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Exploring the students' attitudes towards e-learning at territory level: a focus on Türkiye

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Abstract

This study aims to examine the attitudes of university students towards e-learning. An explanatory mixed-method design was used in the study, which combines both quantitative and qualitative methods. The quantitative dimension of the study included 930 students studying at Hatay Mustafa Kemal University, while 34 students participated in the qualitative dimension. "Attitude Scale towards E-learning" and "Semi-Structured Interview Form" were used as data collection tools in the study. Descriptive statistics such as arithmetic mean, standard deviation, min and max, as well as independent sample t-test and ANOVA test were used in the analysis of quantitative data. In the analysis of qualitative data, content analysis was used. The findings showed that students had high level of attitude towards e-learning. It was found that male students, students who had prior e-learning experience, home internet access, personal computers, and studying in technical fields had higher attitude towards e-learning. Students stated the strengths of e-learning as providing access from anywhere, ease of access, providing easy access to information, being accessible at any time, enabling to revise the lessons, and providing access to a wide range of information, Students identified the weaknesses of e-learning as poor teacher-student interaction, inequalities opportunities, students' and educators' lack of knowledge. Students identified the problems encountered during the e-learning process as network connection loss, lack of equipment, and lack of internet access. In terms of the development of e-learning, students suggested that equipment support should be provided, internet access should be provided for everyone, training on e-learning should be given, and infrastructure inadequacies should be addressed.

Keywords: E-learning; attitude; attitude towards e-learning; university students

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1. Introduction

1.1. E-learning

With the advancement of information and communication technologies, there have been various changes in every aspect of life, including the process of teaching and learning, leading to the widespread use of various technological tools and resources in the learning process. The growing accessibility of technology and the widespread use of the internet has also led to an increase in demand for web-based learning and teaching (Ninsiana et al., 2022). Additionally, The COVID-19 pandemic has had a significant impact on educational systems worldwide, resulting in lockdowns of schools and universities (Carrillo & Flores, 2020). According to UNESCO data, over 1.5 billion students have been affected by the pandemic, resulting in significant changes to their education. This unprecedented situation has presented unforeseen challenges to educational institutions, which have responded by adopting online learning methods (Mohammadimehr, 2020). As a result, in the educational processes, new methods have begun to be used intensively. Accordingly, electronic learning (e-learning), which allows users to function beyond the limitations of time and space, has come into existence.

E-learning is a broad concept that refers to the transfer of knowledge to learners through electronic systems, either synchronously or asynchronously. While the exact origins of this term are uncertain, it is widely believed that e-learning began to evolve with the increasing use of personal computers and the internet (Wang et al., 2021). E-learning refers to any type of learning that takes place through or with a computer or other digital device, typically over the internet. E-learning can involve a range of multimedia resources, including video and audio recordings, interactive software, and virtual reality environments. The goal of e-learning is to provide flexible and accessible learning opportunities that can be customized to meet the needs of individual learners (Khan, 2005; Clark & Mayer, 2016).

E-learning incorporates various forms of media such as text, film, audio, and engaging visuals to fully engage students in the learning process. It has the potential to enhance the quality of teaching and learning, and to highlight the importance of higher education institutions maintaining a competitive edge. In a global economy, e-learning can increase accessibility to higher education (Alsoud & Harasis, 2021). By utilizing information technology, e-learning has lowered the costs for learners and improved the quality of teaching and learning (Songkram, 2015). This means that students who choose e-learning may be able to save money while still pursuing other valuable activities during their free time (Aparicio et al., 2016). E-learning also offers a great advantage in terms of flexibility, enabling students to access courses from anywhere and at any time. Additionally, it has the ability to incorporate a vast range of interactive resources available on the internet, making it more adaptable to different learning styles (Songkram et al., 2015). Therefore,

it has become a suitable alternative for teaching various courses due to its continuous development, which has opened new opportunities for students, instructors, educational planners, and institutions (Rahimi et al., 2021). From the previously mentioned analysis, it can be stated that incorporating technology enhances the effectiveness and efficiency of the educational setting. To put it differently, integrating technology in the classroom greatly benefits the teaching and learning process (Ayçiçek & Karafil, 2021). However, to ensure effective student learning, it is crucial to move beyond emergency online practices and create high-quality online learning activities rooted in thorough instructional design. In this virtual environment, affective factors such as motivation, anxiety, and attitudes can significantly impact students' learning outcomes (Jiang et al., 2022). Therefore, it is essential to explore and consider these factors when designing and conducting online classes. Attitude is one of the factors that affects the success of e-learning.

