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EXAMINATION OF HEALTH SCIENCE UNIVERSITY STUDENTS' LEVEL OF READINESS FOR E-LEARNING

Research Article

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Abstract

In this study, the e-readiness levels of university students studying in the field of health sciences were examined in terms of different variables. In this context, whether the level of e-readiness differs according to gender, department, class level, type of education, device ownership, working status and economic level has been examined. In addition, the relationship between e-readiness level and academic success was investigated. The research sample consists of 923 health science students studying in different departments. The results of the research show that gender, learning type, device type and income level are important factors on the e-readiness level. In addition, the e-readiness levels of the nursing department students, normal (daytime) teaching, 1st year students were found to be low in the study. As the difficulty level of the courses increased, the level of e-readiness was found to be an important factor on academic achievement. The results obtained from this research provide important clues for academicians as well as institutions and organizations providing services in the field of health sciences who want to switch to distance education. In addition, some suggestions were made in the light of this research results.

Keywords: E-readiness levels, university students, health science university.

1. Introduction

The world health organization announced that COVID-19, which is spreading rapidly in many countries, is described as a pandemic. Schools have been closed and education stopped in more than 130 countries due to quarantine or social isolation rules. This affects approximately 80% of students. Education and training institutions continue their educational activities with e-learning method in many countries where anxiety level has increased and people feel frightened and sad due to this situation. In this process, many digital learning methods, communication tools and learning management systems have been used. In this context, all schools and universities in Turkey continue their education and training by distance learning. It is necessary to consider carefully whether the distance education will be successful or not, especially for the health sciences students, who receive applied education for a significant part of their courses. E-learning is defined as a way of learning, in which the interaction between educator, student and course content is carried out synchronously or asynchronously via electronic communication systems such as internet, video, telephone, computer, etc. Other common names of e-learning are known as online learning, virtual learning, distance education, network and web-based learning and distributed learning (Işık, Hakan & Güler, 2008). The use of e-learning systems has advantages such as eliminating the cost of printing required for teaching materials, providing ease of distribution, updating when desired, and providing support and ease of interaction (Ibili, Resnyansky & Billinghurst, 2019). Thanks to the ability to customize e-learning systems according to the level and content of education (Benhamdi, Babouri & Chiky 2017) and the possibility of repeating as much as the student needs without time limitation (Duran, Önal & Kurtuluş, 2006), it creates equal

opportunities for individual differences (Hakkari et al., 2008). One of the important advantages of e-learning systems compared to formal education is that it enables student to understand the teaching content that is impossible to display in a physical environment because of its difficulty or high cost, in a short time with the appropriate visuals and animations as well as to reinforce what he / she has learned by experimenting with simulations and repeating it as much as he wishes. In other words, in e-learning environments, accessing richer and more comprehensive content through visual and audio sources and accessing learning content on demand without the need for time and space increases the effectiveness and efficiency of teaching.

In addition, providing a wide range of options according to the cognitive styles of the students, e-learning both increases the motivation of the student and facilitates the achievement of the mastery learning's goal (the whole class) (Grundman, Wington & Nickol, 2000). On the other hand, obtaining statistical data related to educational activities carried out in e-learning environments more easily and quickly gives important clues in order to increase the quality of education and the necessary education as well as training methods can be applied quickly. For the first time, Thorndike (1971) defined readiness as "mental preparation for learning" and stated that there are basically three important points on this subject. First of all, he emphasized that letting the activity be done when the individual is ready for an activity makes him happy. In addition, it was stated that an individual feels anger when the individual is ready for the activity, but he is prevented from doing the activity or is forced to do the activity even though he is not ready (Thorndike, 1971). E-learning readiness is defined as being mentally and physically ready for e-learning experiences and activities (Borotis & Poulymenakou, 2004). The e-learning process is divided into ten sub-factors by some researchers. These are planning, e-readiness, management, support, pedagogy, technology, skill, institution, assessment and ethics (Al- Fraihat, Joy & Sinclair, 2017). However, in terms of students, the level of e-readiness is one of the most important factors (İlhan & Çetin, 2013). For this reason, it can be said that one of the most important reasons for the failure of the e-learning process is the low-level readiness of students for the use of e-learning systems (Piskurich, 2003).

It is emphasized that the student's not being ready for e-learning will lead the student to have a negative learning experience and to be biased towards e-learning (Guglielmino & Guglielmino, 2003). Smith (2005) emphasized the importance of having the skills such as technological skills, motivation, time management in addition to having basic knowledge and skills related to the course in order to be ready for e-learning and added that performing the teaching process by taking the cognitive style differences of the students into account is also important. Mafenya (2013) divided the readiness for e-learning into six sub-titles: psychological, sociological, environmental, technological readiness, content and equipment preparation. On the other hand, according to some researchers, readiness for e-learning is composed of computer-internet-online communication self-efficacy, self-learning, student control, learning motivation factors (Hung et al., 2010). Similar to this idea, Watkins R, Leigh D and Triner (2004) reported that students' access to technology, technical abilities, motivation status and usefulness of e-learning environments are effective on their e-readiness levels.

1.1. Related Literature

Studies on readiness have shown that individuals with a high level of readiness have a positive attitude towards the course (Altun, 2003; Güngör & Aşkar, 2004; Öner et al., 2018), and their motivation and academic success are high (Sakal, 2017; Öner et al., 2018). One of the most important reasons for this is that students' interest and attitudes to the lesson increase due to students' less cognitive effort required during learning (Güngör & Aşkar, 2004). On the other hand, the level of readiness is one of the basic steps not only for formal courses but also for online courses. Altun (2003) stated in his study that e-readiness is an important factor on

attitudes of pre-service teachers towards e-learning and that attitudes of those who took computer courses towards e-learning are higher than those who did not take computer courses. In addition, studies about its effect on academic success show that students who take computer lessons for the first time and who have a lower level of e-readiness have low academic success in online courses (Güngör & Aşkar, 2004; Altun, 2003, Öner et al., 2018). In addition, the effects of cognitive style on e-learning supported education were also revealed in the studies. For example, Güngör et al. (2004) found that field independent students are more successful than field dependents. Therefore, these researchers have argued that instant discussion and e-mail applications increase success in the e-learning process for dependent students. Similarly, it has been demonstrated by different researchers that students with computer and e-mail use experience have a positive attitude towards e-learning (Panda & Mishra, 2007; Brinkerhoff & Koroghlanian, 2005). In addition, it helps students feel sufficient and adapt to e-learning more easily when they have high ability to use e-learning materials (Venkatesh & Davies, 1996).

