A Comparison of Learning Style Preferences in E-Learning Environment: A Study of Health Science University Students in Turkey

Emin İBİLİ 🆔

Abstract. In this study, it was investigated whether the e-learning styles of health science students differ according to gender, education type, department, class, working status, daily Internet usage time, and degree of graduation. E-learning Styles Scale and Personal Information Form were used as data collection tools in the research. In this context, data were obtained from a total of 1989 students studying in 17 different departments. In the study, it was found that female students had higher audio-visual and independent learning preferences, and male students had higher verbal and social learning levels. In addition, it was determined that the working status influenced the intuitive learning style, and the grade level influenced the logical learning style. In the results of bilateral correlations between learning styles, the highest relationship was found between active learning style and social learning style, while the lowest relationship was found between independent learning style and social and active learning style. In addition, this research has revealed that e-learning styles differ according to the departments where students study, and daily Internet usage time is inversely proportional to verbal, logical, and independent learning styles and directly proportional to active learning style. The results of this research showed that different variables are effective on e-learning styles for health science students; therefore, personalized teaching environments are important in content design, instructional design, and determination of teaching methods and strategies.

Keywords. Learning styles, e-learning, health science university.

Emin İBİLİ. Afyonkarahisar Health Sciences University, Department of Healthcare Management, Afyonkarahisar, Turkey

e-mail: eminibili@aku.edu.tr.

INTRODUCTION

E-learning system is a learning and teaching method using Internet, computer, mobile technologies, video, and other electronic information and communication technologies. In other words, e-learning system is a process that relates various instructional technologies, teaching strategies, and pedagogical models, such as writing, visualization, and storage using information and communication technologies, such as Internet and computer (Dabbagh, 2005). One way to make the best use of e-learning systems today is to provide a personalized learning environment suitable for students' cognitive and learning styles (Hsu, 2017). E-learning styles can be defined as the student's preferences to access information in e-learning environments. The differences found in learning styles in the e-learning process through many years of research show that these styles cannot be ignored in education. Applying a teaching strategy suitable for students' learning styles can enable the student to learn better and increase their motivation (Hakkari et al., 2008, Kurnaz & Ergün, 2019). Features of e-learning, such as being rich in visual and auditory resources, easily accessing comprehensive information in terms of content, accessing the learning environment at any time, and most importantly, offering a wide range of options according to the cognitive styles of students, can positively affect the motivation of the student (Grundman, Wington & Nickol, 2000). Determining the e-learning styles of students helps students develop educational programs and teaching content that suit their own learning preferences and motivates students by providing a personalized learning environment (Brown et al., 2009).

Learning styles and cognitive styles contain similar definitions in some studies. However, while learning styles address students' preferences to access information, Cognitive style expresses the individual's preferences, such as receiving and using information, processing, organizing, remembering and keeping it in memory, and recalling it when necessary (Witkin, Moore, Goodenough, and Cox, 1977). On the other hand, the concept of learning style originated from the cognitive styles that determine the difference of the individual's cognitive features (Hsu, 2017). In most research, it is argued that every individual can learn, and education will be more permanent when education is carried out considering individual learning styles (Kamal & Radhakrishnan, 2019; Ibili, 2020). There is no single way to learn for every student. However, there is a learning style that will support the learning of all learners (Dağhan & Akkoyunlu, 2011). In an e-learning environment organized according to the students' learning styles, students can feel more comfortable and enjoy learning. To achieve this, first, the student and the trainer should be aware of the individual differences and use the e-learning environment according to these differences (Murayama, et al.,

2017). As a result of many studies, considering the learning style differences of individuals, it is seen that the individual is successful (Alessi & Trollip, 2001, Knoll et al., 2017). E-learning environments can be organized following the individual characteristics and learning styles of students (Graf, Liu, Kinshuk, Chen & Yang, 2009). Different types of learning styles have been proposed; field dependent-field independent (Witkin, Moore, Goodenough & Cox, 1977); verbal-visual (Childers, Houston & Heckler, 1985); participating-avoiding, collaborative-competitor, dependent-independent (Jonassen & Grobowski, 2012); individual-social, audio-visual, abstract-concrete, logical-intuitive (Gülbahar & Alper, 2014) are some of these types.

Towards the end of the 2000s, the most accepted learning style subgroups were regarded as field dependent and field independent. Students in the field-dependent group passively receive the information and use it as it is (Pewewardy, 2002). Their generalization skills are low. On the other hand, field-independent students prefer active learning environments, establish hypotheses and reach concepts themselves, have high generalization achievements and have the ability to rearrange knowledge to remember it (Witkin, Moore, Goodenough & Cox, 1977). Recently, the most used learning style subgroups are auditory and visual. Students with a visual learning style learn best by seeing, and they are interested in subjects such as drawing, art, and geometry; they can easily visualize visual elements and situations. On the other hand, students with an auditory learning style learn best by hearing, and they prefer written or verbal explanations; they prefer instructors who explain the topics in detail (Gülbahar & Alper, 2011; Akgün, Küçük, Çukurbaşı & Tonbuloğlu, 2014).