1.2. The role of attitude in e-learning

The role of attitudes in understanding how learners use new learning environments is crucial, as attitudes are considered predictors of behavior (Çelik & Uzunboylu, 2022). Attitude refers to an individual's position when establishing a relationship with an object, person, situation, or before initiating a behavior, indicating the state of readiness for action (Dündar et al., 2017). This readiness is associated with an individual's socio-cultural background, prior knowledge, and previous learning experiences (Ojo & Olakulehin, 2006). A group of researchers conducted a study on students' views on e-learning within the context of education. Their findings indicated that the learners' attitudes towards e-learning were highly indicative of their ability to benefit from it to the fullest extent possible, and had an impact on their overall success in using this method of learning (Cinkara & Bagceci, 2013; Erarslan & Topkaya, 2017).

The perception of e-learning can be seen as an overarching concept that encompasses various methods of education that are supported by information and communication technology. This perception is determined by students' opinions on the significance of technology and their level of competence with it. In addition, students' attitudes towards e-learning are influenced by the advantages and disadvantages they perceive from this form of education. A positive attitude towards e-learning increases the likelihood that learners will accept this new mode of education. Several factors, including patience, self-discipline, proficiency in using software, technical skills, and time-management abilities, affect students' attitudes towards e-learning. As a result, their attitude can either be positive if the e-learning system fits their needs and characteristics or negative if they are unable to adapt to it due to a lack of required attributes (Bhatia, 2011). As can be understood, positive attitudes towards e-learning are crucial in ensuring that learners can fully benefit from this mode of education. When students view e-learning as an effective and useful tool for acquiring knowledge and skills, they are more likely to engage with the

material and stay motivated throughout the learning process. This, in turn, can lead to better academic performance and higher success rates in the long run. Moreover, positive attitudes towards e-learning can also promote a sense of comfort and confidence in the use of technology, which is an essential skill in today's digital age. As such, fostering positive attitudes towards e-learning is vital for educators and institutions looking to enhance the effectiveness and accessibility of their educational programs.

1.3. The current study

The COVID-19 crisis has resulted in a range of changes in various aspects of life. As a result of these changes, governments have implemented numerous significant measures in the education sector. In this situation, educational institutions such as schools, colleges, and universities have closed down, leading to a shift towards online teaching as the only available alternative. As other countries around the world, this process has had a significant impact on higher education in Türkiye. With the closure of universities due to the pandemic, the Turkish government and universities rapidly implemented e-learning systems to ensure continuity of education. While the transition has not been without its difficulties, it has highlighted the importance of e-learning in providing access to education during times of crisis.

The increasing use of e-learning technologies during the pandemic has brought attention to the importance of learners' perceptions and attitudes towards e-learning in achieving the desired learning outcomes, as emphasized in various studies in the literature (Cevik & Bakiogli, 2021; Guillasper, Soriano & Oducado, 2020; Kim, Hong & Song, 2019). Therefore, university students' positive attitudes towards this mode of education have become more critical than ever since positive attitudes towards e-learning among university students can improve their engagement and motivation, leading to better learning outcomes, enable them to cope with any unexpected changes in their learning environment. Therefore, it is crucial for universities to promote positive attitudes towards e-learning among their students to ensure their academic success and future career prospects. Based on this, it has due importance to conduct studies to examine the attitudes of university students towards e-learning. In light of this information, this study aims to determine the university students' attitudes towards e-learning in Türkiye. Accordingly, the following sub-problems were sought to be answered:

1. What are the attitudes of university students towards e-learning in Türkiye?
2. Do the attitudes of university students towards e-learning differ in terms of gender, prior e-learning experience, having home internet, having a computer, and program type variables?
3. What are the university students' opinions on the strengths of e-learning?
4. What are the university students' opinions on the weaknesses of e-learning?
5. What are the problems experienced by in e-learning?