The high student motivation ensures that the success increases in parallel (Yılmaz & Özkaynak, 2012). When studies conducted on the effect of gender on the level of readiness for e-learning systems are analyzed, it is seen that different results emerge. The results show that e-readiness levels of male students are higher than female students (Coşkun, Özeke, Budakoğlu & Kula, 2018;), they feel more comfortable in e-learning (Wei & Johnes, 2005) and their e-learning satisfaction is higher. (Lu & Chiou, 2010). However, some studies have found that gender does not affect readiness for e-learning (Changiz, Haghani & Nowroozi, 2013; Yacob, Kadir, Zainudin & Zurairah, 2012; Hung, Chou, Chen & Own, 2010). According to age, it has been stated in studies related to the level of e-readiness that students under the age of 30 feel more comfortable in e-learning environments and this is due to the fact that this age group interacts more with technology (Adams, Sumintono, Mohamed & Noor, 2018; Wang, Wu & Wang, 2009).

E-learning has become a more important educational tool in this recent COVID-19 pandemic and the social isolation imperative that we must have. It is evident that the world must adapt quickly to changes and distance education in this period. Technological and scientific developments will continue as the world turns, so it is an imperative need to transfer these developments and to continue education in all areas under all circumstances. It is necessary to accept that e learning, which is still discussed in the world and not yet adopted for students, has become the most important part of education in today's conditions. In today's world, learners are composed of groups working in various positions, various age groups, or not working in any job. For this reason, planning should be made by considering the quality of the content used in e-learning, the way of communication, the transfer of information to the student, and the variables for the departments (Tuncer & Taşpınar, 2008). It is evident that readiness for e-learning is also important for health professionals. In the literature, it is emphasized that nursing and medical students are not at the desired level in terms of readiness for e-learning. As seen in the studies, as the experience increases, the satisfaction of students towards e-learning, their desire to use technology and their motivation increase. It is important to increase the effectiveness of e-learning in the health community and to make the necessary arrangements for e-learning quickly. Otherwise, educational effectiveness will be limited. For this reason, e-learning should provide equal opportunities considering the characteristics of each individual and department and necessary arrangements should be made in terms of individuals' adaptation.

In this research, the following research questions were investigated:

a. Does the e-readiness levels of students differ according to

- Gender,

- Learning Type,
- Department,
- Grade level,
- Accommodation place,
- Income rate,
- Mobile device type?

b. Is there any relationship between students' E-Readiness levels and academic achievement?

2. Method

2.1. Research Method

Paying attention to the accessibility factor in the sample selection, E-Readiness Scale (ERS) was applied to students studying in different faculties and colleges of Afyonkarahisar Health Sciences University in 2019-2020 education year before the Covid 19 quarantine. In addition, the demographic information form includes students' gender, department, type of education, class, working status, accommodation, family economic status, mobile technologies and distance education courses. In this context, the demographic characteristics of 923 students participating in the study are shown in Table 1. Family income is categorized as low income for those below 5,000 TL, medium income for those between 5000-1000 TL and high income for those above 10,000 TL. Moreover, the data of 7 students studying 5th and 6th grades of the Medicine Faculty were combined with the 4th grades and grouped as 4th grade and above. In this study, E-Readiness levels of the Health Science University students were measured. Therefore, the study was carried out in the relational screening model since the data obtained were presented as they existed and analyses were made by comparison (Karasar, 2005).

2.2. Data Collection Tools

In the research, E-readiness Scale (ERS) for e-learning developed by Yurdugül and Demir (2017) was used to measure the e-readiness levels of students. The scale items are arranged with a 7-point Likert type rating according to the options ranging from not suitable for me tocompletely suitable for me. E-Readiness scale consists of six sub-dimensions. Computer Use Self-Efficacy Perception consists of 5 items, Internet Use Self-efficacy perception consists of 4 items, Online Communication consists of 5 items, Self-Learning consists of 8 items, Learner Control consists of four items, motivation for e-learning consists of 7 items. Yurdugül and Demir (2017) calculated the overall Cronbach Alpha reliability coefficient of the scale, which was developed with the participation of 1802 students studying at the Faculty of Education, consisting of 33 items in total, as 0,93. It is seen that the subscale reliability coefficients ranged from 0.84 to 0.95. According to the results of the confirmatory factor analysis conducted by the researchers, the fit indices were found as RMSA = 0.08, NNFI = 0.96, NFI = 0.96, CFI = 0.96 and GFI = 0.96. In this study, the Cronbach's Alpha (α) coefficient of the whole scale was found to be 0.957, while the Cronbach's Alpha (α) coefficient of the sub-factors was found between 0.875 and 0.958. The scale explains 72.96% of the total variance. Based on these results, it was decided that the scale is sufficiently valid and reliable in order to measure the readiness levels for E-learning which is intended to be measured within the scope of the study. In addition, it can be said that the scale is acceptable and has good fit values according to the fit indexes (Hu and Bentler 1999).

