

The Effect of Class Attendance on Learners' Success in Mathematics Course During Distance Education Process

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Abstract

The aim of this study is to determine the effect of class attendance during distance education process on academic success. The research was conducted among 46 students studying in sixth and seventh graders in a private educational institute in Elazığ city. As data collection tool, four achievement tests designed at the Central Office of relevant institution were employed and validity and reliability of the tests were ensured before application. Required approvals were taken prior to administering achievement tests in the research and before sharing collected data. In identifying the relationship between class attendance and exam success scores correlation analysis was harnessed and in determining their predictive power multiple regression analysis was applied. In sum, at the end of consecutive measurements it was identified that class attendance has a positive relationship with exam success scores.

Keywords: Distance Education, Class Attendance, Academic Success, Regression Analysis.

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INTRODUCTION

The main objective of schools can be defined as, in line with outlined plans, forming behavioral changes among students in an attempt to raise qualified human capital much needed in a society. In educational institutes aiming to instill learners with essential knowledge, objective academic competency level is measured and obtained measurement results are utilized to direct future educational life of learners and by prioritizing their personal traits students are guided towards the fields they succeed in most (Silah, 1994). In order to ensure smooth operation of the process, students are likewise expected to demonstrate active and continuous participation in the process.

Students' failure of to attend the education process is defined as absenteeism. In literature absenteeism is depicted as skipping school or class (truancy), irregular participation in class (Kearney & Silverman, 1990), distancing from class or school with no excuse stated (Wisconsin, 2000; Trans: Özkanal & Arıkan, 2011). Stoll (1990) defines absenteeism as skipping school without any excuses and legal causes (Trans: Şimşek, Uğurlu & Usta, 2016) and in the same vein it can also be defined as intentionally and habitually distancing from a learning setting without any legal causes such as health problems and with no valid grounds (Teixeira, 2013). Due to his/her negligent behavior a student intentionally and inexcusably avoiding educational process (Mlowosa, Kalimang'asi & Mathias, 2014) misses out not only acquisitions of program-based education but also acquisitions offered by unstructured education (Özkan, 2015). That is because absenteeism is a vital and yet mostly ignored determinant factor in education (Cattan et al., 2017:47) and it is for certain that the most significant determinant factor is students' success performance.

In relevant literature success has been defined in different ways and one of these definitions provided by Turkish Language Institute (TDK) in (2020) is such, “a *positive outcome related to the mental or actual activities that a person demonstrates based on his/her talent and upbringing*”. Bloom, on the other hand, defines (1998:345) success as the product of an interaction formed between the learner and learner's environment. Academic success, however, is explained adopting a specific knowledge level by the learner in relation to the academic lessons learnt at school (Silah, 1994). In the same vein Yaşar & Balkıs (2004) described academic success as the level of predetermined progress achieved by a learner in a learning setting. Indeed, success should not merely be confined to academic success concept but instead, all cognitive (knowledge and skill) and non-cognitive (attention, personal traits and attitude) behaviors should be treated within that context.

According to Shirazi & Heidari (2019) one of the most salient indicators foregrounded in evaluating results of education is academic success. A myriad of factors namely physical, psychological and social are influential in learners' academic success (Gençtürk, 2001, p. 8; Türnüklü et al., 2001; Silah, 1994). In addition to herein stated factors, one determinant affecting learners' academic success negatively is absenteeism (Elis, 2016:86) since outcomes resulting from absenteeism are strongly connected with academic success. Literature studies that focus on the effect of absenteeism on academic success (Cattan et al., 2017; Khalid, 2017; Alexander & Hicks, 2015; Gershenson, Jackowitz & Brannegan, 2015; Gottfried, 2015; Teixeira, 2013; Aucejo & Romano, 2014; Pudaruth, Nagowah, Sungkur, Moloo & Chiniah, 2013; Musa, 2014; Arulampalam, Naylor & Smith, 2009; Altınkurt, 2008; Strickland, 1998) report that students with higher level of total absenteeism have, compared to students with lower level of total absenteeism, scored decreased academic success in achievement tests. In parallel with that statement Pudaruth et al. (2013) in their research concluded that absenteeism has a significant and negative correlation coefficient with academic success. In the research by Arulampalam et al. (2009) regression results demonstrated that absenteeism has a negative effect on academic success.

