Distance Education Students' Acceptance of Online Learning Systems, Attitudes Towards Online Learning and Their Self-directed Learning Skills

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ABSTRACT

About four million people living in Turkey or abroad with a Turkish passport enrolled in distance education schools to have the opportunity to complete their compulsory formal education in the spring of 2018-19. The aim of this descriptive study was to determine distance education students' acceptance of online learning systems, their attitudes towards online learning, and their self-directed learning skills and the relationship between them. Some of the main results are as follows: A six-variable model (perceived ease of use, perceived usefulness, general acceptance, individual awareness, usefulness, application effectiveness) played a significantly explanatory role in dependent variables (subscales of self-directed learning skills). Perceived usefulness and usefulness positively predicted motivation, suggesting that the higher the perceived usefulness, the higher the motivation. General acceptance and application effectiveness negatively predicted self-monitoring. Female participants were more motivated by online learning environments than males

Keywords: *Self-directed learning, online learning, learning attitude, distance education, compulsory education*

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INTRODUCTION

Today, practices for education at different levels are becoming far from being satisfactory and universally effective. In this respect, distance education is an important academic tool that provides educational options and learning environments for people with different interests, needs, skills, ages, and geographical, educational and socioeconomic background or for those whose access to education is limited due to a number of factors.

Keegan (1986) states that online or e-learning should be classified as open and distance learning. Online or e-learning is designed according to certain instructional principles and involves learning through interaction with web-based content (Allen & Seaman, 2013). Education administrators, teachers, and education specialists should develop and implement policies to design learning environments that increase students' readiness and motivation for online learning. Liu and Wang (2009) argue that online learning is mostly based on the Internet and that the flexibility of online learning environments facilitates the dissemination of information and learning resources globally, breaking the limits of time and space.

Liaw, Huang, and Chen (2007) argue that online learning makes learning more active, fun and interesting in the academic field characterized by multimedia structures. Cost, service, quality, and speed are regarded as the main components of online learning (Hammer & Champy, 2001). Moreover, e-learning has become increasingly popular in educational institutions (Sulčič, 2007) due to its contribution to the development of teachers and students, and advancements in the excellence of teaching systems and learning management systems (Begiievic, Divjak & Hunjak, 2007),

Distance education requires students to take more responsibility because online learning is more flexible, more student-centered and more autonomous than face-to-face learning environments (Kuo, Walker, Schroder & Belland, 2014), and students should focus on their studies and plan their learning for academic achievement. According to Brockett and Hiemstra (1991), people with high self-directed learning skills are motivated learners who can use learning resources to solve problems in learning tasks.

Online learning systems acceptance level: Perceived usefulness, perceived ease of use, and user acceptance of information technology

Researchers have developed numerous models to explain people's attitudes towards innovation. One of said models is the technology acceptance model (TAM) developed by Fred D. Davis during his PhD studies in 1986. The objective of TAM is to determine why users accept or reject information technologies (Legris, Ingham & Collerette, 2003). Research shows that perceived ease of use and perceived usefulness enable students to use online resources more. Students satisfied with distance education are more engaged in classroom activities and use distance education environments more (Lee, Cheung, & Chen, 2005). Researchers state that ease of use and usefulness are the two most important factors affecting people's acceptance or rejection of information technology (Davis, 1989). The components in the model are defined as follows:

Perceived usefulness is defined as the degree to which person believes that using a specific system would improve her/his performance of job. The perceived usefulness about a system is directly positevly related to the user's belief in the relationship between use and performance (Davis, 1989). "Perceived ease of use is defined as the degree to which one believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Perceived ease of use plays a key role in one's acceptance of an application (Davis, 1989). Attitude towards using is the evaluation of a behavior as positive or negative (Davis, Bagozzi & Warshaw, 1989). Intention is a sign of readiness for behavior and depends on behavior, subjective norms, and perceived behavioral control (Davis et al., 1989).

The most important variables of this model are perceived usefulness and perceived ease of use. Beliefs in technology in TAM are based on the assumption that high perceived ease of use and perceived usefulness affect users' attitude, making them more ready to use that technology. TAM is commonly recognized and used in the field of information technology (Arbaugh, 2000). Research shows that TAM accounts for 40% of the total variance of intention and behavior (Venkatesh & Davis, 2000b). Numerous experimental studies show that people with positive attitudes towards information technology accept technology more than those with negative attitudes towards it (Davis et al., 1989; Karahanna & Straub, 1999; Venkatesh, Morris, Davis & Davis, 2003).

Attitude towards online learning

Students' attitudes towards online learning are a critical factor in learning environments supported by online learning tools. Attitudes are about one's ideas and feelings and one's behavior towards attitude objects. Strong attitudes can drive behavior, and positive attitudes towards learning may contribute to effective use of learning strategies (Maio & Haddock, 2009).

Ghergulescu and Muntean argue that motivation is a psychological feature or energy that enables us to access information and participate in learning (2010) and that motivation is a behavioral feature that facilitates performance and depends on internal or external conditions (2012). Motivation is an internal force that encourages students to acquire new knowledge and develop new ideas and pushes them to perform constantly to reach a state of cognitive and psychological balance that raises their awareness and stimulates their attention. Motivation also helps students to discover their true potential to actualize themselves and to achieve their goals at any educational level.

One's attitudes towards displaying behavior affect one's intention to display it, and one's intention determines whether one will display it or not (Arı & Yılmaz, 2015). From this perspective, one's attitudes towards distance education and technologies are directly related to one's learning. Students with negative attitudes towards online learning have less success in adapting to it and have lower levels of achievement (Birişçi, Metin & Demiryürek, 2011). Students' thoughts and feelings about distance education environments should, therefore, be determined to develop their attitudes towards them. Self-directed learning is considered another important factor affecting students' attitudes towards online learning.