Table 1. *Distribution of participants by demographic profile*

Features	Category	Frequency	%
Gender	Female	727	78.8
	Male	196	21.2
Department	Nutrition and Dietetics	158	17.1
	Physio Therapy V.H.S.	103	11.2
	Physical therapy and rehabilitation	96	10.4
	Healthcare Management	87	9.4
	Medical Laboratory Techniques V.H.S.	87	9.4
	Nursing	83	9.0
	Medical Documentation V.H.S.	75	8.1
	Electroneuro Physiology V.H.S.	55	6.0
	Dentist	48	5.2
	First and Emergency Aid V.H.S.	32	3.5
	Medical Imaging V.H.S.	29	3.1
	Medical School	20	2.2
	Pharmacy	20	2.2
	Other	30	3.3
	Total	923	100
Education Type	Normal Education (Daytime Education)	726	78.7
	Secondary Education (Evening Education)	197	21.3
Education Level	Vocational High School (2-Year Education)	411	44.5
	Faculty (4-6 Years Education)	512	55.5
Grade	I	457	49.5
	II	284	30.8
	III	104	11.3
	IV +	78	8.5
Working Status	No	883	95.7
	Yes	40	4.3
Accommodation place	Dormitory	641	69.4
	Apart	202	21.9
	Family	80	8.7
Economical	Low	733	79.4
	Middle	163	17.7
	High	27	2.9

2.3. Data Analysis

Arithmetic mean, standard deviation, t test for unrelated measurements, one-way analysis of variance, Bonferroni test and Pearson correlation coefficients were used in the analysis of the data by the means of SPSS 23 software. It was determined whether normality, linearity and homogeneity assumptions were met before analyzing the data and interpreting the findings (Tabachnick & Fidell, 2001). In order to test the compliance of the data distribution of the measured variables with the statistical analyses to be performed, the kurtosis and skewness coefficients of the variables were examined. It can be said that the data show normal distribution because the kurtosis and skew coefficients of the data are between 1 and – 1 values (West, Finch and Curran, 1995). While the homogeneity assumption of variances is tested with Levene's test, it was decided that the normality assumption is met in each combination of independent variables of the study's dependent variables($p > 0.05$). Pearson's chi-square test is preferred for comparisons between groups (Hinkle, Wiersma and Jurs, 2003).

3. Findings

In this section, the findings obtained for the purposes of the research are given tables and explanations.

Whether gender plays a role in the subscale mean scores of the scores obtained from the E-Readiness Scale of the students was examined by t-test analysis and the results are given in Table 2.

Table 2. *Results of t-test analysis of students' ERS subscale scores by gender*

	Mean ($\acute{X}$)		t	p
	Male(N=196)	Female(N=727)		
Use of computer	26.6	21.4	9.19	< .001
Using Internet	25.4	23.9	4.19	< .001
Online Communication	29.0	25.7	5.95	< .001
Self Learning	43.4	42.5	1.07	.286
Learner Control	23.1	22.2	2.23	.026
Motivation	34.9	29.8	5.40	< .001
Total	182.3	165.6	6.18	< .001

**: 0.05 significance level; **: 0.01 significance level*

According to the data in Table 2, when we look at the subscale mean scores for the E-readiness levels of the students, it is seen that there is a differentiation in favor of men in terms of the mean scores and total score averages except Self Learning ($p > .05$).

Whether the students' E-Readiness level subscale score averages differ according to their education type was examined by t-test analysis for the independent samples and the results are given in Table 3.

Table 3. *Results of t-test analysis of students' ERS subscale scores according to their education type*

	Mean ($\acute{X}$)		t	p
	Normal Education (N=726)	Secondary Education (N=197)		
Use of computer	22.2	23.8	-2.83	.005**
Using Internet	24.0	24.8	-2.19	.029*.
Online Communication	26.1	27.7	-2.95	.003**
Self Learning	42.4	43.7	-1.73	.085
Learner Control	22.1	23.3	-2.91	.004**
Motivation	30.6	32.3	-1.81	.071
Total	167.4	175.7	-3.02	.003**

**: 0.05 significance level; **: 0.01 significance level*

According to the data in Table 3, it is seen that there is a statistically significant difference in favor of students attending evening education in terms of the total score averages for their E-readiness levels ($p < .01$). In terms of e-readiness scale subfactors, while there is a statistically significant difference in favor of evening education students regarding the use of Computer, Online Communication, Learner Control ($p < .01$) and Using Internet ($p < .05$), there is no differentiation in terms of Self-Learning and Motivation subfactors.

The results of the t-test analysis regarding whether the students' E-Readiness score averages differ according to their working status are given in Table 4.

Table 4. *Results of t-test analysis of students' ERS subscale scores according to their working status*

	Mean ($\acute{X}$)		t	p
	No (N=726)	Yes (N=197)		
Use of computer	22.4	25.3	-2.433	.015*
Using Internet	24.2	23.6	0.882	.378
Online Communication	26.4	26.9	-0.474	.636
Self Learning	42.7	43.3	-0.419	.675
Learner Control	22.3	23.3	-1.173	.241
Motivation	30.7	35.6	-2.608	.009**
Total	168.7	178.1	-1.682	.093

**: 0.05 significance level; **: 0.01 significance level.*

According to the data in Table 4, the ERS mean scores of the students who work in an institution are higher than the ERS mean scores of the students who do not work in any

institution in terms of the Computer Aid and Motivation scores, and this difference is statistically significant. However, there is no statistically significant difference in terms of other sub-factors and total score averages.

One-Way Variance Analysis (ANOVA) results regarding whether the sub-scale mean scores obtained by the students from the E-Readiness scale differ according to the department are given in Table 5.

Table 5. *ANOVA results of students' course subscale scores according to the departments*

	N	$\acute{X}$	SS	df	F	p
Use of computer	923	22.53	7.33	13	1.56	.091
Using Internet	923	24.19	4.47	13	1.49	.116
Online Communication	923	26.41	7.00	13	2.05	.015*
Self Learning	923	42.71	9.54	13	1.63	.071
Learner Control	923	22.38	5.05	13	1.68	.061
Motivation	923	30.92	11.77	13	2.26	.006**
Total	923	169.13	34.34	13	2.45	.003**

**: 0.05 significance level; **: 0.01 significance level.*

According to the results of ANOVA in Table 5, the total score averages as well as the Average Communication and Motivation ERS averages of the students show statistically significant difference, while the other subscale average scores of the scale do not differ according to the type of the department. Bonferroni test and Post Hoc comparison results are given in Table 6.