Today, Distance Education was critical due to the COVID-19 pandemic. In many countries, the education and training process has been maintained by distance education due to social isolation not only in secondary education and high schools, but also in public and private universities (Ibili, 2020). Due to the rapid spread of the pandemic, institutions and organizations first focused on creating technological infrastructure plans suitable for large student audiences. However, the completion of the technological infrastructure process will direct universities, faculty and students to a teaching process that will consider effective teaching strategies as well as pedagogical factors in distance education. In terms of health science students, more careful education and training should be planned since the quality of the education process includes a process that directly affects human life. For these students, the quality of education should not decrease; appropriate content for students' learning styles should be produced or effective teaching strategies and pedagogical methods should be determined. For this reason, it is important to determine the e-learning styles of health science students and the

variables that affect e-learning styles. For this purpose, the following research questions were answered in this research:

- Do the e-learning styles of students differ according to the departments?
- Do the e-learning styles of students differ according to gender?
- Do the e-learning styles of students differ according to their degree of graduation?
- Do the e-learning styles of students differ according to their learning style?
- Do the e-learning styles of students differ according to the grade level?
- Do the e-learning styles of students differ according to their employment status?
- Do the e-learning styles of students differ according to their daily Internet usage?
- Is there a relationship between students' e-learning styles?

METHOD

In this study, e-learning styles of health science students were measured and whether they differed in terms of different variables was investigated. The participants were health and research university students studying at a public university. The university continued its associate, undergraduate and graduate courses in 2019-2020 spring semester with distance education in order to keep social distance in the process of the COVID-19 pandemic. Research data was collected at the end of the 2019-2020 spring semester. An anchor link (web address link) of the e-learning styles scale and personal information form prepared with Google Forms were sent to all students as announcements through the distance education system. The university's Learning Management System (LMS) is a Canvas based learning management system. A total of 1050 lessons were carried out synchronously and asynchronously in the COVID-19 process. Synchronous applications were carried out via the BigBlueButton application, which is open source and compatible with the Canvas learning management system. The midterm, final and make-up exams of theoretical courses and assignments and projects defined for applied courses were completed through the Canvas learning management system.

Study Group

The sample of the study consists of health and research university students who attended the spring semester in 2019-2020 academic year and continued their education via distance education due to COVID-19 pandemic. A total of 5,000 associate and undergraduate degree students continued their spring semester education via distance education. In this study, a total of 1989 (40%) students were reached. The demographic features of the students participating in the research are given in Table 1.

Table 1. *Distribution of Participants by Demographic Profile*

Features	Category	Frequency	%
Gender	Female	1518	76.3
	Male	471	23.7
Degree	Vocational School (V.S.-2-year education programme)	1037	52.1
	Faculty (4-6-year education programme)	952	47.9
Department	Nutrition and Dietetics	271	13.6
	Dentist	177	8.9
	Dialysis (V.S.)	48	2.4
	Pharmacy	20	1.0
	Electroneurophysiology (V.S.)	57	2.9
	Physio Therapy (V.S.)	213	10.7
	Physical therapy and rehabilitation	114	5.7
	Nursing	136	6.8
	First and Emergency Aid (V.S.)	86	4.3
	Healthcare Management	106	5.3
	Orthosis Prosthesis (V.S.)	74	3.7
	Health Institutions Management (V.S.)	64	3.2
	Medical Laboratory Techniques (V.S.)	110	5.5
	Medical Documentation and Secretarial (V.S.)	260	13.1
	Medical Imaging (V.S.)	29	1.5
	Medical School	128	6.4
	Elderly Care (V.S.)	96	4.8
Education Type	Formal Education (Daytime Education)	1658	83.4
	Secondary Education (Evening Education)	331	16.6
Grade	I	987	49.6
	II	689	34.6
	III	166	8.3
	IV	115	5.8
	V+	32	1.6
Working Status	No	1912	96.1
	Yes	77	4.9
Total		**1989**	**100.0**