Self-directed learning

In the broadest sense, self-directed learning refers to the initiative taken to identify and use learning needs, goals, strategies and resources, and to evaluate learning outcomes with or without the help of others (Knowles, 1975). Self-directed learning is a three-stage cyclic process: (1) prediction involving planning and setting goals, (2) performance where students focus on self-learning and monitoring, and (3) self-reflection where students evaluate their performance and make causal references (Williams & Hellman, 2004). Self-directed learning involves the process of directing learning responsibility from one source to students whose control over and active participation in learning is of paramount importance (Boyer & Usinger, 2015). This control mechanism helps students organize their own learning and set goals. They can take responsibility for learning and make individual choices to achieve their goals (Gilbert & Driscoll, 2002). According to Savin-Baden and Major (2004), self-directed learners are independent and self-motivated people who set clear goals, follow a plan, perform tasks, and push themselves beyond their limits to achieve high standards. They are also curious, organized, motivated, self-controlling, enthusiastic, and open to and appreciative of learning, and comfortable with uncertainty and change (Cho, Kim, & Choi, 2017). Mainly, it is an individual's skills and abilities to undertake the learning process (Zhoc & Chen, 2016).

Numerous studies have highlighted the significance of developing self-directed learning skills that are necessary in e-learning to improve learning outcomes and to increase academic achievement (e.g., Durnali, 2020). Song and Hill (2007) argue that self-directed learning is an important aspect of adult education and online learning. Durnali (2020) found that self-directed learning predicted online learning positively and played a fully mediating role in the relationship between self-leadership and online learning of university students. In other words, self-directed learning is an important component of both online learning and successful learning.

The aim of this study was, therefore, to determine Turkish distance education students' acceptance of online learning systems, attitudes towards online learning, and self-directed learning skills and the relationship between them. We believe that this study will fill the gap in the literature and provide insight for further research. The characteristics of Turkish distance education students is such that some people do not have a secondary or high school degree or are excluded from the formal education system because they have passed the compulsory education age limit. The Ministry of National Education (MoNE) provides them with the opportunity to continue their education through distance education schools within the General Directorate of Lifelong Learning (Başyemenici, Öter, Kılıç & Sulak, 2018). According to the Distance Education Department (2019; Durnalı, 2019), distance education schools (distance education secondary schools, distance education high schools, vocational distance education high schools, vocational and technical distance education schools, and distance education religious high schools) provide education within the MoNE General Directorate for Lifelong Learning. According to the MoNE data (2019), distance education schools have 1 million 579 thousand 691 active students while the total number of students who are enrolled but not attending school is about four million. According to Açık Öğretim Lisesi (2019; Durnalı, 2019), distance education high schools use the same curriculum as equivalent schools in formal education but have a more centralized structure and provide education in a different way. Distance education high schools have a course–credit system and use such teaching materials as custom textbooks, e-learning content on the Educational Informatics Networks (EIN) platform, e-books, course videos, and audio CDs (for the visually impaired), http://internettv.meb.gov.tr/ (lecture videos), CDs for lecture videos, supporting courses offered to distance education students by the Central Directorates of Public Education, and A-Okul, which is a web-based learning management system.

RESEARCH METHOD

Research Model

The aim of this descriptive study was to determine Turkish distance education students' acceptance of online learning systems, attitudes towards online learning, and self-directed learning skills and the relationship between them. As in this study, the aim of the methods of most studies on education is to define. In other words, they describe (McMillan & Schumacher, 2014) and explain "what a phenomenon is like" to "define and interpret" it (Cohen, Manion & Morrison, 2007) and also provide insight to help future studies develop hypotheses (Erkuş, 2013). A comparative relational screening model (Fraenkel, Wallen and Hyun, 2012) was used in this study to examine the relationship between the aforementioned components.

Participants

The research was conducted with the students studying in Open Education Schools with the permission of the Ministry of National Education, General Directorate of Lifelong Learning (HÖGM) dated 05.10.2018 and numbered 18532639. The data collection tools were delivered to participants through Facebook groups and the websites of distance education institutions. Participation was voluntary. Table 1 shows the participants' demographic characteristics.

Table 1. *Participants' Demographic Characteristics*

Variable	Sub-Groups	f	%
Sex	Man	468	38
	Woman	765	62
Total		1233	100
Type of Distance Education School	Vocational Distance Education High School	108	8.8
	Distance Education Middle School	324	26.3
	Distance Education High School	711	57.7
	Vocational and Technical Distance Education Middle School	9	0.7
	Distance Education Religious High School	81	6.6
Total		1233	100
Level of Using Tablet Computers	Low	198	16.1
	High	783	63.5
	Very High	252	20.4
Total		1233	100
Level of Using Educational Informatics Networks (EIN)	Never	441	35.8
	Rarely	603	48.9
	Generally	153	12.4
	Always	36	2.9
Total		1233	100
Disability	Yes	90	7.3
	No	1143	92.7
Total		1233	100
Employment	Yes	414	33.6
	No	819	66.4
Total		1233	100
Geographical Region of Enrollment in Distance Education Institution	Marmara	387	31.4
	Aegean	225	18.2
	Central Anatolia	99	8
	Black Sea	18	1.5
	Eastern Anatolia	126	10.2
	Southeastern Anatolia	324	26.3
	Abroad	54	4.4
Total		1233	100

The majority (62%) of participants were women. The majority of students enrolled in distance education institutions in Turkey are women, which can be explained by the fact that parents do not send their daughters to formal schools. Most participants (57.7%) were distance education high school students.

High schools have had the highest drop-out rates since the education reform was passed into law - known by public as 4+4+4 - extending the compulsory education from eight to twelve years. Most participants had a high level of tablet computer use (63.5%). Most participants (85%) rarely or never used EIN, which is an e-learning platform developed by the MoNE. Ninety participants were disabled. The majority (66.4%) of participants were unemployed, which might be due to the fact that the sample consisted mostly of female students whose parents probably did not allow them to work. Most participants were from Marmara (31.4%) and Southeast Anatolia (26.3%) regions. Of all regions, Marmara has the highest population density, and hence, the highest rate of participation. However, high rate of participation from Southeast Anatolia can again be accounted for by the fact that parents in that region do not send their children, especially their daughters, to school.

Data Collection Tool

The Online Learning Systems Acceptance Scale (OLSAS) is a 7-point Likert-type scale developed by Ilgaz (2008) based on Davis's technology acceptance model. It consists of two subscales "perceived ease of use" and "perceived usefulness" to assess student satisfaction with distance education. It had a Cronbach's alpha (α) of 0.89. The subscales "perceived ease of use" and "perceived usefulness" had a Cronbach's alpha of 0.90 and 0.93 respectively.