Table 6. *Results of E-readiness scale subscale scores by Bonferroni test and Post Hoc by department type.*

Measurement	Department	n	$\acute{X}$	Sd	F	p	Difference
Online Communication	HM	87	28.21	7.11	2.05	.019*	HM - NU
	NU	83	24.31	7.87			
Motivation	HM	87	33.45	5.69	2.26	.025*	HM - NU
	NU	83	28.37	4.16			
Total	PH	10	175.66	37.7	2.44	.034*	PH - NU
	NU	83	157.76	29.6			
	HM	87	178.70	35.2		.005*	HM - NU

*: 0.05 significance level; **: 0.01 significance level.
HM: Health Management, NU: Nursing. PH: Physiotherapy

As can be seen in Table 6, the Online Communication and Motivation subscale scores of the Health Management students are significantly higher than those of the Nursing students. In addition, the E-readiness scale total score averages of both Health Management and Vocational School Physiotherapy Department students are significantly higher than the students of the nursing department. There is no difference between the other subscale mean scores by

departments. On the other hand, according to the level of education (2-Year Vocational School Education or 4-6-year Faculty Education), both the total average scores and the subscale scores are not different (p> .05).

One-way variance analysis results regarding whether the subscale mean scores of the students obtained from the E-Readiness scale differ according to the grade level are given in Table 7.

Table 7. *ANOVA results of students' ERS subscale scores according to grade level*

	N	$\acute{X}$	SS	df	F	p
Use of computer	923	22.53	7.33	3	8.99	.000***
Using Internet	923	24.19	4.47	3	2.22	.084
Online Communication	923	26,41	7,00	3	4.63	.003**
Self-Learning	923	42,71	9,54	3	2.59	.052
Learner Control	923	22,38	5,05	3	1.70	.167
Motivation	923	30,92	11,77	3	2.86	.036*
Total	923	169,13	34,34	3	5.91	.001***

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the results of ANOVA in Table 7, besides the total scores of the students obtained from the ERS scale; Computer Usage, Online Communication and Motivation subscale scores differ statistically according to the grade level. Bonferroni test and Post Hoc comparison results are given in Table 8.

Table 8. *Post Hoc analysis result of students' ERS subscale scores according to grade level*

Measurement	Class	n	$\acute{X}$	Sd	F	p	Difference
Use of computer	I	457	21.56	7.35	8.99	.000***	I - IV
	II	284	22.93	7.35			
	III	104	23.13	7.02		.007**	II - IV
	IV	78	25.92	6.36			
Motivation	II	457	30.13	11.79	2.86	.038*	I - IV
	III	284	31.50	11.82			
	IV	104	30.39	11.37			
	II	78	34.06	11.63			
Total	III	457	165.13	35.14	5.91	.001***	I - IV
	IV	284	171.73	33.79			
	II	104	170.63	32.34			
	III	78	181.08	30.73			

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

As can be seen in Table 8, Computer Usage subscale score averages of Grade 4 and above students show a statistically significant difference compared to first grade students. In addition, 4th grade students' motivation subscale mean scores and total mean scores are higher than 1st grade students. There is no difference between the other subscale mean scores by class.

ANOVA results regarding whether the subscale mean scores of the students obtained from the E-Readiness scale differ according to the accommodation place are given in Table 9.

Table 9. *ANOVA analysis results of students' ERS subscale scores according to accommodation place*

Accommodation	N	$\acute{X}$	SS	df	F	p
Use of computer	923	22.53	7.33	2	9.24	.000***
Using Internet	923	24.19	4.47	2	2.72	.067
Online Communication	923	26.41	7.00	2	2.83	.059
Self-Learning	923	42.71	9.54	2	5.47	.004**
Learner Control	923	22.38	5.05	2	4.84	.008**
Motivation	923	30.92	11.77	2	2.07	.126
Total	923	169.13	34.34	2	6.53	.002**

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the results of one-way variance analysis in Table 9, as well as the total scores of the students obtained from the ERS scale, the Computer Usage, Self-Learning and Learner Control subscale scores show statistically important difference ($p < .05$). Bonferroni test and Post Hoc comparison results are given in Table 10.

Table 10. *Post Hoc analysis result of students' ERS subscale scores according to accommodation place*

Measurement	Accommodation	n	$\acute{X}$	Sd	F	P	Difference
Use of computer	Family	80	24.5	7.5	9.24	.007**	Dormitory-Family
	Apartment	202	23.9	7.3			
	Dormitory	641	21.9	7.2		.002**	Dormitory-Apartment
Using Internet	Family	80	26.7	7.1	5.49	.005**	Dormitory-Family
	Apartment	202	27.4	7.3			
	Dormitory	641	26.1	6.9			
Self-Learning	Family	80	23.4	4.8	4.84	.041*	Dormitory-Apartment
	Apartment	202	23.1	5.0			
	Dormitory	641	22.1	5.1			
	Family	80	177.1	32.6			

Total	Apartment	202	174.4	35.1	6.53	.026*	Dormitory-Family
	Dormitory	641	166.5	34.0		.012*	

**: 0.05 significance level; **: 0.01 significance level*

As it can be seen in Table 10, the self-learning levels of the students staying with families show a statistically significant difference compared to the individuals living in the dormitory. The learner control subscale mean scores of students staying in the apartments are significantly higher than the students staying in the dormitories. When the total average scores are taken into consideration, the average scores of the students staying with the family and staying in the apartments are significantly higher than the students staying in the dormitory. In the other subscale mean scores, there is no difference according to accommodation.

One-way variance analysis results regarding whether the sub-scale mean scores obtained by students from the E-Readiness scale differ according to income rate are given in Table 11.

Table 11. *ANOVA analysis results of students' ERS subscale scores according to income rate*

Measurement	N	$\acute{X}$	SS	df	F	p
Use of computer	923	22.53	7.33	2	9.54	.000***
Using Internet	923	24.19	4.47	2	5.01	.007**
Online Communication	923	26.41	7.00	2	5.66	.004**
Self Learning	923	42.71	9.54	2	3.55	.029*
Learner Control	923	22.39	5.053	2	3.32	.037*
Motivation	923	30.916	11.78	2	.003	.997
Total	923	169.13	34.34	2	3.73	.024*

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the results of one-way variance analysis in Table 11 there is a significant difference between the total score averages that the students obtained from the scale of ERS ($p < .05$). In addition, there is a statistically significant difference in the other subscale mean scores except the Motivation subscale mean scores. Bonferroni test and Post Hoc comparison results are given in Table 12.

