scores.

### 3.3. The Results About The Second Research Question

To examine whether an internet connection from a personal cell phone affects the students' AHE scores, an independent samples t-test was used. The results of the analysis are shown in Table 3.

**Table 3:** AHE analysis by internet connection from a personal cell phone

Variable	Category	N	X	Ss	t	p
Internet connection from personal cell phone	Yes	205	240,88	51,98	-1,753	0,080
	No	328	232,99	49,60		

Table 3 shows that there is no significant difference between the students who can connect to the internet using their personal cell phone and those who cannot in terms of their AHE scores ( $t = -1,753$ ;  $p > 0.05$ ). In other words, as shown in Table 3, the students who are able to connect to the internet from a personal cell phone ( $M = 240,88$ ) and those who are not ( $M = 232,99$ ) have similar AHE mean scores.

### 3.4. The Results About The Third Research Question

To examine whether having a home computer affects students' AHE scores, an independent samples t-test was used. The results of the analysis are shown in Table 4.

**Table 4:** AHE analysis by computer at home

Variable	Category	N	X	Ss	t	p
Computer at home	Yes	365	240,78	49,06	-3,222	0,001
	No	168	225,70	52,55		

Table 4 shows that there is a statistically significant difference between the students who have personal computer at home and those who do not in terms of the AHE scores ( $t = -3,222$ ;  $p < 0.05$ ). In other words, as shown in Table 4, the students who have a personal computer at home ( $M = 240,78$ ) have a higher AHE mean score than the students who do not have a personal computer at home ( $M = 225,70$ ).

### 3.5. The Results About The Fourth Research Question

To examine whether an internet connection from a home computer affects the students' AHE scores, an independent samples t-test was used. The results of the analysis are shown in Table 5.

**Table 5:** AHE analysis by internet connection from a home computer

Variable	Category	N	X	Ss	t	p
Internet connection from the computer at home	Yes	297	241,84	49,13	-2,997	0,003
	No	236	228,71	51,63		

Table 5 shows that there is a statistically significant difference between the students who have an internet connection from the home computer and those who do not have an internet connection from a home computer in terms of their AHE scores ( $t = -2,997$ ;  $p < 0.05$ ). In other words, as shown in Table 5, the students who have an internet connection from a home computer ( $M = 241,84$ ) have a higher mean AHE score than the students who do not have an internet connection from a home computer ( $M = 228,71$ ).

### 3.6. The Results About The Fifth Research Question

To examine whether the number of TVs at home affects the students' AHE scores, a one-way ANOVA was used. The results of the analysis are shown in Table 6.

**Table 6** AHE analysis by number of TVs at home

Source of Variance	Sum of Squares	df	Mean Square	F	p
Between-groups	4857,89	2	2428,95	0,947	0,388
Within-groups	1358713,74	530	2563,61		
Total	1363571,63	532			

Table 6 demonstrates that there is no significant difference based on the number of TVs ( $F = 0,947$ ;  $p > 0.05$ ). The descriptive statistics of students' AHE scores by number of TVs at home are presented in Table 7.

**Table 7** Descriptive statistics by number of TV at home

Variable	Category	N	M	Sd
number of TV at home	1 and 2 TV	271	233,55	53,64
	3 TV	204	237,31	49,00
	4 and 5 TV	58	243,05	40,67
Total		533	236,03	50,63

## 4. CONCLUSION

This study has investigated the effects of technological devices, such as cell phones, computers, the internet and TV, on students' academic success. Due to data constraints, these effects are assessed generally. The results of the analysis suggest that access to a home computer and internet connection contributes to student's success. These devices may affect students differently. For example, young people may feel self-confident and relax with these

devices. Students may use them for communicating as well as acquiring information. The results suggest that the positive influence outweighs the negative influence of devices.

Students in high school may be affected by other students' possessions. Therefore, home computers and internet connections may contribute students' feelings.

Additionally, students can communicate with each other utilising devices.

Furthermore, the results of this study may demonstrate that access to a home computer and internet connection aids in developing self-learning skills. This result supports the constructivist approach. The constructivist approach is based on the principal that individuals take possession of knowledge by receiving information through their sense organs, making sense of it and internalising it. To create permanent behaviour change, it is important to activate the sense organs. (Hancer et al. 2009). This condition may contribute a positive effect on the student's retention. It has been observed that computer assisted teaching not only improves success but also develops the higher level thinking abilities of students and that these students learn by comprehension rather than memorising (Renshaw, et al. 2000, Kara and Yakar 2008, Kara and Kahraman 2008). As a result, students who use home computers and the internet are developing the concept's skills and self-learning skills. The development of these skills can positively impact students' academic achievement and retention.

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