6. What are the recommendations of university students for the improvements of e-learning?

2. Method

In this section, details are presented regarding the research model, the participants involved in the study, data collecting tools, the process of collecting data, and the methods of analyzing the obtained data.

2.1. Research Model

In this study, which was carried out to examine the attitudes of university students towards e-learning, mixed research method was employed. The mixed research method provides the opportunity to benefit from the advantages of quantitative and qualitative methods and to reduce their limitations (Johnson & Onwuegbuzie, 2004). There are different designs in the mixed research method. Creswell (2021) divides mixed research designs into three categories: explanatory sequential design, exploratory sequential design, and convergent design. In this study, an explanatory sequential design was used. In an explanatory sequential design, the research starts with a quantitative study and is followed by a qualitative study to explain the quantitative data. The qualitative stage is applied because it is believed that quantitative data alone will not be sufficient to explain the research results (Creswell, 2021). In this study, firstly, a scale was applied to determine the level of attitude of university students towards e-learning. Based on the scores obtained from the scale, the opinions of students with high and low levels of attitude towards e-learning were obtained, and the attitudes of students towards e-learning were tried to be explained.

2.2. Population, Sample and Participants

In this part, data on the population and sample is provided for quantitative data, while participant information is provided for qualitative data.

2.2.1. Population and Sample for Quantitative Data

The population of the study consisted of the students who were enrolled in Hatay Mustafa Kemal University in 2022-2023 the academic year. The sample of the study consisted of 930 students selected from this population using convenience sampling method. This sampling method is a method of determining the most appropriate sample for the purpose of the research in terms of time, cost, and labor (Balcı, 2020; Büyüköztürk et al., 2020). The descriptive data of the students included in the study sample are shown in Table 1.

Table 1. Descriptive Data of the Students in the Sample

Variables	N	%
Gender		
Female	523	56.2
Male	407	43.8
The Studied Department		
Faculty	362	38.9
Vocational High School	568	61.1
Grade		
1st Grade	411	44.2
2nd Grade	328	35.3
3rd Grade	107	11.5
4th Grade	84	9.0
The Studied Program Type		
Social Sciences	364	39.1
Technical Sciences	359	38.6
Health Science	207	22.3
Prior E-learning Experience		
Yes	447	48.1
No	483	51.9
Grade Point Average		
Below 2.00	74	8.0
2.00-2.50	244	26.2
2.50-3.00	321	34.5
3.01-3.50	231	24.8
3.51-4.00	60	6.5
Home Internet		
Yes	737	79.2
No	193	20.8
Having a computer		
Yes	558	60.0
No	372	40.0
Total	930	100

When Table 1 is examined, it is seen that 523 students (56.2%) were female and 407 (43.8%) were male; 362 (38.9%) were studying at the faculty, and 568 (61.1%) at the vocational school; 411 (44.2%) were the first grade, 328 (35.3%) were the second grade, 107 (11.5%) were the third grade, and 84 (9.0%) were the fourth grade. Additionally, 364 (39.1%) were studying social sciences, 359 (38.6%) were studying technical sciences, and 207 (22.3%) were studying health sciences; 447 (48.1%) had prior e-learning experience, while 483 (51.9%) did not have e-learning experience; 74 (8.0%) had a grade point average below 2.00, 244 (26.2%) had a grade point average between 2.00 and 2.50, 321 (34.5%) were in the range of 2.50-3.00, 231 (24.8%) were in the range of 3.00-3.50, and 60 (6.5%)

were in the range of 3.51-4.00. As seen, the majority of students had a computer and internet access at home.