These findings on the relationship between academic success and absenteeism shed light in some degree to the status of these variables but what indeed raises questions in mind is how, during distance education process in particular, class attendance can affect students' academic success. There have been a wide range of studies conducted to investigate the dimensions of the link between class attendance and academic success in formal education and these studies mainly discussed the effect of

class attendance on academic success (Schmidt, 1983; Park & Kerr, 1990; Moore et al., 2003; Gump, 2005; Hammen & Kelland, 1994). Similarly, there have also been many other studies that examined the dimensions of the link between class attendance and academic success in distance education. Seven (2012) and Yorgancı (2013) in their studies determined that students continuing distance education are more successful than those attending formal education. In their research Özturan, Egeli & Darcan (2000) analyzed success rates of students continuing formal education and those continuing distance educations but they failed to identify a significant differentiation. However, Simpson (2013) in a study detected that the difference was in favor of students continuing formal education.

This study differs from similar literature researches in certain aspects. First difference is that current study was a longitudinal analysis hence it aims to present the relationship between academic success and class attendance via multiple measures. In addition, it is significant to reiterate that kind of studies conducted in the fields open to techno-pedagogic progress like distance education. In light of these evaluations it can be argued that main objective of this study is to determine the relationship between class attendance and academic success in Mathematics course among secondary education students during distance education process.

METHOD

This research was executed according to longitudinal study methodology. In longitudinal study the key principle is repetitive examination of a research group at different time frames. Within that context, a total of four exams were administered in measurement stage and one exam was conducted at the start of application and at the end of three periods constituting eight hours of time slots. In the specified periods, class attendance at eight class hours and learners' success scores at the end of eight class hours were recorded. As data collection tool, four achievement tests designed at the central office of relevant institution were employed and validity and reliability of the tests were ensured before application.

Research population consists of secondary education students attending a private educational institute in Elazığ city. Sampling consists of randomly selected 6th and 7th graders. Among 46 students attending 6th and 7th grades in that school in the specified periods, the relationship between class attendance and exam success in Mathematics course was explored.

Data Analysis

In this study, views related to both of the dependent variables were contrasted with respect to independent variables such as gender and attended class level (continuing sixth and seventh grade). In these comparisons' independent groups t-test was administered whenever distribution was homogenous. Provided that in data set, total number of observation is below 20 it is more appropriate to employ nonparametric tests under given circumstances (Büyüköztürk, 2012). On that account in the analysis relevant of gender variable Mann-Whitney U test was employed. In order to reveal the relationship between dependent variables Pearson Correlation Coefficient was computed and in determining predictive power of class attendance on exam scores in Mathematics course, multiple regression analysis was employed. Further to that, in an attempt to detect normalcy of the distribution related to average exam scores in Mathematics course, histogram graphic was drawn and exhibited in Figure 1.

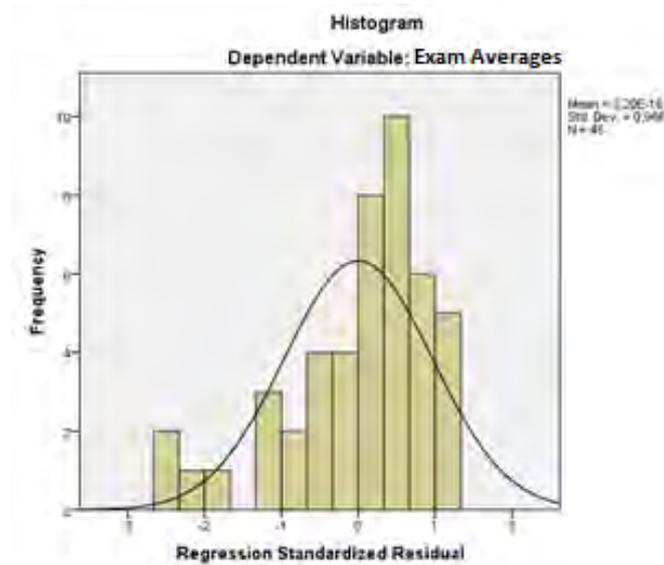


Figure 1. Histogram Graphic related to Academic Success Scores in Mathematics Course

As is witnessed in Figure 1 histograms indicating the average exam scores suggest that distribution is normal and Q-Q graphic related to that condition is as drawn in Figure 2.