Data Collection Tools

The data collection tool consists of two parts. In the first part, the personal information form developed by the researchers, containing demographic information about the participants' gender, education style, department, class, working status, daily Internet usage time, and degree of graduation was used. In the second part, the E-Learning Styles Scale (ELSS) developed by Gülbahar and Alper (2014) was used to determine the learning styles of students in e-learning environments. This scale is a 5-point Likert-type scale consisting of 38 items in total. The e-learning styles scale consists of 7 factors: independent learning, social learning, audiovisual learning, active learning, verbal learning, logical learning, and heuristic learning. The researchers developed the ELSS scale with Exploratory Factor Analysis by collecting data from 2344 students enrolled in distance education programs of a public university. Then, Confirmatory Factor Analysis (CFA) was applied and they showed that ELSS scale gives reliable and valid results in terms of Turkish culture and online learning environments. Similar results were confirmed by subsequent researchers (Kurnaz & Ergün, 2019; Özonur, Kamişli & Solmaz, 2020). In this study, Cronbach's Alpha (α) internal consistency coefficients for seven factors of the scale ranged between 0.71 and 0.81, and the reliability coefficient for the entire scale was 0.88. The scale explains 53.70% of the total variance. Based on these results, it was decided that the scale is valid and reliable enough to measure the e-learning styles desired to be measured within the scope of the study.

Data Analysis

Descriptive statistics, comparison and relational analyzes were used to analyze the research data by SPSS 23. Percentage (%), frequency (f), standard deviation (SD) and mean ($\acute{X}$) analyzes were used as descriptive statistics. In addition, The Kolmogorov-Smirnov test was used to control the normality of samples distribution, and the Levene test was used to check the homogeneity assumption. In order to determine the differences between the groups, unpaired samples t-test, one-way variance analysis and Tukey test were used. In addition, Pearson's correlation coefficient was used to determine the relationships between ELSS subscale factors.

RESULTS

In this section, the mean scores of the students obtained from the E-learning styles scale are given with their tables and descriptions according to their gender, education type, department, class, working status, daily Internet usage time, and degree of graduation.

Whether the E-learning styles subscale scores of students differ according to gender was examined by t-test analysis for independent samples, and the results are given in Table 2.

Table 2. *Results of t-Test Analysis of Students' ELSS Subscale Scores by Gender*

E-Learning Styles	Male (N=471)	Female (N=1518)	t	p
Audio-Visual Learning	31.22	31.75	2.42	.016*
Verbal Learning	23.85	22.81	-4.56	.000**
Active Learning	19.09	18.96	-0.535	.593
Social Learning	20.50	19.65	-3.457	.001**
Independent Learning	11.33	11.75	3.770	.000**
Logical Learning	10.76	10.50	-1.667	.096
Intuitive Learning	14.13	13.89	-1.746	.081

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

As can be seen in Table 2, students' e-learning styles subscale mean scores differ according to gender. In terms of Audio-Visual Learning style and Independent Learning Style, female students' mean scores are statistically significantly higher than male students. On the other hand, male students' verbal learning style and social learning style mean scores are higher than female students.

One-Way Variance Analysis (ANOVA) results regarding whether students' e-learning styles subscale mean scores differ according to the departments they are studying are given in Table 3, and the mean scores according to the departments they are studying are given in Figure 1.

Table 3. *ANOVA Results of Students' ELSS Subscale Scores According to the Departments*

E-Learning Styles	N	$\acute{X}$	SS	df	F	p
Audio-Visual Learning	1989	31.62	4.10	16	3.42	.000**
Verbal Learning	1989	23.06	4.36	16	2.73	.000**
Active Learning	1989	18.99	4.42	16	2.32	.002**
Social Learning	1989	19.85	4.69	16	3.45	.000**
Independent Learning	1989	11.65	2.15	16	1.94	.014*
Logical Learning	1989	10.56	2.99	16	10.03	.000**
Intuitive Learning	1989	13.94	2.61	16	3.46	.000**

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

The results in Table 3 show the e-learning styles subscale mean scores of health science students differ in all departments. According to the graph in Figure 1, the highest and lowest sections in terms of e-learning styles subscale point averages are as follows:

- Students with the highest Audiovisual Learning Style score average are the students of the Medical Laboratory Techniques Department, while the lowest are the students of the Faculty of Pharmacy and Dentistry.

- While the students with the highest verbal learning style score average are the students of the Health Management Department, the lowest are Dentistry students.

- While the students with the highest social learning style score average are the students of Health Management, the lowest are students of Dialysis.