2.2.2. Participants for Qualitative Data

In the study, extreme/outlier sampling, which is one of the purposive sampling methods, was used to get the opinions of the students on e-learning. Extreme/outlier sampling is a sampling type in which those with low and high performance in the same context or application are included in the sampling in cases where problems may arise in terms of sampling due to the large size of the population (Yıldırım & Şimşek, 2018). The most important purpose in this sampling method is to obtain different and original information from dramatic or extraordinary situations (Liamputtong, 2013). In the study, students with low and high attitudes towards e-learning were included in the study to ensure maximum diversity. Within the scope of the research, interviews were conducted with 34 university students. The descriptive characteristics of the interviewed university students are shown in Table 2.

Table 2. Descriptive Data of the Interviewed University Students

Code	Gender	The Studied Department	Grade	The Studied Program	E-learning experience	Grade Point Average	Home Internet	Computer
S1	Female	Faculty	4th Grade	Social	Yes	2.51-3.00	Yes	Yes
S2	Female	VHS	2nd Grade	Health	Yes	3.01-3.50	Yes	Yes
S3	Male	VHS	1st Grade	Health	Yes	2.01-2.50	Yes	Yes
S4	Male	Faculty	1st Grade	Health	Yes	2.01-2.50	Yes	Yes
S5	Female	VHS	1st Grade	Social	Yes	3.01-3.50	Yes	Yes
S6	Female	Faculty	1st Grade	Social	Yes	3.01-3.50	Yes	Yes
S7	Female	VHS	2nd Grade	Social	Yes	2.51-3.00	Yes	Yes
S8	Female	VHS	1st Grade	Health	Yes	2.01-2.50	Yes	Yes
S9	Female	Faculty	3rd Grade	Social	Yes	3.01-3.50	Yes	Yes
S10	Female	Faculty	4th Grade	Social	Yes	3.01-3.50	Yes	Yes
S11	Male	VHS	2nd Grade	Social	Yes	3.01-3.50	Yes	Yes
S12	Female	VHS	1st Grade	Social	Yes	2.51-3.00	Yes	Yes
S13	Female	VHS	1st Grade	Health	Yes	2.01-2.50	Yes	Yes
S14	Female	VHS	1st Grade	Health	Yes	2.51-3.00	Yes	Yes
S15	Female	VHS	2nd Grade	Health	Yes	3.01-3.50	Yes	Yes
S16	Male	Faculty	3rd Grade	Social	Yes	3.01-3.50	Yes	Yes
S17	Female	VHS	2nd Grade	Social	Yes	2.51-3.00	Yes	Yes
S18	Female	Faculty	4th Grade	Technical	Yes	2.01-2.50	Yes	Yes
S19	Female	Faculty	2nd Grade	Social	Yes	3.01-3.50	Yes	Yes
S20	Female	VHS	2nd Grade	Technical	Yes	2.51-3.00	Yes	Yes
S21	Female	Faculty	3rd Grade	Health	Yes	3.51-4.00	Yes	Yes
S22	Female	Faculty	2nd Grade	Health	Yes	2.01-2.50	Yes	Yes
S23	Male	Faculty	2nd Grade	Technical	Yes	2.51-3.00	Yes	Yes
S24	Male	VHS	1st Grade	Social	Yes	2.51-3.00	Yes	Yes
S25	Female	Faculty	1st Grade	Social	Yes	2.51-3.00	Yes	Yes
S26	Female	Faculty	1st Grade	Health	Yes	2.51-3.00	Yes	Yes
S27	Female	VHS	1st Grade	Health	Yes	3.01-3.50	Yes	Yes
S28	Male	Faculty	4th Grade	Health	Yes	3.01-3.50	Yes	Yes
S29	Female	VHS	1st Grade	Health	Yes	3.01-3.50	Yes	Yes

S30	Female	VHS	1st Grade	Technical	Yes	3.01-3.50	Yes	Yes
S31	Female	Faculty	1st Grade	Social	Yes	2.51-3.00	Yes	Yes
S32	Female	VHS	1st Grade	Social	Yes	2.51-3.00	Yes	Yes
S33	Female	VHS	1st Grade	Technical	Yes	2.51-3.00	Yes	Yes
S34	Female	Faculty	1st Grade	Social	Yes	2.51-3.00	Yes	Yes

Note: TC: VHS: Vocational High School

When Table 2 is examined, it is seen that 7 of the participants who provided qualitative data were male, 27 were female, and all of them had prior e-learning experience. In addition, the majority of the students were the first graders, had grade average point between 2.51 and 3.00, were studying in health and social programs in a vocational school, had internet access at home, and had a computer.