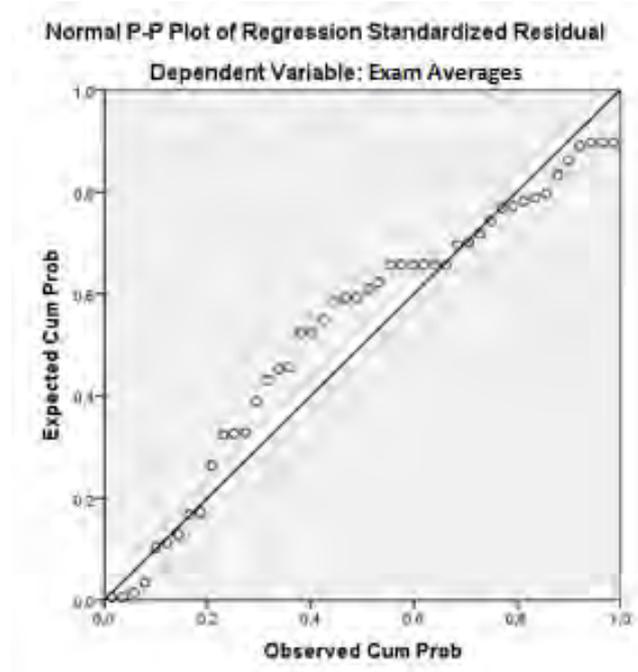


Figure 2. Q-QW Graphic related to Academic Success Scores in Mathematics Course

As demonstrated in Figure 2 linearity condition which is the secondary pre-assumption of regression analysis has been secured.

FINDINGS

Within the context of this study at first learners' exam scores in Mathematics course and class attendance were compared with respect to gender variable and results displayed in Table 1 were thus obtained.

Table 1. Comparison of academic success scores in Mathematics course and class attendance with respect to gender variable

	Gender	N	\bar{X}	Sum of Ranks	Mann Whitney U		
					U	Z	p.
Exam-1	Female	19	57,63	367,50	177,500	-1,774	,076
	Male	27	68,70	713,50			
Exam-2	Female	19	53,95	383,00	193,000	-1,428	,153
	Male	27	62,78	698,00			
Exam-3	Female	19	55,53	406,50	216,500	-,902	,367
	Male	27	68,52	674,50			
Exam-4	Female	19	71,58	443,50	253,500	-,068	,946
	Male	27	75,19	637,50			
Absenteeism-1	Female	19	6,74	439,00	249,000	-,197	,844
	Male	27	7,26	642,00			
Absenteeism-2	Female	19	6,05	400,00	210,000	-1,222	,222
	Male	27	7,19	681,00			
Absenteeism-3	Female	19	7,26	430,00	240,000	-,629	,529
	Male	27	7,81	651,00			

According to Table 1 learners' academic success scores in Mathematics course and class attendance do not vary significantly with respect to gender variable ($p > .05$). Secondly in this research comparisons were drawn with respect to attended class level. Learners' academic success scores in Mathematics course and class attendance were compared with respect to class level and results displayed in Table 2 were thus gathered.

Table 2. Comparison of academic success scores in Mathematics course and class attendance with respect to attended class level

	Class	N	\bar{X}	S.d.	Levene test		t test		
					F	p	Sd	t	p.
Exam-1	6	21	61,67	21,871	,169	,683	43,11	-,689	,495
	7	25	66,20	22,651					
Exam-2	6	21	59,05	28,837	,001	,971	43,56	-,017	,986
	7	25	59,20	31,181					
Exam-3	6	21	60,48	33,537	3,210	,080	37,59	-,547	,588
	7	25	65,40	26,257					
Exam-4	6	21	74,05	26,440	1,156	,288	37,93	,091	,928
	7	25	73,40	21,002					
Absenteeism-1	6	21	7,48	1,289	4,187	,047	42,55	1,704	,096
	7	25	6,68	1,865					
Absenteeism-2	6	21	6,71	2,572	,280	,600	40,62	-,008	,994
	7	25	6,72	2,301					
Absenteeism-3	6	21	7,43	1,326	1,852	,180	41,01	-,773	,444
	7	25	7,72	1,208					

According to Table 2, learners' average academic success scores in Mathematics course and class attendance do not significantly vary with respect to attended class level ($p > .05$).

Within the context of this research it was aimed to unveil the direction and significance level of the relationship between academic success scores in Mathematics course and class attendance and to conduct that comparison Pearson Correlation Analysis was employed. Obtained results are as listed in Table 3.