- While the students with the highest Active Learning Style score average are the students of the Health Management Department, the lowest are the First and Emergency Aid Department students.
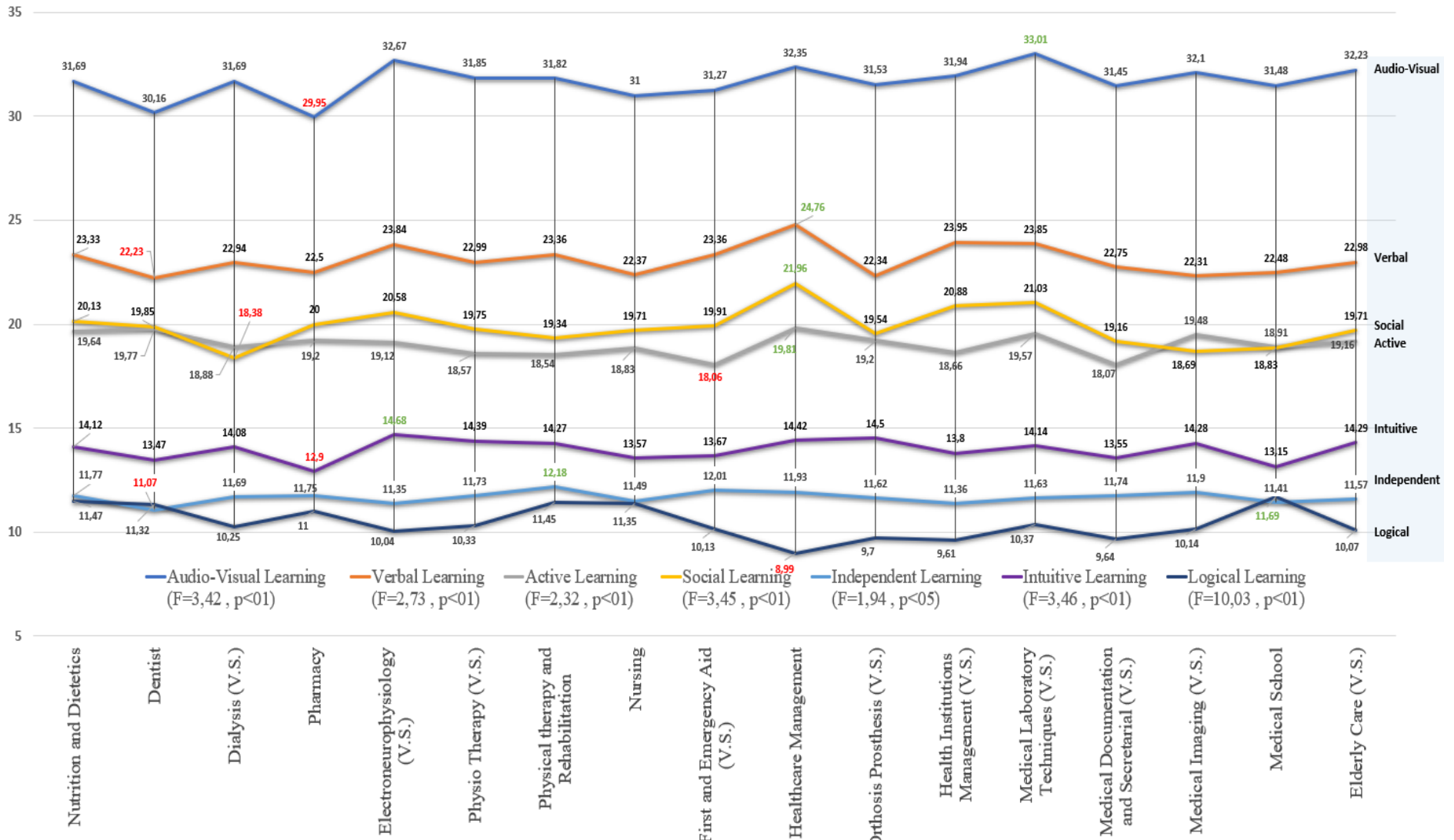
Figure 1. Results of Students' ELSS Subscale Scores by Department

- Intuitive Learning Style score average is the highest in the Department of Electroneurophysiology, while the lowest is in the Faculty of Pharmacy.

- While Independent Learning Style score average is the highest in Physiotherapy and Rehabilitation students, it is the lowest in Dentistry faculty students.

- While the Logical Learning Style score average is the highest among the Faculty of Medicine students, the lowest score is the Health Management Department students.

Tukey Test, one of the Post Hoc Tests, was applied to determine the source of the differences in the e-learning styles subscale mean scores according to the departments; the results are given in Table 4. According to the results in Table 4:

- In terms of visual and auditory learning style, the mean score of the Faculty of Dentistry students is statistically significantly lower than Nutrition and Dietetics, Electroneurophysiology, Physiotherapy, Health Management, Medical Laboratory Techniques, and Elderly Care departments.

- In terms of Verbal Learning Style, the average score of Health Management students is significantly higher than Dentistry, Nursing, Physiotherapy M.Y.O., Orthosis Prosthesis, Medical Documentation and Secretarial, and Medical faculty students.