Table 12. *Post Hoc analysis results of students' ERS subscale scores according to their income status*

Measurement	Income	n	$\acute{X}$	Sd	F	p	Difference
Use of computer	X_1	733	22.00	7.39	9.54	.000***	X_1 - X_2
	X_2	163	24.67	6.39			
	X_3	27	23.93	8.51			
Using Internet	X_1	733	23.98	4.60	5.01	.005**	X_1 - X_2
	X_2	163	25.18	3.51			

	X_3	27	23.78	5.47		
Online Communication	X_1	733	26.02	7.12		
	X_2	163	27.86	6.15	5.66	.007**	X_1 - X_2
	X_3	27	28.30	7.54		
Self-Learning	X_1	733	42.56	9.50		
	X_2	163	43.98	8.92	3.55	.038*	X_2 - X_3
	X_3	27	39.04	12.86		
Learner Control	X_1	733	22.25	5.06		
	X_2	163	23.20	4.70	3.32	.029*	X_1 - X_2
	X_3	27	21.07	6.43		
Total	X_1	733	167.72	34.74		
	X_2	163	175.77	30.67	3.73	.020*	X_1 - X_2
	X_3	27	167.19	40,51		

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*
X_1: Low Income Level, X_2: Middle Income Level, X_3: High Income Level

According to the data in Table 12, the total point average of the students with middle income level is higher than the students with low income level ($p < .05$). Similarly, the mean scores of middle-income students' Computer Usage, Using Internet, Online Communication, and Learner Control subscale are significantly higher than students with low income ($p < .01$). On the other hand, the self-learning subscale score averages of middle-income students are significantly higher than the students with high income levels. There is only no difference in Motivation subscale point averages according to income status.

The desktop computer ownership plays a role in the subscale score averages obtained by the students from the e-readiness scale was examined with t-analysis for independent samples and the results are given in Table 13.

Table 13. *T-test analysis results of students' ERS subscale scores according to PC ownership*

	Mean ($\acute{X}$)		t	p
	No (N=851)	Yes (N=72)		
Use of computer	22.2	26.5	-4.904	< .001***
Using Internet	24.1	24.8	-1.309	.191
Online Communication	26.2	28.8	-3.016	.003**
Self-Learning	42.6	44.4	-1.586	.113
Learner Control	22.3	23.1	-1.224	.221
Motivation	31.0	30.4	0.364	.716

Total	168.4	178.1	-2.317	.021*

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the data in Table 13, when the average scores of the students for their e-readiness levels are analyzed, Computer Usage, Online Communication and Total score averages differ significantly in favor of those with desktop computers.

The laptop ownership plays a role in the subscale score averages obtained from the E-Readiness scale of the students was examined with the t-analysis for independent samples and the results are given in Table 14.

Table 14. *Results of t-test analysis of students' ERS subscale scores according to laptop ownership*

	Mean ($\acute{X}$)		t	p
	No (N=565)	Yes (N=358)		
Use of computer	21.4	24.3	-6.10	< .001***
Using Internet	23.6	25.1	-4.98	< .001***
Online Communication	25.5	27.8	-4.98	< .001***
Self-Learning	41.8	44.2	-3.78	< .001***
Learner Control	21.9	23.1	-3.34	< .001***
Motivation	30.3	31.9	-2.11	.036*
Total	164.5	176.5	-5.25	< .001***

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the data in Table 14, when the average scores of the students' E-readiness levels are analyzed, both the sub-scale mean scores and the total mean scores differ significantly in favor of those with a laptop computer. There is no difference in other subscale mean scores according to desktop computer ownership.

The tablet ownership plays a role in the subscale score averages obtained by the students from the E-Readiness Scale was analyzed with the t-test for independent samples and the results are given in Table 15.

Table 15. *Results of t-test analysis of students' ERS subscale scores according to tablet computer ownership*

	Mean ($\acute{X}$)		t	p
	No (N=800)	Yes (N=123)		
Use of computer	22.1	25.2	-4.451	< .001***
Using Internet	24.1	25.0	-2.284	0.023*
Online Communication	26.2	28.1	-2.809	0.005**
Self-Learning	42.5	43.7	-1.301	0.194

Learner Control	22.3	22.6	-0.552	0.581
Motivation	30.7	32.3	-1.386	0.166
Total	167.9	177.0	-2.735	0.006**

: 0.05 significance level; **: 0.01 significance level; *: 0.001 significance level*

According to the data in Table 14, when it is looked at the average scores for students' E-readiness levels, there is a significant difference in favor of those who have a tablet computer in terms of Computer Usage, Using Internet, Online Communication and total score averages. There is no difference in other subscale mean scores according to the ownership of tablet computers. On the other hand, according to the ownership of the smart phone, both the total score averages and the subscale score rates differ (P> .05).

Bilateral correlation results of students' E-readiness scale subscale scores and courses taken by students via distance education are given in Table 16.

Table 16. *The relationship between ERS scale sub-factors and academic success (pearson r)*

	Academic Success Average			
	Turkish Language I (n=858)	Turkish Language II (n=463)	History I (n=768)	History II (n=409)
Use of computer	.077*	.145**	.085*	.155**
Using Internet	.067*	.092*	.075*	.131**
Online Communication	.037	.117*	.041	.133**
Self-Learning	.093**	.106*	.079*	.129**
Learner Control	.075*	.071	.081*	.112*
Motivation	.044	-.002	.039	.011
Total	.085*	.105*	.083*	.132**

*: 0.05 significance level; **: 0.01 significance level; ***: 0.001 significance level

While there is no significant relationship between the academic success averages of Turkish Language I and History I courses and online communication skills of the variables in Table 15, there is a significant relationship between the academic achievement averages of Turkish Language II and History II courses. Besides, the learner control does not have a significant relationship with only the academic achievement averages of Turkish Language II course but has a significant relationship with the other subscale mean scores. On the other hand, while it is seen that the highest relationship was between the Academic success average of History II course and Computer use subscale score, the lowest meaningful relationship was observed between internet usage skills and Turkish Language I course.