Table 3. Results of the correlation analysis about the relationship between academic success scores in Mathematics course and class attendance

Correlations (N=46)		E-1	A-1	E-2	A-2	E-3	A-3	E-4
E-1	Pearson Correlation	1						
	Sig. (2-tailed)							
A-1	Pearson Correlation	,557**	1					
	Sig. (2-tailed)	,000						
E-2	Pearson Correlation	,670**	,556**	1				
	Sig. (2-tailed)	,000	,000					
A-2	Pearson Correlation	,354*	,606**	,259	1			
	Sig. (2-tailed)	,016	,000	,082				
E-3	Pearson Correlation	,622**	,636**	,736**	,661**	1		
	Sig. (2-tailed)	,000	,000	,000	,000			
A-3	Pearson Correlation	,230	,626**	,239	,645**	,523**	1	
	Sig. (2-tailed)	,124	,000	,109	,000	,000		
E-4	Pearson Correlation	,728**	,586**	,762**	,378**	,713**	,420**	1
	Sig. (2-tailed)	,000	,000	,000	,010	,000	,004	

** . Correlation is significant at the 0.01 level (2-tailed). A: Absenteeism, E: Exam
 * . Correlation is significant at the 0.05 level (2-tailed).

As shown in Table 3 there exists not a significant relationship between E-2 and A-2, E-1 and A-3 E-2 and A-3 ($p > ,05$); and the most significant relationship is between E-2 and E-4 ($r = ,762$; $p < ,001$) whereas the least significant relationship is between E-2 and A-1 ($r = ,354$; $p < ,001$) and in a positive direction.

In this study lastly it was aimed to detect the degree of predictive power of class attendance on academic success. To that end multiple regression analysis was conducted and prior to multiple regression analysis, VIF values (variance enhancing factor) were computed to test if a multicollinearity problem existed or not. At the end of conducted analysis VIF (E-4)àA-1 (1.859), VIF (E-4)àA-2 (1.934) and VIF (E-4)àA-3 (2,016) values were computed. According to Vupa and Alma (2008) if VIF value is above 10 multicollinearity problem would emerge hence based on the VIF values computed within the scope of this study it was deemed appropriate to conduct multiple regression analysis. By taking initiative from all of the determined values, multiple regression analysis was conducted in order to explore to what degree class attendance predicted academic success. Via regression analysis it was explored if t tests and variables are significant or not, and via F test it can be decided if the entire model is significant or not. Results related to this analysis are as tabulated in Table 4.

Table 4. Comparison of the relationship between Average Exam scores in Mathematics course and Class attendance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	12362,391	3	4120,797	10,891	,000*
Residual	15891,051	42	378,358		
Total	28253,442	45			

As displayed in the Table, exam averages have a significant effect on class attendance ($F(3,42)=10,891$, $p < .05$). In order to determine predictive power of this difference on class attendance, multiple regression analysis was harnessed and results related to this analysis can be seen in Table 5.

Table 5. Predictive Power of Average Exam Scores in Mathematics Course over Class Attendance

	<i>B</i>	Std. Error	Beta	t	Sig.
(Constant)	-2,635	18,511	-	-,142	,887
Absenteeism -1	8,781	2,382	,581	3,686	,001*
Absenteeism -2	1,515	1,680	,145	,902	,372
Absenteeism -3	-,535	3,274	-,027	-,164	,871

R=.661, R²=.438, (F=10,891, p=.000), Durbin Watson=2,158.

As depicted in Table 5 results of the multiple regression analysis conducted to determine the relationship between exam averages and class attendance were found to be statistically significant (F=10,891; p<,001). According to regression analysis; around 44% of the variance related to academic success scores in Mathematics course can be explained through class attendance (R²=.438).

CONCLUSION AND DISCUSSION

An analysis of the findings obtained within the scope of this study put forth, neither gender nor attended class level variable could significantly change class attendance and academic success. This finding hereby is in parallel with the findings obtained in the research of Firat, Kılınç & Yüzer (2017). Firat, Kılınç & Yüzer (2017) in their studies concluded that during distance education process, demographic variables were not a significant factor for success. Likewise failure of gender to create a noticeable effect has been echoed in similar studies (Keskin & Sezgin,2009; Chinnanon, 1985; Oladejo et al., 2010; Wang & Newlin 2002) but there are also studies suggesting that gender variable has predictive power on academic success (Gürşen-Otacıoğlu, 2009; Stein, 1971), and that compared to boys, girls are more successful (Buluş et al., 2011; Darwazeh, 1998). In addition to such studies Tuncer & Yılmaz (2020) in their research among students in secondary education detected that attended class level affected academic success scores in a significant degree. Nartgün & Çakır (2014) obtained a similar finding in their research conducted among high school students.