- In terms of Active Learning Style, the average score of Medical Documentation and Secretarial students is lower than Nutrition and Dietetics and Dentistry students.

- In terms of Social Learning Style, the average score of Health Management students is higher than Dentistry, Physiotherapy and Rehabilitation, Nursing, Dialysis department, Medical Documentation and Secretariat, Medical Laboratory Techniques, and Medical Faculty students.

- In terms of Intuitive Learning Style, the average score of the Faculty of Medicine students is higher than the students of Electroneurophysiology, Physiotherapy Vocational School, Health Management, and Orthotic Prosthetics department.

- In terms of Independent Learning Style, the average score of the Physiotherapy and Rehabilitation (PTR) students is lower than the Dentistry students.

- In terms of logical learning style, there are more significant differences among the departments:

Table 4. *Results of ELSS Scale Subscale Scores by Tukey Test and Post Hoc by Department Type* (Difference = Column - Row).

	Audio-Visual	Verbal	Active	Social	Independent	Intuitive	Logical				
	DE	HM	MD	HM	PR	MS	MS	ND	PR	DE	NR
Nutrition and Dietetics (ND)	-1.53*		-1.58**								
Dentist (DE)		2.53**	-1.58**	2.11*	1.10**						
Physical therapy and rehabilitation (PR)				2.62**							
Nursing (NR)		2.40**		2.25*							
Dialysis (DI)				3.59**							
Electroneurophysiology (EN)	-2.5**					-1.54*	1.65*				
Physio Therapy (PT)	-1.69**	2.22**				-1.25**	1.35*	1.14**			
First and Emergency Aid (FE)							1.56*	1.34*			
Healthcare Management (HM)	-2.19**					-1.28*	2.7**	2.48**	2.46**	2.33**	2.36**
Orthosis Prosthesis (OP)		2.43*				-1.35*	1.98**	1.77**	1.74**	1.61**	1.64**
Health Institutions Management (HI)							2.08**	1.86**	1.84**	1.71**	1.74**
Medical Documentation and Secretarial (MD)		2.01**		2.8**			1.31*	1.4**	1.81**	1.67**	1.7**
Medical Laboratory Techniques (ML)	-2.85**			1.87*			2.05**				
Medical School (MS)		2.29**		3.13**				1.83**			
Elderly Care (EC)	-2.07**						1.61**				

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

- The average score of medical students is higher than those of Electro Neurophysiology, Physiotherapy V.S., First and Emergency Aid, Medical Laboratory Techniques, and Elderly Care Services.

The average score of Nutrition and Dietetics students is higher than Physiotherapy V.S., First and Emergency Aid and Medical Faculty students

The results of the t-test analysis for independent samples regarding whether the e-learning styles subscale mean scores of students differ according to their learning style are given in Table 5.

Table 5. *Results of T-Test Analysis of Students' ELSS Subscale Scores by Education Type*

E-Learning Styles	Formal Education (N=1658)	Secondary Education (N=331)	t	p
Audio-Visual Learning	31.51	32.19	-2.75	.006**
Verbal Learning	22.88	23.95	-4.08	.000**:
Active Learning	19.06	18.65	1.53	.13
Social Learning	19.75	20.33	-2.04	.04*
Independent Learning	11.59	11.97	-2.95	.003**
Logical Learning	10.66	10.06	3.33	.001**
Intuitive Learning	13.87	14.28	-2.57	.010*

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

As seen in Table 5, the e-learning styles subscale mean scores of the students differ according to the learning style in all learning styles except Active Learning Style. On the other hand, while the average score of Formal Education students is higher only in terms of the Logical Learning Style score averages, the average score of the secondary education students is higher in terms of other learning styles.

Whether the students' e-learning styles subscale mean scores differentiate according to grade level was examined by ANOVA, and it was seen that the logical learning style and intuitive learning style subscale mean scores differed (FLogical Learner = 8.15, p <.01; Fintuitive Learner = 3.20, p <.05).

Tukey Test, one of the Post Hoc Tests, was applied to determine the source of the differences, and the results are given in Table 6.