4. Discussion and Results

In this study, the readiness of students studying in the thirteen faculties and vocational schools of the Health Sciences University regarding online learning was examined in terms of different variables. According to this, it has been investigated whether the level of e-readiness of students differs according to their gender, accommodation, computer or mobile device ownership, department in which they are studying, job status, education types (daily or evening

education), distance education experience. In addition, the relationship between e-readiness and academic achievement was examined.

In the study, it was found that students' levels of E-readiness differ according to their gender. In terms of sub-dimensions, the average score of male students is higher in all other sub-dimensions except Self-Learning sub-dimension. In his study, Sakal (2017) found that there was a significant difference in the online communication dimension in favor of male students, but other sub-dimensions did not differ by gender. Toplu and Gökçearslan (2012) reported that male students at the university have higher self-efficacy beliefs towards e-learning. Adnan and Boz (2017) reported that the readiness of engineering students for e-learning does not differ by gender. However, in the same study, it was emphasized that the sub-dimensions of personal characteristics and technological skills in the expectation scale of readiness were higher in male students. It was also emphasized that male students with e-learning experience have more positive attitudes towards e-learning than female students (Adnan & Boz, 2017). In this study, while there was no gender difference in the self-learning dimension, in accordance with the literature, all sub-dimensions of the e-readiness scale were found high in favor of male gender in terms of computer use, internet use, online communication, learner control and motivation subscales.

In the study, E-readiness levels of Health Management and Vocational School Physiotherapy Department students were found to be higher than the students of the nursing department. In a study examining midwifery department students, it was found that the e-readiness scores and motivation of e-learning were high (Öner et al., 2018). In another study, it has been found that first year students of computer and civil engineering have sufficient personal characteristics, access to technology and sufficient technological skills for e-learning (Adnan & Boz, 2017). Accordingly, the researchers found that the readiness level of students to e-learning is high. However, they did not find any difference in terms of inter-departmental readiness levels. In the same study, these students were found to have high motivation for e-learning. Based on these results, researchers stated that students' better experience with internet technologies will not affect their success in e-learning environments. The researchers stated that the reason for this is that the students do not have enough orientation education for e-learning. Coşkun, Kaymakoğlu and Gök (2007) determined that the first, second and third grade students of the medical faculty have low levels of e-learning knowledge, as well as e-learning and video conference systems are not used. In the same study, it was observed that students used the internet while conducting research. In addition, it was found that medical students' requests to take lessons in the electronic environment were low (Coşkun, Kaymakoğlu & Gök, 2007). Yurdugül and Demir (2017) reported that e-readiness of prospective teachers is at a good level in a study involving approximately thirteen different education department students. As a result of the study, the researchers found that the students of Foreign Language Education Department, Secondary School Science and Mathematics Education Department and Computer Education Instructional Technology Department (CEIT) had a high level of e-readiness. In addition, they found that the majority of students in the Guidance and Psychological Counseling and Primary Education departments had low level of e-readiness. Especially, it was emphasized that the facts that the higher computer and internet self-efficacy subscales of CEIT students compared to all departments and foreign language students to be actively using e-learning for a long time played an important role in these results (Yurdugül & Demir, 2017). In this study, it was found that online communication and motivation subscale scores of Health Management and Vocational School Physiotherapy students were higher than the students of the nursing department. Other e-readiness sub-dimensions did not differ according to the departments. Accordingly, in the study of Öner et al. (2018), it can be thought that the ease of access to internet and computer for midwifery students receiving distance

education also affected their motivations. In this study, it can be said that the use of internet and computers for teaching purposes is higher for Health management and Physiotherapy students rather than the students of the nursing department. As seen in other studies, as the rate of internet-related lessons and the ease of access to technology increase, the increase in many readiness sub-dimension scores such as motivation, online communication, and technical skills is observed. It can be thought that the low-level readiness of the Nursing Department and the Faculty of Medicine students derives from that these departments are more focused on practical work and their experience in terms of e-learning is not enough.

In the study, it was found that E-Readiness levels of students differ according to their grade level. In a study conducted with the first, second, and third classes pre-service teachers, it was found that the attitudes of students who have taken a computer course before to e-learning are higher than those who have never taken a computer course (Altun, 2003). In another study, it was reported that fourth year students of undergraduate teacher education got higher scores in all sub-dimensions of e-learning readiness compared to the first-grade students (Yurdugül & Demir, 2017). On the other hand, Öner et al (2018) stated that the readiness scores for e-learning between the first and second grades did not differ; however, the second-grade students had higher motivation scores. In this study, in accordance with the literature, it can be said that fourth grade students have higher scores compared to first grade students in terms of computer usage and motivation dimension. According to these results, it can be said that as e-learning experience increases, readiness and especially motivation increase.

In this study, it was found that students' E-Readiness levels differ according to their working status. Öner et al. (2018) examined e-readiness levels of people who are graduates of health high schools and work in health institutions, and those who receive midwifery education via distance education, and reported that the first group's scores are higher in terms of computer use and e-learning motivation. In this study, in accordance with the literature, it was found that students working in any institution have higher levels of Computer Use Self-Efficacy and Motivation compared to students who do not work. It can be said that distance education offering an equal opportunity for the students working is an important factor for this.