The Online Learning Attitude Scale (OLAS) is a 5-point Likert-type scale developed by Usta, Uysal and Okur (2016) to measure students' attitudes towards online learning. It consists of four subscales; general acceptance, individual awareness, usefulness (time-labor-cost) and application effectiveness (active participation) with a Cronbach's alpha of 0.77. 0.85. 0.79 and 0.68 respectively. The total scale had a Cronbach's alpha of 0.90.

The Self-Directed Learning Skills Scale (SDLSS) is a 5-point Likert-type scale developed by Aşkın Tekkol and Demirel (2018) to determine students' self-directed learning skills. It consists of four subscales; motivation (α = 0.83), self-control (α = 0.80), self-monitoring (α = 0.77), and self-confidence (0.69). The total scale had a Cronbach's alpha of 0.89.

Data Analysis

Number, percentage, mean and standard deviation were used for descriptive statistics of variables. Sex, distance education type of school, and EIN usage level were compared. Regression analyses were conducted to determine the relationship between participants' online learning systems acceptance level, attitudes towards online learning and self-directed learning skills.

Normality tests are hypersensitive tests (Tabachnick & Fidell, 2013). It can be easily seen that data on dependent variables are not normally distributed in some social science studies (Pallant, 2016). The central limit theorem states that the distribution of the sample means is normally distributed in case of the sample is largely enough (n = 30 +) despite the variables' distribution. A violation to assumption of the normality does not bring about a principal problem (Everitt & Howell, 2005; Field, 2018; Pallant, 2016; Tabachnick & Fidell, 2013). In large sample sizes, the level of skewness does not deviate significantly from the normal curve to make a difference in analysis. Negative kurtosis disappears with samples of 100 or more cases while positive kurtosis disappears with samples of 200 or more cases (Tabachnick & Fidell, 2013). Therefore, parametric tests were used in this study.

FINDINGS

Table 2 shows the descriptive statistics of the participants' acceptance of online learning systems, attitudes towards online learning and self-directed learning skills. Participants had a mode OLSA ease of use score of 12, indicating that they thought that the acceptance of online learning systems provided ease of use. They had a mode OLSA perceived usefulness score of 24, suggesting that they had believed that online learning systems were useful. All participants had higher OLA subscale scores than the mean, indicating that they had a high general acceptance level and individual awareness and thought that OLA was useful and effective. All participants had higher SDLS subscale scores than the mean, indicating that they had high SDLS motivation, self-monitoring, self-control and self-confidence.

Table 2. *Participants' Acceptance of Online Learning Systems, Attitudes Towards Online Learning and Self-Directed Learning Skills*

Variable	$\overline{X}$	Mode	Median	P
Online Learning Systems Acceptance (OLSA) Ease of Use	9.89±0.09	12	11	3.09
OLSA Perceived Usefulness	20.65±0.16	24	22	5.68
Online Learning Attitude (OLA) General Acceptance	23.60±0.14	28	25	6.04
OLA Individual Awareness	20.40±0.16	22	21	5.58
OLA Usefulness	10.99±0.09	12	12	3.39
OLA Application Effectiveness	14.24±0.11	16	15	3.94
Self-Directed Learning Skills (SDLS) Motivation	31.57±0.14	35	33	4.78
SDLS Self-Monitoring	21.10±0.10	25	22	3.58
SDLS Self-Control	19.76±0.11	22	21	4.00
SDLS Self-Confidence	17.46±0.09	20	19	3.23

N = 1233

Sex, Age, Acceptance of online learning systems, Attitude towards online learning, Self-directed learning skill

Multivariate analysis of variance (MANOVA) was resorted to examine the effect of age and sex on participants' acceptance of online learning systems, attitudes towards online learning, and self-directed learning skills. Table 3 shows the results.

Table 3. *Effect of Age and Sex on Participants' Acceptance of Online Learning Systems, Attitudes towards Online Learning, and Self-Directed Learning Skills (Hotelling's Trace Test)*

Effect	Value	F	SD	SD Error	p	η
Sex	0.159	19.272	10	1214	0.000	0.137
Age	0.465	14.102	40	4850	0.000	0.104
Sex*Age	0.482	14.599	40	4850	0.000	0.107

There was a significant difference in the variables (acceptance of online learning systems, attitudes towards online learning, and self-directed learning skills) between male and female participants ($F_{(10-1214)}$=19.27. p<.05) with a large effect size (η=0.14) according to Cohen's (1988) classification. The variables also differed by age ($F_{(40-4850)}$=14.10, p<.05). and by sex*age ($F_{(40-4850)}$=14.60, p<.05). A MANOVA was used to determine which means significantly differed. Table 4 shows the results.

Table 4. *Difference in Participants' Acceptance of Online Learning Systems, Attitudes towards Online Learning, and Self-Directed Learning Skills by Sex, Age, and Sex*Age*

Sources of Variance	Variable	Sum of Squares	SD	Mean Squares	F	p	η
Sex	OLSA Ease of Use	65.607	1	65.607	7.432	0.006	0.006
	OLSA Perceived usefulness	661.677	1	661.677	23.068	0.000	0.019
	OLA General acceptance	36.316	1	36.316	1.050	0.306	0.001
	OLA Individual awareness	51.300	1	51.300	1.725	0.189	0.001
	OLA Usefulness	7.889	1	7.889	0.704	0.401	0.001
	OLA Application effectiveness	341.703	1	341.703	23.888	0.000	0.019
	SDLS Motivation	106.805	1	106.805	6.005	0.014	0.005
	SDLS Self-monitoring	109.407	1	109.407	9.586	0.002	0.008
	SDLS Self-control	0.101	1	0.101	0.007	0.933	0.000
	SDLS Self-confidence	277.456	1	277.456	32.543	0.000	0.026
Age	OLSA Ease of use	232.750	4	58.187	6.592	0.000	0.021
	OLSA Perceived usefulness	1242.066	4	310.517	10.825	0.000	0.034
	OLA General acceptance	2202.757	4	550.689	15.925	0.000	0.050
	OLA Individual awareness	1411.269	4	352.817	11.865	0.000	0.037
	OLA Usefulness	403.475	4	100.869	9.006	0.000	0.029
	OLA Application effectiveness	1259.460	4	314.865	22.012	0.000	0.067