When correlation of success scores of learners related to mathematics course during distance education process with their attendance status is examined, it was determined that there were significant relationships at various levels. Absenteeism can affect scores of exams taken in following periods. As per this determination, in this study it was investigated whether there is a correlation at significant level between A-1 and E-2, A-2 and E-3 ve A-3 and E-4. In a way to support this finding, as the outcome of study it was determined that there was a significant correlation at high level between A-1 and E-2 and A-2 and E-3 and that there is a significant correlation at intermediate level between A-3 and E-4. Since there was limited number of studies overlapping with the research subject in literature, relationship at adequate level could not be established. Studies reached (Hook, Zhu, Defazio & Huang, 2015; Landin & Pérez, 2015; Gökçearslan & Alper, 2015) are limited with formal education and it is seen rate of attendance and the exam grade are in a congruent relationship. Besides, In addition, Snopce & Alija (2015) concluded in their study that students who are absent in less than 30% of the course had 5 times higher mathematics course exam success rate than those of students who are absent in more than 30% of the course. Furthermore, it is possible to find studies where it is determined that there is a correlation between course attendance and academic success (Cattan et al, 2017; Gottfried, 2015; Özkan, 2015; Pudaruth et al, 2013; Ilie & Lietz, 2010; Altinkurt, 2008; Furrer & Skinner, 2003; Nystrand & Gamoran, 1991). For example it the study conducted by Altinkurt (2008), a negative relationship was found between academic successes of students and their absenteeism without any excuse. In the study of Özkan (2015) based on PISA-2012 Turkish data, it was stated that absenteeism has a negative effect as one of the most important variables in predicting student achievement. In the study conducted by Pudaruth et al (2013), it was reached to the conclusion that as course attendance was increased by 10 percent, an increase of 3.56 percent was achieved in student scores. As the conclusion of analyzes conducted by Cattan et al (2017) covering data belonging to Swedish elementary school students, it was reached to the conclusion that having absenteeism for ten days during a school year caused for mean score to get reduced. According to

Gottfried (2015), students in classes with high chronic absenteeism have lower test scores in both reading and mathematics results. In the study conducted by Ilie and Lietz (2010) as based on TIMSS-2003 data of 21 European countries, it was found out that students having high level of academic success were students of schools with low absenteeism levels.

Another finding of study is that mathematics course academic mean score could be explained with attendance situation with a ratio of 44%. This relational context is consistent with research outcomes specified in the previous paragraph. Although it was determined that this predictor was quite high, such as 44%, the effect of other unexplained variables at a rate of 56% should not be ignored. It was determined that with respect to relationship of predictiveness, only one study in the literature was supporting this finding (Kablan, 2009). Absenteeism is also important since it causes for students to be away from in-class teaching activities. When it is viewed in this respect, it is emphasized that in situations where increase in the in-class activities provide benefits for student, the correlation between attendance situation and success increases relatively (Foy, 2005; Strickland, 1998; Van Blerkom, 1996; Volkman, 1996; Durden & Ellis, 1995; Romer, 1993).

This study contains unique conclusions in explaining absenteeism and success phenomenon during distant learning processes. As there is no study bearing this quality in the literature, no idea is had about generalization of results obtained. Technical problems encountered in distance education programs (speed problems, database loadings, infrastructure deficiencies, power cuts) and integration of different systems (Bilgiç & Tüzün, 2015) and problems that may be experienced in follow-up (freezes in presentations of synchronous courses, online participant number) are the situations that feed the phenomenon of absenteeism. Hence, in distant and face-to-face education programs, phenomenon of absenteeism becomes differentiated. Significant level of correlation values that is revealed in this research was considered to be attention grabbing with respect to this specified period. The study was conducted with a limited sample including 6th and 7th class students and only in one class. Conducting similar studies in more different education areas and courses shall bear importance with respect to validity of conclusions obtained in this study. Findings to be obtained for different educational environments and for more periods will support obtaining correct judgments.

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