Toplu and Gökçearslan (2012) found that the status of university students in the computer ownership does not affect their self-efficacy believes in the internet use. The researchers attributed this to the inadequate use of the internet today and to the inadequate diverting of students to the use of computers for e-learning purposes in high school education. Öner et al. (2018) reported that 96.5% of the students in their study have internet connection at home and 75% of them use the internet for e-learning purposes. Researchers reported that the students of midwifery department were not different in terms of e-readiness. They thought this derived from their almost equal access to technology (Öner et al., 2018). In this study, it was found that students with desktop computers had higher perception of computer use and online communication self-efficacy compared to students without desktop computers, while students with laptop computers had high scores in all sub-factors of e-readiness scale. Students with tablet computers were found to have high average scores on Computer Usage, Using Internet, Online Communication and total. On the other hand, students who have smart phones do not differ in their total scores and subscale scores. According to this, it can be said that owning laptop computers and accessing to technology allow students to work anywhere and anytime, and it has a positive effect on e-readiness, but as mobile devices get smaller, they have lost their impact on e-learning.

Adnan and Boz (2017) argued thate-learning readiness levels did not affect the previous e-learning experience. However, it was reported that the technological skills, attitude and motivation sub-dimensions of the students who have received e-learning education earlier were

higher than the students who received the e-learning education for the first time. It has also been reported that students with previous e-learning experience have higher e-learning satisfaction. Toplu and Gökçearslan (2012) stated that taking a computer lesson has no effect in terms of self-efficacy belief in e-learning or educational internet use. In this study, in line with the literature, a positive correlation was found between distance education experience and motivation. In another study, it was found that as the readiness increased, academic success increased; especially high technical skills and motivation were found to affect success very well (Korkmaz, Çakır & Tan, 2015). It was found that there was no relationship between motivation and academic success. In this study, the relationship between the success of Turkish Language II and History II courses and online communication skills was found. In addition, no relationship between the Turkish Language II achievement average and the sub-dimensions other than learner control and motivation factor was identified. It was found that the highest correlation was between the achievement averages of History II course and the self-efficacy perception of Computer Use. According to this, it can be considered that as the experience increases, students' technical skills, motivation levels and attitudes are positively affected.

5. Conclusion and Recommendations

In this study, the e-readiness levels of university students studying in the field of health sciences were examined in terms of different variables. Research results show that gender, education type and income level are important factors in students' readiness levels. It was found that students' level of computer use and motivation differed from the e-readiness scale sub-factors according to their work status. No effect of the type of education was found for other sub-factors. E-readiness levels were lower than the students of the nursing department, the students of the health management department and the students of the vocational high school physiotherapy department. E-readiness scores of 4th grade students were found higher than 1st grade. E-readiness levels are lower in terms of total scores, as well as computer use, Using Internet and learner control sub-factors compared to students staying in homestays or in apartments. In terms of device ownership, the e-readiness level of students who have a laptop computer was found to be the highest. While smartphone ownership has no effect on the level of e-readiness, it has been found that desktop ownership and tablet computer ownership differ in terms of computer usage and online communication sub-factors in addition to the total scores of E-readiness. As the level of e-readiness increases, the relationship between academic achievement increases in terms of lessons which are more difficult in academic terms. According to the results of this research, the following suggestions were made.

Due to the low level of e-readiness of female students, distance education may be ineffective in health programs, the majority of which are female students. For this reason, e-readiness levels of these students can be increased by providing pedagogical trainings to female students prior to distance education as well as technical trainings for the use of the system.

There is a high level of readiness in distance education for secondary education students, some of whom are working or have to go to school in the evening. For this reason, e-readiness levels of normal education students can be increased through online communication or video conference applications.

E-readiness levels of students with moderate economic income were higher than students with low income. This result is related to the findings showing that laptop ownership is an important advantage. Therefore, having low income students having a laptop will have a significant impact on the level of e-readiness of these students.

E-readiness levels of nursing students were lower in the study. The fact that the number of female students is high in this section may be an important factor in the emergence of this

result, at the same time, it may be effective in this result that students of this department receive more practical courses. For this reason, the inclusion of similar departments in online communication applications and activities that will increase their motivation in distance education will contribute on e-readiness levels.

E-readiness levels of students staying in homestays or in apartments are higher. This result is due to disadvantageous reasons such as limited internet access of students living in dormitories. In addition, the fact that most of the students living in state dormitories are composed of students with low economic level is effective in this result. For this reason, providing some basic facilities such as free internet to these students will be an important factor in increasing their e-readiness levels.

History I and Turkish language I courses are easier than History II and Turkish language II courses. For this reason, less online communication, using internet or advanced computer skills are required. This result shows that e-readiness is an important factor with increasing difficulty level of lessons. For this reason, it is recommended that lecturers provide more guidance in terms of readiness for e-learning in high difficulty courses.

In this study, the lesser participation of the medical faculty students created a limitation in the research. On the other hand, in addition to the e-readiness level of the students, it is suggested to the next researchers to collect learning styles, cognitive loads and qualitative data related to these data together.

6. Conflict of Interest

The author declares that there is no conflict of interest.

7. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

References

Adams, D., Sumintono, B., Mohamed, A., & Noor, N.S. (2018). M.E-Learning readiness among students of diverse backgrounds in a leading Malaysian Higher Education Institution. *Malaysian Journal of Learning and Instruction*, 15(2). 227-256.

Adnan, M., & Boz, Y.B. (2017 Profile of engineering undergraduates on readiness and satisfaction for e-learning. *Turkish Journal of Computer and Mathematics Education*, 8(2), 218-243.

Al-Fraihat, D., Joy, M., & Sinclair, J. (2017, June). Identifying success factors for e-learning in higher education. In *International conference on e-learning* (pp. 247-255). Academic Conferences International Limited).

Altun A. (2003). Ögretmen adaylarinin bilissel stilleri ile bilgisayara yönelik tutumlari arasindaki iliskinin incelenmesi. *TOJET: The Turkish Online Journal of Educational Technology*, 2.1.

Benhamdi, S., Babouri, A., & Chiky, R. (2017). Personalized recommender system for e-learning environment. *Education and Information Technologies*, *22*(4), 1455-1477.

Brinkerhoff, J., & Koroghlanian, C. M. (2005). Student computer skills and attitudes toward internet-delivered instruction: An assessment of stability over time and place. *Journal of Educational Computing Research*, *32* (1), 27-56.