	SDLS Motivation	1734.391	4	433.598	24.380	0.000	0.074
	SDLS Self-Monitoring	1165.727	4	291.432	25.534	0.000	0.077
	SDLS Self-Control	920.126	4	230.031	15.892	0.000	0.049
	SDLS Self-Confidence	653.724	4	163.431	19.169	0.000	0.059
Sex*Age	OLSA Ease of Use	545.847	4	136.462	15.459	0.000	0.048
	OLSA Perceived Usefulness	1172.199	4	293.050	10.216	0.000	0.032
	OLA General Acceptance	564.880	4	141.220	4.084	0.003	0.013
	OLA Individual Awareness	607.657	4	151.914	5.109	0.000	0.016
	OLA Usefulness	210.038	4	52.509	4.689	0.001	0.015
	OLA Application Effectiveness	274.512	4	68.628	4.798	0.001	0.015
	SDLS Motivation	3144.845	4	786.211	44.206	0.000	0.126
	SDLS Self-Monitoring	417.535	4	104.384	9.146	0.000	0.029
	SDLS Self-Control	1055.192	4	263.798	18.225	0.000	0.056
	SDLS Self-Confidence	890.325	4	222.581	26.107	0.000	0.079

Both sex and age resulted in significant differences in some or all of the subscales. However, in MANOVA, it is more important to determine whether the interaction between variables (sex and age) thought to cause significant differences has a significant effect on the dependent variables (acceptance level of online learning systems, attitudes towards online learning, self-directed learning skill). The results of the main effects are shown in Table 4 but not interpreted. Table 4 shows that the interaction between sex and age had a significant effect on OLSA ease of use ($F = 15.50$, $p < .05$) with a medium effect size ($\eta = 0.05$). The Bonferroni test was used for post-hoc comparisons. Table 5 shows the results.

Table 5. *Difference in Participants' OLSA Ease of Use Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=11)	21 to 30 years of age Males ($\bar{X}$=9.36)	31 to 40 years of age Males ($\bar{X}$=8.53)	41 to 50 years of age Males ($\bar{X}$=10.50)	51 years of age or older Males ($\bar{X}$=7)	13 to 20 years of age Females ($\bar{X}$=8)	21 to 30 years of age Females ($\bar{X}$=11)	31 to 40 years of age Females ($\bar{X}$=9.98)	41 to 50 years of age Females ($\bar{X}$=10.36)	51 years of age or older Females ($\bar{X}$=11)
13 to 20 years of age Males ($\bar{X}$=11)		+	+		+	+				
21 to 30 years of age Males ($\bar{X}$=9.36)							+			
31 to 40 years of age Males ($\bar{X}$=8.53)							+	+	+	+
41 to 50 years of age Males ($\bar{X}$=10.50)					+					
51 years of age or older Males ($\bar{X}$=7)							+	+	+	+
13 to 20 years of age Females ($\bar{X}$=8)							+	+	+	+
21 to 30 years of age Females ($\bar{X}$=11)								+		
31 to 40 years of age Females ($\bar{X}$=9.98)										
41 to 50 years of age Females ($\bar{X}$=10.36)										
51 years of age or older Females ($\bar{X}$=11)										

+ means Groups with significant differences

The older the male participants, the more negative perceptions they held towards OLSA ease of use whereas the older the female participants, the more positive perceptions they held towards OLSA ease of use.

Table 6. *Difference in Participants' OLSA Perceived Usefulness Levels by Sex*Age*

	13 to 20 years of age Males	21 to 30 years of age Males	31 to 40 years of age Males	41 to 50 years of age Males	51 years of age or older Males	13 to 20 years of age Females	21 to 30 years of age Females	31 to 40 years of age Females	41 to 50 years of age Females	51 years of age or older
13 to 20 years of age Males ($\bar{X}$=19.63)			+				+		+	
21 to 30 years of age Males ($\bar{X}$=19.72)			+				+	+	+	
31 to 40 years of age Males ($\bar{X}$=17)							+	+	+	
41 to 50 years of age Males ($\bar{X}$=17)							+	+	+	
51 years of age or older Males ($\bar{X}$=19)										
13 to 20 years of age Females ($\bar{X}$=16.75)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=22.83)										
31 to 40 years of age Females ($\bar{X}$=21.49)										
41 to 50 years of age Females ($\bar{X}$=22.82)										
51 years of age or older Females ($\bar{X}$=21)										

+ means Groups with significant differences

The older the male participants, the more negative perceptions they held towards OLSA usefulness whereas the older the female participants, the more positive perceptions they held towards OLSA usefulness.

Table 7. *Difference in Participants' OLSA Perceived Usefulness Levels by Sex*Age*

	13 to 20 years of age Males	21 to 30 years of age Males	31 to 40 years of age Males	41 to 50 years of age Males	51 years of age or older Males	13 to 20 years of age Females	21 to 30 years of age Females	31 to 40 years of age Females	41 to 50 years of age Females	51 years of age or older
13 to 20 years of age Males ($\bar{X}$=19.63)			+				+		+	
21 to 30 years of age Males ($\bar{X}$=19.72)			+				+	+	+	
31 to 40 years of age Males ($\bar{X}$=17)							+	+	+	
41 to 50 years of age Males ($\bar{X}$=17)							+	+	+	
51 years of age or older Males ($\bar{X}$=19)										
13 to 20 years of age Females ($\bar{X}$=16.75)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=22.83)										
31 to 40 years of age Females ($\bar{X}$=21.49)										
41 to 50 years of age Females ($\bar{X}$=22.82)										
51 years of age or older Females ($\bar{X}$=21)										

+ means Groups with significant differences

The older the male participants, the more negative perceptions they held towards OLSA usefulness whereas the older the female participants, the more positive perceptions they held towards OLSA usefulness.