Table 6. *Results of Students' ELSS Subscale Scores by Tukey Test and Post Hoc by Class Grade*

Measurement	Department	n	$\acute{X}$	Sd	F	p	Difference
	Grade I	987	10.40	3.01		.000**	I and III
	Grade II	689	10.40	3.06		.021*	I and IV
Logical Learning	Grade III	166	11.54	2.37	8.15		
	Grade IV	115	11.28	3.08		.000**	II and III
	Grade V+	32	11.41	2.87		.024*	II and IV
	Grade I	9877	13.89	2.61		.019*	I and IV
Intuitive Learning	Grade IV	115	14.68	2.42	3.20		
	Grade V+	32	13.15	2.14		.029*	IV and V

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

As can be seen in Table 6, logical Learning Style subscale score averages of Grade I and II students are statistically lower than Grade III and IV students. In addition, the intuitive learning style point averages of grade 1 and 5 students are lower than grade IV students. Whether the students' e-learning styles subscale score averages differ according to the working status is examined by the t-test analysis for independent samples, and the results are given in Table 7.

Table 7. *Results of T-Test Analysis of Students' ELSS Subscale Scores According to Their Working Status*

	No (N=1912)	Yes (N=77)	t	p
Audio-Visual Learning	31.59	32.40	-1.71	.088
Verbal Learning	22.98	25.03	-4.06	.000**
Active Learning	18.95	19.97	-1.99	.047*
Social Learning	19.79	21.20	-3.35	.010
Independent Learning	11.65	11.66	-0.43	.966
Logical Learning	10.55	10.84	-0.87	.388
Intuitive Learning	13.91	14.66	-2.47	.014*

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

According to the results in Table 7, Verbal, Active, Social and Intuitive Learning Style scores of students working in any institution (private and public) are higher than the students who do not work. The results of the t-test analysis on whether the students' e-learning styles subscale mean scores differ according to the degree of graduation are given in Table 8.

Table 8. *Results of T-Test Analysis of Students' ELSS Subscale Scores According to Their Grade Degree*

	Faculty(N=952)	Vocational Schools(N=1037)	t	p
Audio-Visual Learning	31.33	31.89	-3.10	.003[**]
Verbal Learning	23.02	23.09	-0.35	.729
Active Learning	19.33	18.68	3.28	.001[**]
Social Learning	19.95	19.75	0,94	.348
Independent Learning	11.62	11.68	-0.67	.507
Logical Learning	11.17	10.01	8.78	.000[**]
Intuitive Learning	13.82	14.06	-2.04	.042[*]

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

According to the results in Table 8, although the average scores of undergraduate students are higher in terms of Active Learning and Logical Learning Style score averages, the average score of associate degree students is higher in terms of Audiovisual and Intuitive Learning Style. The relationship between students' e-learning styles is given in Table 9.

Table 9. *Relationship Between ELSS Scale Sub-factors (Pearson r)*

	Audio-Visual	Verbal	Active	Social	Independent	Logical	Intuitive
Audio-Visual Learning	1	,500[**]	,329[**]	,376[**]	,351[**]	,228[**]	,316[**]
Verbal Learning		1	,399[**]	,459[**]	,337[**]	,196[**]	,310[**]
Active Learning			1	,501[**]	,138[**]	,255[**]	,337[**]
Social Learning				1	,189[**]	,238[**]	,300[**]
Independent Learning					1	,242[**]	,309[**]
Logical Learning						1	,247[**]
Intuitive Learning							1

**: 0.01 significance level, *: 0.05 significance level.

Considering the binary correlations of the variables in Table 9, the highest relationship is seen between the Audiovisual Learning style and the verbal learning style (r = .500, p <0.01). Verbal learning style also has a strong relationship with social learning style (r = .459, p <0.01). There is also

a strong relationship between Social Learning Style and Active Learning Style (r = .501, p <0.01). On the other hand, the relationship between Active and Social Learning Style and Independent Learning Style is less than the results of bilateral correlation (ractive = 138, rsocial = 189, p <0.01). The logical learning style has a similar relationship with other learning styles (rmin = 196, rmax = 255, p <.01). The relation between intuitive learning style and logical learning style (rlogical = 247, p <.01) is lower than other learning styles (rmin = 300, rmax = 337, p <.01).

ANOVA results regarding whether students' e-learning styles subscale mean scores differ according to daily Internet usage time are given in Table 10.

Table 10. *Results of Students' ELSS Subscale Scores by Tukey Test and Post Hoc by Class Grade.*

Measurement	Internet Usage	n	$\acute{X}$	Sd	F	p	Difference (hours)
Verbal Learning	1-2 hours	326	23.60	4.57	3.84	.018*	1-2 and 4-5
	4-5 hours	308	22.54	4.33			
	V+ hours	389	22.65	4.58		.028*	1-2 and 5+
Active Learning	2-3. hours	492	18.58	4.22	3.21	.013*	2-3 and 5+
	V+ hours	389	19.54	4.62			
Independent Learning	1-2 hours	326	11.94	2.10	2.73	.026*	1-2 and 4-5
	4-5. hours	308	11.44	2.14			
Logical Learning	1-2 hours	326	10.89	2.96	23.85	.020*	1-2 and 4-5
	4-5. hours	308	10.17	3.06			

: 0.05 significance level.