2.3. Data collection tools

In this section, information about the data collection tools is provided. The "Attitude Scale towards E-Learning" was used to collect quantitative data, and the "Semi-Structured Interview Form" was used to collect qualitative data.

2.3.1. Attitude Scale Towards E-Learning

In the study, the *"Attitude Scale Towards E-Learning"* developed by Kisanga (2016) and adapted into Turkish by Biçer and Korucu (2020) was used to determine university students' attitudes towards e-learning. There are different scales in the literature for determining attitudes towards e-learning. The reason for using this scale in the study is the belief that it is the most appropriate scale to serve the purpose of the research in line with expert opinions. The scale consists of sub-dimensions of *"Technology Use Tendency"*, *"Satisfaction", "Motivation", and "Usability"*. There are 23 items in the scale, 12 of which are positive and 11 of which are negative. The items of the scale, which is in a 4-point Likert type, is ranged between Strongly Agree: 4, Agree: 3, Disagree: 2, Strongly Disagree: 1. The lowest possible score that can be obtained from the scale is 23, and the highest score is 92. The high mean score obtained from the scale indicates that university students have positive attitudes towards e-learning. In the original study, the Cronbach's Alpha reliability coefficients of the sub-dimensions of the scale were found as .72, .71, .75, and .68, respectively. The Cronbach's Alpha reliability coefficient of the total mean score was found as .78. In this study, the Cronbach's Alpha reliability of the sub-dimensions were found to be .75, .78, .87, and 0.71, respectively. The Cronbach's Alpha reliability coefficient of the whole scale was determined as .88, indicating that the scale is highly reliable (Büyüköztürk, 2020).

2.3.2. Semi- Structured Interview Form

In the study, a semi-structured interview form developed by the researcher was used to obtain the attitudes of university students towards e-learning. In the development process of the form, a draft interview form was created by considering the purpose of the research

and the principles of developing semi-structured interview forms (Yıldırım & Şimşek, 2018). The draft form was sent to four experts, one in qualitative research, two in curriculum and instruction, one in Turkish education. After receiving feedback from the experts, a revision was made to one question in the interview form. The change made in the interview form is as follows:

1. The question *"What are your suggestions for the development of e-learning?"* has been modified as *"What are your suggestions for the use of e-learning in teaching and for the development of e-learning?"*

Finally, pilot interviews were conducted with four university students using the interview form. As a result of these interviews, it was determined that there were no unclear or differently understood questions.

2.4. Data Collection Process

In the study, the data collection tools were printed and filled out by the students in November 2022. The data collection process for quantitative data took about 15 days. Afterwards, the process of collecting qualitative data began. Interviews were conducted with university students who had low and high levels of attitude towards e-learning and had prior e-learning experience. The questions on the semi-structured interview form were explained to the students. It was stated that they could ask questions. In addition, students were asked to write explanatory and long answers instead of short ones when filling out the form. Explanations were given to students who requested information about the questions in the interview form. The qualitative interviews lasted for about a week.

2.5. Data Analysis

In the study, the mean scores obtained from the scale were used as the basis for the analysis of quantitative data. Prior to calculating the mean scores, the negative items were reverse-coded. Descriptive statistics such as arithmetic mean, standard deviation, minimum and maximum were used to calculate the levels of university students' attitudes towards e-learning. The levels of university students' attitudes towards e-learning were divided into five levels by using the formula Score Range = (Highest score - Lowest score)/5 (Güvendi & Serin, 2019; Kaplanoğlu, 2014). According to this formula, the score range was determined as (4-1)/5=0.8. According to this calculation, regarding the level of attitude of university students towards e-learning, the scores between 1 and 1.59 was determined as very low, between 1.60 and 2.19 as low, between 2.20 and 2.79 as moderate, between 2.80 and 3.39 as high, and between 3.40 and 4.00 as very high (Kozikoğlu & Özcanlı, 2020).