Table 8. *Difference in Participants' OLA General Acceptance Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=24.13)	21 to 30 years of age Males ($\bar{X}$=24.40)	31 to 40 years of age Males ($\bar{X}$=20.27)	41 to 50 years of age Males ($\bar{X}$=25.50)	51 years of age or older Males	13 to 20 years of age Females ($\bar{X}$=25)	21 to 30 years of age Females	31 to 40 years of age Females	41 to 50 years of age Females	51 years of age or older Females ($\bar{X}$=20)
13 to 20 years of age Males ($\bar{X}$=24.13)			+							
21 to 30 years of age Males ($\bar{X}$=24.40)			+							
31 to 40 years of age Males ($\bar{X}$=20.27)				+		+	+	+	+	
41 to 50 years of age Males ($\bar{X}$=25.50)										
51 years of age or older Males ($\bar{X}$=20.50)										
13 to 20 years of age Females ($\bar{X}$=25)										
21 to 30 years of age Females ($\bar{X}$=24.74)										
31 to 40 years of age Females ($\bar{X}$=23.44)										
41 to 50 years of age Females ($\bar{X}$=24.55)										
51 years of age or older Females ($\bar{X}$=20)										

+ means Groups with significant differences

There was a significant reduction in OLA general acceptance levels in male participants 31 to 40 years of age. No other significant difference was observed.

Table 9. *Difference in Participants' OLA Individual Awareness Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=20.13)	21 to 30 years of age Males ($\bar{X}$=21.04)	31 to 40 years of age Males ($\bar{X}$=17.53)	41 to 50 years of age Males ($\bar{X}$=20.50)	51 years of age or older Males ($\bar{X}$=20.50)	13 to 20 years of age Females ($\bar{X}$=23.50)	21 to 30 years of age Females ($\bar{X}$=21.61)	31 to 40 years of age Females ($\bar{X}$=20.44)	41 to 50 years of age Females ($\bar{X}$=19.64)	51 years of age or older Females ($\bar{X}$=18)
13 to 20 years of age Males ($\bar{X}$=20.13)										
21 to 30 years of age Males ($\bar{X}$=21.04)			+							
31 to 40 years of age Males ($\bar{X}$=17.53)						+	+	+		
41 to 50 years of age Males ($\bar{X}$=20.50)										
51 years of age or older Males ($\bar{X}$=20.50)										
13 to 20 years of age Females ($\bar{X}$=23.50)									+	+
21 to 30 years of age Females ($\bar{X}$=21.61)										
31 to 40 years of age Females ($\bar{X}$=20.44)										
41 to 50 years of age Females ($\bar{X}$=19.64)										
51 years of age or older Females ($\bar{X}$=18)										

+ means Groups with significant differences

There was a significant reduction in OLA individual awareness levels in male participants 31 to 40 years of age. The older the female participants, the more negative perceptions they held towards OLA individual awareness.

Table 10. *Difference in Participants' OLA Usefulness Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=10.38)	21 to 30 years of age Males ($\bar{X}$=11.48)	31 to 40 years of age Males ($\bar{X}$=9.60)	41 to 50 years of age Males ($\bar{X}$=12)	51 years of age or older Males ($\bar{X}$=11)	13 to 20 years of age Females ($\bar{X}$=9.75)	21 to 30 years of age Females ($\bar{X}$=11.57)	31 to 40 years of age Females ($\bar{X}$=11.09)	41 to 50 years of age Females ($\bar{X}$=11.18)	51 years of age or older Females ($\bar{X}$=9.50)
13 to 20 years of age Males ($\bar{X}$=10.38)										
21 to 30 years of age Males ($\bar{X}$=11.48)			+							
31 to 40 years of age Males ($\bar{X}$=9.60)							+	+	+	
41 to 50 years of age Males ($\bar{X}$=12)										
51 years of age or older Males ($\bar{X}$=11)										
13 to 20 years of age Females ($\bar{X}$=9.75)										
21 to 30 years of age Females ($\bar{X}$=11.57)										
31 to 40 years of age Females ($\bar{X}$=11.09)										
41 to 50 years of age Females ($\bar{X}$=11.18)										
51 years of age or older Females ($\bar{X}$=9.50)										

+ means Groups with significant differences

There was a significant reduction in OLA usefulness levels in male participants 31 to 40 years of age. The older the female participants, the more positive perceptions they held towards OLA usefulness.

Table 11. *Difference in Participants' OLA Application Effectiveness Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=13.20)	21 to 30 years of age Males ($\bar{X}$=15.08)	31 to 40 years of age Males ($\bar{X}$=11.93)	41 to 50 years of age Males ($\bar{X}$=10.50)	51 years of age or older Males ($\bar{X}$=12.50)	13 to 20 years of age Females ($\bar{X}$=14)	21 to 30 years of age Females ($\bar{X}$=15.66)	31 to 40 years of age Females ($\bar{X}$=14.33)	41 to 50 years of age Females ($\bar{X}$=14)	51 years of age or older Females ($\bar{X}$=14.50)
13 to 20 years of age Males ($\bar{X}$=13.20)		+					+			
21 to 30 years of age Males ($\bar{X}$=15.08)			+	+						
31 to 40 years of age Males ($\bar{X}$=11.93)							+	+	+	
41 to 50 years of age Males ($\bar{X}$=10.50)							+	+	+	
51 years of age or older Males ($\bar{X}$=12.50)							+			
13 to 20 years of age Females ($\bar{X}$=14)										
21 to 30 years of age Females ($\bar{X}$=15.66)								+	+	
31 to 40 years of age Females ($\bar{X}$=14.33)										
41 to 50 years of age Females ($\bar{X}$=14)										
51 years of age or older Females ($\bar{X}$=14.50)										

+ means Groups with significant differences

Male participants had a more negative perception of OLA application effectiveness than females.