According to the results in Table 10, Verbal Learning, Independent Learning, Logical Learning Style score averages differ in favor of those who use the Internet on average 1-2 hours a day. In addition, the average of Active Learning Style points of students who use the Internet 5 hours or more per day is higher than the students who use the Internet 2-3 hours a day.

DISCUSSION AND CONCLUSION

In this study, e-learning styles of health science students were examined in terms of different variables. In this context, it was examined whether e-learning styles differ according to gender,

education type, department, class, working status, daily Internet usage time, and degree of graduation. Research results revealed that different variables affect e-learning styles of health science students.

In the study, it was found that students' e-learning styles differed by gender. According to these results, it has been shown that female students prefer more audio-visual and independent learning paths than male students in e-learning environments, and male students adopt the verbal and social learning pathways more (Nirmalya, Kaushik & Rituparna, 2015). In terms of logical and intuitive learning, there was no difference in female and male students. These results show that female students can participate more in individual studies by taking their own learning responsibilities, and they can prefer group work after individual study. On the other hand, it can be said that male students can participate in group-based studies through more projects and homework and prefer online discussions and forums more frequently (Kulac, et al., 2015). On the other hand, it can be said that female students prefer to learn by using shapes, graphics and pictures in e-learning environments, and male students prefer to learn through written and verbal communication (Özbaş, 2013; Romanov and Nevgi, 2007; Yemane,Y. et al., 2017).

One of the important findings of the study was that all e-learning styles differed according to the education department (Brown, et al, 2009, Willems, 2011, Hauer, Straub, & Wolf, 2005; Altintas and Goren 2018);

Students with the highest audiovisual learning style score are the students of Medical Laboratory Techniques and Electroneurophysiology department. On the other hand, the lowest students are the Faculty of Pharmacy and the Faculty of Dentistry. However, while the scores of the Pharmacy Faculty students did not differ statistically in terms of audio-visual aspects, the average score of the Dentistry Faculty students is lower than the Nutrition and dietetics, Electroneurophysiology, Physio Therapy V.S., Health Management, Medical Laboratory Techniques, and Elderly Care departments. According to the gender average of the students participating in the research, the proportion of male students studying in dentistry and participating in the research is 75%, while in other departments it is 30% and below. Therefore, gender can have an impact on these results. However, the absence of a similar result in the departments where the female student ratio is higher, such as the nursing department, shows that different variables are effective on the audiovisual learning style. When this result is analyzed with the correlation results between e-learning styles (Table 9), it is seen that the highest relationship is between the audiovisual learning style and the verbal learning style. The verbal learning style point average of the Nursing students who have more

female students is lower than the other departments. This result may have prevented the emergence of differentiation in favor of nursing department students in terms of visual-cognitive.

In terms of verbal, social, and active learning style, the average score of health management students is found to be the highest, while the verbal cognitive learning style of the dental faculty students is the lowest. This result may be related to the fact that most of the courses of Health Management students consist of theoretical courses related to business, economics, and hospital management. In addition, one of the departments with the highest number of secondary school students is the Health Management Department. So, the high number of people working in the public or private sector may have an impact on the verbal, active, and social learning levels of these students. This result is consistent with the finding (Table 7) that shows working status affects the level of verbal and social learning.

In terms of logical learning style, it is seen that the logical learning style is higher in the departments that accept students with the highest numerical score in the university placement exam (Faculty of Medicine, Dentistry, etc.).

Intuitively, the average score of medical students is higher. These students use their intuition more in problem-solving for the treatment and diagnosis process as well as logical learning. Intuitive learners perform learning in problem solving by separating them from the whole and by associating them with their intuition (Emamepur, Shams, 2007). Students of the physiotherapy and rehabilitation department receive practical training aimed at improving health and quality of life, as well as pain and dysfunction in all kinds of injuries, diseases and aging that cause movement disorders of individuals. For this reason, these departments need more practical and individual learning. The effect of applied courses in these sections on e-learning styles is suggested to be examined in later research.

In the study, it was found that e-learning styles differ according to the type of education (Willems, 2011, Özbaş, 2013). It has been found that secondary education students have higher audio-visual, verbal, social, and independent learning styles, whereas Traditional Education students have higher logical and intuitive learning levels. In faculties, Physiotherapy and Rehabilitation and Health Management departments, as well as in Vocational Schools, Physiotherapy, medical documentation and secretarial, and medical laboratory techniques departments continue their dual education. It can be said that the high independent learning levels of physiotherapy and rehabilitation, physiotherapy, medical documentation and secretarial department students, high level of audiovisual, verbal and social learning of students in health management, physiotherapy and medical laboratory techniques

department, the high logical and intuitive thinking levels of students in medicine, dentistry, nursing and nutrition dietetics department are effective in the emergence of this result.