Borotis, S., & Poulymenakou, A. (2004). e-Learning readiness components: Key issues to consider before adopting eLearning interventions. In J. Nall, & R. Robson (Eds.), Proceedings of world conference on e-Learning in corporate, government, healthcare, and higher education (pp. 1622e1629). Chesapeake, VA: AACE.

Changiz, T., Haghani, F., & Nowroozi, N. (2013). Are postgraduate students in distance medical education program ready for e-learning? A survey in Iran. *Journal of education and health promotion*, *2*.2.

Coşkun, G., Kaymakoğlu, B., & Gök, E. (2007). The Internet Usage of Medical School Students and Their Attitudes Towards e-learning: An Application for Başkent University, *IV. National Medical Informatics Congress,72-77.*

Coşkun, Ö., Özeke, V., Budakoğlu, İ., & Kula, S. (2018). The levels of readiness of medical faculty members for e-learning: Gazi University Case. *Ankara Medical Journal*, *18*(2), 175-185.

Duran, N., Önal, A., & Kurtuluş, C. (2006). E-Öğrenme Ve Kurumsal Eğitimde Yeni Yaklaşım Öğrenim Yönetim Sistemleri, Bilgi Teknolojileri Kongresi IV, 9-11 Şubat 2006, Bildiriler Kitabı, 97-101.

Grundman, J., Wigton, R., & Nickol, D. (2000). You Have Got Mail: Distance Education. Academic Medicine, 75(10): 47-49.

Guglielmino, L. M., & Guglielmino, P. J. (2003). Identifying learners who are ready for e-learning and supporting their success. In G. Piskurich (Ed.), Preparing learners for e-learning (pp. 18-33). San Francisco: Jossey-Bass.

Gülbahar, Y. (2005). Learning Styles and Technology, *Educalion and Science*, *30*(138).

Gülbahar, Y., & Alper, A. (2014). Development of e-learning styles scale for electronic environments. *Educalion and Science*, *39*(171).

Güngör, C., & Aşkar (2004), P. E-öğrenmenin ve bilişsel stilin başarı ve internet öz yeterlik algısı üzerindeki etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 27.27.

Hakkari, F., İbili, E., Kantar, M., Boy, Y., Bayram, F., & Doğan, M. (2008). Uzaktan Eğitimde Ders Materyallerinin Hazırlanmasında Ders İçeriklerinin Tasarımı ve Senaryolaştırılması, 2. *Uluslararası Gelecek İçin Öğrenme Alanında Yenilikler Konferansı, İstanbul*.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (2003). *Applied statistics for the behavioral sciences* (Vol. 663). Houghton Mifflin College Division.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55.

Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, *55*(3), 1080-1090.

Işık, İ., Hakan, A., & Güler, İ., (2008), Using the 3D Web Technologies in Distance Education, International Journal of Informatics Technologies, 75-77

İlhan, M., & Çetin, B. (2013). The validity and reliability study of the Turkish version of an online learning readiness scale. *Educational Technology Theory and Practice*, *3*(2), 72-101.

Karasar, N. (2015). Scientific Research Method (28th edition.). Ankara: Nobel Yayın Dağıtım.

Korkmaz, Ö., ÇAKIR, R., & Tan, S. S. (2015). Students E-learning Readiness and Satisfaction Levels and Effects on the Academic Achievement. *Journal of Kirsehir Education Faculty*, *16*(3).

Lu, H. P., & Chiou, M. J. (2010). The impact of individual differences on e-learning system satisfaction: A contingency approach. *British Journal of Educational Technology*, *41*(2), 307-323.

Mafenya, P. N. (2013). An investigation of first-year students' pedagogical readiness to e-learning and assessment in open and distance learning: an University of South Africa context. *Mediterranean Journal of Social Sciences*, *4*(13), 353.

Öner, S. Ç., Çelik, G., Bay, H., Yeşil, Y., & Turfan, E. Ç. (2018). Evaluation of midwifery distance education students e-learning readiness. *Medical Sciences*, *13*(1), 10-18.

Panda, S., & Mishra, S. (2007). E-Learning in a Mega Open University: Faculty attitude, barriers and motivators. Educational Media International, 44(4), 323- 338.

Piskurich, G. M. (2003). *Preparing learners for e-learning*. San Francisco: John Wiley & Sons.

Smith, P. J. (2005). Learning preferences and readiness for online learning. *Educational psychology*, *25*(1), 3-12.

Tabachnick, B. G., & Fidell, L. S. (2001). Using multivariate statistics. Allyn and Bacon. *Needham Heights, MA*.

Toplu, M., & Gökçearslan, Ş. (2012). Development of E-learning and Reflections of the Internet on the Process of Education: A Case Study at Gazi University. *Turkish Librarianship*, *26*(3), 501-535.

Thorndike, R. L. (Ed.): 1971, Educational Measurement, American Council on Education, Washington. DC.

Tuncer, M., & Taşpınar, M., (2008). The future of education and training in virtual environments and possible problems, *Journal of Social Sciences*, 10(1) 124.

Venkatesh, V. & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: development and test. Decision Sciences, 27 (3), 451–481.

Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British journal of educational technology*, *40*(1), 92-118.

Watkins, R., Leigh, D., & Triner, D. (2004). Assessing Readiness for E-Learning. Performance Improvement Quarterly,17(4), 66-79.

Wei, Y., & Johnes, J. (2005). Internet tools in teaching quantitative economics: why gaps between potential and reality? Journal of Further and Higher Education. 2005, 29(2):125–41.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies.

Yacob, A., Kadir, A. Z. A., Zainudin, O., & Zurairah, A. (2012). Student awareness towards e-learning in education. *Procedia-Social and Behavioral Sciences*, *67* (93-101).

Yılmaz, H., & Özkaynak, E. (2012). A Motivational Tool in Internet-Based Education: Ice Breakers, *XIV. Academic Informatics Conference, 1 - 3 February, Uşak University*, 155-162.

Yurdugül, H., & Demir, Ö. (2017). An investigation of Pre-service Teachers' Readiness for E-learning at Undergraduate Level Teacher Training Programs: The Case of Hacettepe University. *Hacettepe University Journal of Education*, 32(4), 896-915.