Table 12. *Difference in Participants' SDLS Motivation Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=30.86)	21 to 30 years of age Males ($\bar{X}$=31.32)	31 to 40 years of age Males ($\bar{X}$=27.87)	41 to 50 years of age Males ($\bar{X}$=28.50)	51 years of age or older Males ($\bar{X}$=27)	13 to 20 years of age Females ($\bar{X}$=25)	21 to 30 years of age Females ($\bar{X}$=32.09)	31 to 40 years of age Females ($\bar{X}$=33.47)	41 to 50 years of age Females ($\bar{X}$=33.55)	51 years of age or older Females ($\bar{X}$=26.50)
13 to 20 years of age Males ($\bar{X}$=30.86)			+		+	+		+	+	+
21 to 30 years of age Males ($\bar{X}$=31.32)			+		+	+		+	+	+
31 to 40 years of age Males ($\bar{X}$=27.87)						+	+	+	+	
41 to 50 years of age Males ($\bar{X}$=28.50)							+	+	+	
51 years of age or older Males ($\bar{X}$=27)							+	+	+	
13 to 20 years of age Females ($\bar{X}$=25)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=32.09)										+
31 to 40 years of age Females ($\bar{X}$=33.47)										+
41 to 50 years of age Females ($\bar{X}$=33.55)										+
51 years of age or older Females ($\bar{X}$=26.50)										

+ means Groups with significant differences

Female participants had significantly higher SDLS motivation levels than males. The older the female participants, the higher their motivation.

Table 13. *Difference in Participants' SDLS Self-Monitoring Levels in Self-Directed Learning by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=20.38)	21 to 30 years of age Males ($\bar{X}$=21.52)	31 to 40 years of age Males ($\bar{X}$=19.27)	41 to 50 years of age Males ($\bar{X}$=19.50)	51 years of age or older Males ($\bar{X}$=16)	13 to 20 years of age Females ($\bar{X}$=18.75)	21 to 30 years of age Females ($\bar{X}$=21.96)	31 to 40 years of age Females ($\bar{X}$=21.64)	41 to 50 years of age Females ($\bar{X}$=21.91)	51 years of age or older Females ($\bar{X}$=17.50)
13 to 20 years of age Males ($\bar{X}$=20.38)					+		+			
21 to 30 years of age Males ($\bar{X}$=21.52)			+		+	+				+
31 to 40 years of age Males ($\bar{X}$=19.27)					+		+	+	+	
41 to 50 years of age Males ($\bar{X}$=19.50)										
51 years of age or older Males ($\bar{X}$=16)							+	+	+	
13 to 20 years of age Females ($\bar{X}$=18.75)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=21.96)										+
31 to 40 years of age Females ($\bar{X}$=21.64)										+
41 to 50 years of age Females ($\bar{X}$=21.91)										+
51 years of age or older Females ($\bar{X}$=17.50)										

+ means Groups with significant differences

Female participants had significantly higher SDLS self-monitoring levels than males. Moreover, the older the female participants, the higher SDLS self-monitoring levels they had.

Table 14. *Difference in Participants' SDLS Self-Control Levels by Sex*Age*

	13 to 20 years of age Males ($\bar{X}$=19.36)	21 to 30 years of age Males ($\bar{X}$=20)	31 to 40 years of age Males ($\bar{X}$=17.33)	41 to 50 years of age Males ($\bar{X}$=20.50)	51 years of age or older Males ($\bar{X}$=17)	13 to 20 years of age Females ($\bar{X}$=16)	21 to 30 years of age Females ($\bar{X}$=20.52)	31 to 40 years of age Females ($\bar{X}$=20.62)	41 to 50 years of age Females ($\bar{X}$=19.91)	51 years of age or older Females ($\bar{X}$=17)
13 to 20 years of age Males ($\bar{X}$=19.36)			+			+				
21 to 30 years of age Males ($\bar{X}$=20)			+			+				
31 to 40 years of age Males ($\bar{X}$=17.33)				+			+	+	+	
41 to 50 years of age Males ($\bar{X}$=20.50)						+				
51 years of age or older Males ($\bar{X}$=17)							+	+		
13 to 20 years of age Females ($\bar{X}$=16)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=20.52)										+
31 to 40 years of age Females ($\bar{X}$=20.62)										+
41 to 50 years of age Females ($\bar{X}$=19.91)										
51 years of age or older Females ($\bar{X}$=17)										

+ means Groups with significant differences

The older the female participants, the higher their SDLS self-control levels, which fell again in those 51 years or older. However, female participants had higher SDLS self-control levels than males in general.

Table 15. *Difference in Participants' SDLS Self-Confidence Levels by Sex*Age*

	13 to 20 years of age Males	21 to 30 years of age Males	31 to 40 years of age Males	41 to 50 years of age Males ($\bar{X}$=13)	51 years of age or older Males	13 to 20 years of age Females	21 to 30 years of age Females	31 to 40 years of age Females	41 to 50 years of age Females	51 years of age or older Females
13 to 20 years of age Males ($\bar{X}$=16.63)				+	+	+	+	+	+	
21 to 30 years of age Males ($\bar{X}$=16.92)			+	+	+	+	+	+	+	+
31 to 40 years of age Males ($\bar{X}$=15.73)				+			+	+	+	
41 to 50 years of age Males ($\bar{X}$=13)							+	+	+	
51 years of age or older Males ($\bar{X}$=14)							+	+	+	
13 to 20 years of age Females ($\bar{X}$=14.25)							+	+	+	
21 to 30 years of age Females ($\bar{X}$=17.96)										+
31 to 40 years of age Females ($\bar{X}$=18.60)										+
41 to 50 years of age Females ($\bar{X}$=19.09)										+
51 years of age or older Females ($\bar{X}$=14.50)										

+ means Groups with significant differences

The older the female participants, the higher their SDLS self-confidence levels, which fell again in those 51 years or older. However, female participants had higher SDLS self-confidence levels than males in general.

Correlation between Acceptance of Online Learning Systems, Attitude towards Online Learning, Self-Directed Learning Skills

The Pearson product-moment correlation coefficient was used to determine the correlation between participants' acceptance of online learning systems, attitude towards online learning, and self-directed

learning skills. Table 15 shows the results.