In the study, it was found that the logical learning level increased with the grade level (Tumkaya, 2012). This result can be said to be effective in higher logical thinking scores of 3rd and 4th year students, with higher numerical scores of higher schools in the university entrance examination. The Intuitive Learning style is a higher-level learning style that can use creativity and emotions that go from whole to pieces. It can be said that the 4th grade students at the faculties started to practice hospital internship, and they could transform these skills into more practice, thus increasing their intuitive learning skills. This result is in line with the findings showing that working status affects intuitive learning level (Jahanbakhsh, 2012).

In the study, it was found that the learning styles of the students differ according to their working status (Zhang and Lambert, 2008). It can be said that the fact that secondary school students work in public and private institutions helps these students to transform their professional knowledge and skills into practice, so their intuitive learning levels increase. In addition, it can be said that the economic situation of these students is relatively better. It is effective in their self-confidence; thus, their verbal and social learning preferences are higher.

In the study, it was found that the learning styles of the students differ according to the degree of graduation (Willems, 2011, Tumkaya, 2012). Visual and auditory learning levels, active learning levels, and logical learning levels of students studying in faculties were higher. On the other hand, it was found that students in Vocational Schools had higher intuitive learning levels. While the internship education in the Vocational Schools starts in 2nd grade, it starts in the 4th grade in the faculties. As seen in the findings of the study status (Table 7), it can be said that the internship training of the students is effective on the intuitive learning levels of these students. It can be said that university placement score types and grade levels are effective in differentiating the Visual-Audio, Active, and Logical learning levels of students between Faculties and Vocational Schools.

In the study, it was found that the highest relation in the bilateral correlations between e-learning styles was between social learning style and active learning style, verbal learning style, and audiovisual learning style (Strayhorn, 2008; Dori and Belcher, 2005). The lowest relationship was found between independent learning style and social and active learning style. In addition, the relationship between logical learning style and verbal learning style was found to be low compared to other bilateral correlations (Diaz and Cartnal, 1999).

One of the important findings of the research is that students' learning styles differ according to the duration of Internet usage. This result is in line with the research findings showing that the problematic Internet usage status affects the written and verbal communication of the student; as the duration of Internet usage increases (Kim et al., 2017), their logical thinking skills and independent learning ability decrease. On the other hand, it can be said that increasing Internet usage time encourages students to group-based learning using online communities and forum or discussion environments.

Recommendations

In this study, the learning styles of health science students in e-learning environments were examined and the effects of different variables were investigated. The results of the research show that female students' preferences of audiovisual and independent learning are higher in e-learning environments, while male students have higher verbal and social learning preferences. It was found that secondary education students had higher audio-visual, verbal, social and independent learning preferences, whereas the Formal Education students' logical and intuitive learning levels were higher. It has been determined that the logical learning level increases with the grade level, and working status influences the intuitive learning level. University placement score types (Numerical-Verbal) and grade level are effective in the differentiation of Faculties and Vocational Schools in terms of Visual and Auditory, Active and Logical learning levels. There is a high relationship between social learning style and active learning style, verbal learning style, and audio-visual learning style. On the other hand, a low level of relationship was found between the independent learning style and the social and active learning style, the logical learning style, and the verbal learning style. It was determined that Internet usage time had a negative effect on the verbal, logical and independent learning preferences of the student, but had a positive effect on the active learning preferences. In addition, it has been concluded that e-learning styles differ according to the departments in which students study.

The results of this research showed that gender, education type, department, class, working status, daily Internet usage time, and degree of graduation affect e-learning styles. For this reason, different methods and techniques suitable for learning styles should be used in content design and teaching design in e-learning environments. On the other hand, due to the lack of qualitative data, the low reliability of electronic exams, the academic achievement scores could not be included in the study, and the low participation rate of 6th grade students at the medical faculty was limited. In

subsequent research, it is recommended to investigate the effect of internship and practice lessons on e-learning styles, to create personalized learning environments suitable for the students' e-learning styles by using pedagogical agents, to conduct experimental researches, as well as to analyze qualitative and quantitative data by including different variables in the research.

About Author

Author: Emin İBİLİ is a faculty member at Afyonkarahisar Health Sciences University. He is the director of the Distance Education Research Center. He received his Ph.D. in Computer Education and Instructional Technology from Gazi University.

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ORCID

Emin İBİLİ https://orcid.org/0000-0002-6186-3710

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