Table 16. *Correlation between Participants' Acceptance of Online Learning Systems, Attitude towards Online Learning, and Self-Directed Learning Skills*

	OLSA Ease of Use	OLSA Perceived Usefulness	OLA General Acceptance	OLA Individual Awareness	OLA Usefulness	OLA Application Effectiveness	SDLS Motivation	SDLS Self-Monitoring	SDLS Self-Control	SDLS Self-Confidence
OLSA Ease of Use	1									
OLSA Perceived Usefulness	.705**	1								
OLA General Acceptance	.455**	.551**	1							
OLA Individual Awareness	.474**	.568**	.784**	1						
OLA Usefulness	.496**	.611**	.759**	.748**	1					
OLA Application Effectiveness	.527**	.597**	.756**	.730**	.817**	1				
SDLS Motivation	.324**	.480**	.144**	.117**	.214**	.117**	1			
SDLS Self-Monitoring	.277**	.382**	.092**	.136**	.136**	.102**	.763**	1		
SDLS Self-Control	.249**	.305**	.018	.070*	.117**	.088**	.681**	.793**	1	
SDLS Self-Confidence	.307**	.416**	.109**	.116**	.140**	.128**	.808**	.741**	.694**	1

N=1233, *p<.05, **p<.01

SDLS self-control was not correlated with OLA general acceptance (p>.05) whereas there was a positive correlation between all other subscales. Ease of use was weakly correlated with self-monitoring and self-control. General acceptance was weakly correlated with self-monitoring and self-confidence. Individual awareness was weakly correlated with motivation, self-monitoring, self-control, and self-confidence. Usefulness was weakly correlated with motivation, self-monitoring, self-control, and self-confidence. The other correlations were moderate or high.

3.2. Predictive power of acceptance of online learning systems and attitudes towards online learning for self-directed learning skills

Multivariate regression analysis was performed using STATA to determine whether participants' acceptance of online learning systems and attitudes towards online learning significantly predicted their self-directed learning skills. Table 16 shows the results.

Table 17. *Regression Model Fitting*

Variables	N	R2	F	p
SDLS Motivation	1233	0.29	84.66	0.000
SDLS Self-monitoring	1233	0.18	43.52	0.000
SDLS Self-control	1233	0.13	31.04	0.000
SDLS Self-confidence	1233	0.20	52.57	0.000

The six-variable model (perceived ease of use, perceived usefulness, general acceptance, Individual awareness, usefulness, and application effectiveness) played a significantly explanatory role in the dependent variables (SDLS subscales) (F=84.66. F=43.52. F=31.04. F=52.57. p<.05), indicating that the regression models fitted to the data. The subscale motivation had the highest explanatory power (R^2=0.29. %29), followed by self-confidence (R^2=0.20, %20), self-monitoring (R^2=0.18. %18), and self-control (R^2=0.13. %13). Table 17 shows the estimates of the regression equation.

Table 18. *Predictive Power of Acceptance of Online Learning Systems and Attitudes towards Online Learning for Self-Directed Learning Skills*

		β	Standard Error	t	p
SDLS Motivation	Constant	25.53	0.52	49.15	0.000
	OLSA Ease of Use	0.05	0.05	1.00	0.310
	OLSA Perceived Usefulness	0.52	0.03	16.23	0.000
	OLA General Acceptance	0.01	0.03	0.36	0.717
	OLA Individual Awareness	-0.16	0.04	-4.30	0.000
	OLA Usefulness	0.28	0.07	4.19	0.000
	OLA Application Effectiveness	-0.37	0.06	-6.64	0.000
SDLS Self-Monitoring	Constant	17.32	0.42	41.22	0.000
	OLSA Ease of Use	0.07	0.04	1.52	0.128
	OLSA Perceived Usefulness	0.29	0.03	11.56	0.000
	OLA General Acceptance	-0.06	0.03	-2.21	0.027
	OLA Individual Awareness	0.03	0.03	0.88	0.380
	OLA Usefulness	0.01	0.05	0.01	0.996
	OLA Application Effectiveness	-0.15	0.05	-3.22	0.001
SDLS Self-Control	Constant	16.93	0.48	35.10	0.000
	OLSA Ease of Use	0.13	0.05	2.66	0.008
	OLSA Perceived Usefulness	0.25	0.03	8.40	0.000
	OLA General Acceptance	-0.15	0.03	-4.62	0.000
	OLA Individual Awareness	-0.02	0.03	-0.49	0.625
	OLA Usefulness	0.11	0.06	1.75	0.080
	OLA Application Effectiveness	-0.06	0.05	-1.23	0.218
SDLS Self-Confidence	Constant	13.66	0.37	36.62	0.000
	OLSA Ease of Use	0.07	0.04	1.86	0.063
	OLSA Perceived Usefulness	0.29	0.02	12.89	0.000
	OLA General Acceptance	-0.02	0.03	-0.96	0.339
	OLA Individual Awareness	-0.04	0.03	-1.64	0.102
	OLA Usefulness	-0.04	0.05	-0.90	0.367
	OLA Application Effectiveness	-0.08	0.04	-1.89	0.060

The constant in SDLS motivation was significant ($p < .05$), suggesting that some variables that were not in the model might also be significant predictors. Future studies should integrate different variables into the model. Perceived usefulness and usefulness positively predicted motivation ($p < .05$), indicating that the higher the perceived usefulness and usefulness, the higher the motivation. Individual awareness and application effectiveness were negative predictors of motivation ($p < .05$), indicating that the higher the individual awareness and application effectiveness, the lower the motivation. Ease of use and general acceptance were not significant predictors of motivation ($p > .05$).

The constant in SDLS self-monitoring was significant ($p < .05$), suggesting that some variables that were not in the model might also be significant predictors. Future studies should integrate different variables into the model. Perceived usefulness was a positive predictor of self-monitoring ($p < .05$), suggesting that the higher the perceived usefulness, the higher the self-monitoring. General acceptance and application effectiveness negatively predicted self-monitoring ($p < .05$), indicating that the higher the general acceptance and application effectiveness, the lower the self-monitoring. Ease of use, individual awareness and usefulness were not significant predictors of self-monitoring ($p > .05$).

The constant in SDLS self-control was significant ($p < .05$), suggesting that some variables that were not in the model might also be significant predictors. Future studies should integrate different variables into the model. Perceived usefulness and ease of use were positive predictors of self-control ($p < .05$), suggesting that the higher the perceived usefulness and ease of use, the higher the self-control. General acceptance is a negative predictor of self-control ($p < .05$), indicating that the higher the general acceptance, the lower the self-control. Individual awareness, usefulness, and application effectiveness did not significantly predict self-control ($p > .05$).

The constant in SDLS self-confidence was significant ($p < .05$), suggesting that some variables that were

not in the model might also be significant predictors. Future studies should integrate different variables into the model. Perceived usefulness was a positive predictor of self-confidence ($p<.05$), suggesting that the higher the perceived usefulness, the higher the self-confidence. Ease of use, general acceptance, individual awareness, usefulness and application effectiveness were not significant predictors of self-confidence ($p>.05$).

DISCUSSION AND CONCLUSION

The six-variable model (perceived ease of use, perceived usefulness, general acceptance, individual awareness, usefulness, and application effectiveness) played a significantly explanatory role in the dependent variables (SDLS subscales). Perceived usefulness and usefulness were positive predictors of motivation, suggesting that the higher the perceived usefulness and usefulness, the higher the motivation. Adopting or using technology depends on positive attitudes towards online learning and intention to use it (Martins & Kellermanns, 2004; Park, 2009; Tsai, Tung & Laffey, 2013). Research shows that perceived usefulness and perceived ease of use enable students to use online resources more, leading to higher student engagement and student satisfaction with distance education, resulting in high motivation (Lee, Cheung, & Chen, 2005; Lin & Lu, 2000; Martins & Kellermanns, 2004; Park, 2009; Venkatesh & Davis, 2000a). Bhuasiri et al. (2012) argue that motivation, changing behavior of students, and awareness of technology are essential elements necessary for effective online learning in developing countries.

OLSA perceived usefulness was a positive predictor of SDLS self-monitoring, suggesting that the higher the perceived usefulness, the higher the self-monitoring. OLSA perceived usefulness and ease of use were positive predictors of SDLS self-control, indicating that the higher the perceived usefulness and ease of use, the higher the self-control. Gökçearslan (2017) also reported a correlation between acceptance of tablets and self-directed learning, a high correlation between perceived usefulness, perceived ease of use and behavioral intention, and a moderate correlation between attitudes towards online learning and self-directed learning. Research shows that technology promotes self-directed learning (Akerlind & Trevitt, 1999; Lai, Shum, & Tian, 2014; Lee, Tsai, Chai, & Koh, 2014). Self-directed learning has a strong relationship with both technology integration (Kirk, 2012) and academic performance (Alotaibi, 2015). The use of technology, the technology acceptance model and the unified theory of acceptance focus on students' acceptance of learning technologies and such factors as personal innovation, perceived usefulness, performance and effort expectations, social impact, and self-management of learning (Liu, Li & Carlsson, 2010; Wang, Wu & Wang, 2009). Students' readiness to technology refers to their tendency to accept and use new technologies to achieve learning objectives (Parasuraman, 2000). Research shows that student success in online learning depends on their readiness to technology (Moftakhari, 2013). Students' intention to adopt web-based learning technologies determines their attitudes towards learning behavior and perceived behavior control. Students who know how to adopt web-based learning technologies understand the design of online and offline learning better and are more aware of teaching (Geng, Law, & Niu, 2019).

There are several factors affecting the adoption of learning technologies. Another important variable, albeit understudied, is intrinsic interest. Bandura and Schunk (1981) reported that self-efficacy and intrinsic interest were positively correlated with learning outcomes. Students' interest in a topic affects their learning positively (Ainley, Hidi, & Berndorff, 2002). Venkatesh (2000) found that emotion and intrinsic motivation explained perceived ease of use to a certain extent.

OLA general acceptance and application effectiveness predicted SDLS self-monitoring negatively, indicating that the higher the general acceptance and application effectiveness, the lower the self-monitoring. Self-monitoring refers to cognitive and metacognitive processes such as monitoring learning strategies (planning and changing ways of thinking in line with learning objectives). Self-monitoring is the dimension where students take responsibility for themselves (combining new information with prior knowledge etc.). Self-monitoring plays a key role in shaping learning strategies to assess the quality of learning outcomes and to achieve better learning. Responsibility for self-learning requires volunteering and self-monitoring skills (Garrison, 1997). Self-management is the first step towards becoming a successful online student (Brooks, 1997). Different from our result, Eroğlu and Özbek (2018) reported that students' self-directed learning significantly predicted their attitudes towards e-learning but that their self-directed learning and attitudes towards online learning were inadequate, which might be due to their online learning

experiences and self-management learning. In this context, students may have limited or negative experiences with online learning. Students may have limited opportunities and experiences with self-directed learning. Students' self-directed learning and attitudes towards online learning should be developed so that they can enjoy information and communication technology-based learning opportunities such as online and mobile learning.

Our results also showed that female participants had significantly higher online learning motivation than males and that the older the female participants, the more their online learning motivation. This result is consistent with Turkish culture. Research shows that age is negatively correlated with technology use (Czaja, Charness, Fisk, Hertzog, Nair, Rogers, & Sharit, 2006). However, it is not that simple. Czaja et al. (2006) found that cognitive skills, computer self-efficacy, and computer anxiety played a mediating role in the relationship between age and technology use. Wang, Wu and Wang (2009) reported that gender affected the intention to accept and use mobile technology in learning. Hur, Kim and Kim (2014) found that attitudes towards perceived ease of use and acceptance of tablets were affected by gender. Different from our results, Venkatesh and Morris (2000) concluded that men put in more effort than women to learn how to use technological tools.

Limitations and Suggestions

This study has two limitations: (1) our results are limited to the descriptive relational survey model, statistical methods, and measurement instruments used and (2) the results cannot be generalized because the study group consisted only of distance education students of the spring term of 2018-2019. Although the results cannot be generalized to all students, other distance education organizations, administrators, educators, and system designers can use them to design and implement more efficient distance education systems and to develop better policies on distance education administration, supervision, and planning.

We believe that this study paves the way for further research on formal distance education in Turkey. We recommend that future studies not only address the relationship between self-directed learning, online learning attitudes, and acceptance of online learning systems but also look into the predictive power of such variables as school belonging and academic achievement.

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