In order to determine the data analysis to be used in the study, the distribution of the data was examined. Interpretation of the distribution of data, skewness and kurtosis values for each variable in the sub-problem, as well as the results of Shapiro-Wilk and

Kolmogorov Smirnov analysis were examined, which are presented in the findings section. Since the skewness and kurtosis values were between -1.5 and +1.5 (Tabachnick & Fidell, 2013) and the significance level was higher than .05 (p>.05) in Shapiro-Wilk and Kolmogorov Smirnov analyzes, it was concluded that the data showed normal distribution. For this reason, parametric tests were used in the analysis. Independent sample T-test was used to determine whether university students' attitudes towards e-learning differed significantly according to their gender, e-learning experience, having home internet and having a computer. ANOVA test was used to determine whether university students showed significant difference according to the type of the program they studied. The homogeneity of the variances was examined to determine the post hoc analysis to be used to see between which groups the significant difference was. As a result of the Levene test, it was determined that the data were homogeneously distributed (p>.05). For this reason, Scheffe test was used to determine the significant difference between the groups.

In the study, content analysis technique was used in the analysis of interviewed data. Content analysis technique is expressed as a technique in which themes, categories and codes are systematically created by using words or phrases to reflect the essence of the content in a text (Büyüköztürk, et al., 2020). The main purpose of content analysis is to reach the concepts that can explain these data and the relationships between these concepts to explain the data obtained as a result of the interview (Yıldırım & Şimşek, 2018). The data obtained from the interviews were transferred to a Microsoft Word document. These documents were subjected to content analysis using a qualitative data analysis program. Descriptive codes are given to the data in the document. In the next stage, the common aspects of these codes were determined and grouped under categories. After the codes, categories and themes were created, the data was reviewed again for last time. In this process, it was checked whether the codes were correct, whether the themes were correct, whether the codes were under the appropriate theme, and necessary corrections were made. Interview data were presented in the findings section using frequency (f) and interviewer codes. For university students, codes such as S1 (Student1), S2, S3 …., S34 were used. The analysis of the interview data for encoder reliability was carried out by two different researchers. Then the percentage of agreement between the analysis results of the researchers was calculated (Miles & Huberman, 1994). As a result of this calculation, it was determined that the percentage of agreement was 94%. After this process, the researchers came together, and the findings were compared, and a consensus was reached on the inconsistent findings.

3. Findings

The findings obtained are presented in this section in line with the sub-problems of the study. The analysis results for determining the level of students' attitudes towards e-learning are given in Table 3.

Table 3. Descriptive Data for Attitude Scale Towards E-learning

Variable	Sub-dimensions	N	Min	Max	$\bar{X}$	Sd	Skewness	Kurtosis
Attitude Towards E-Learning	Tendency to Use Technology	930	1.16	4.00	2.95	.53	-.100	.022
	Satisfaction	930	1.00	4.00	2.90	.56	-.229	.437
	Motivation	930	1.00	4.00	2.82	.62	-.199	.211
	Usability	930	1.50	4.00	2.65	.42	.087	.060
	Attitude Towards E-Learning	930	1.39	3.95	2.83	.42	.140	.378

When Table 3 is examined, it is seen that the skewness and kurtosis values of the scale are between -1.5 and +1.5, which indicates that the data showed normal distribution (Tabachnick & Fidell, 2013). When the findings in Table 3 are evaluated, it can be said that the students' attitudes towards e-learning are at high level ($\bar{X}$=2.83). In addition, the scores obtained from students' tendency to use technology ($\bar{X}$=2.95), satisfaction ($\bar{X}$=2.90), motivation ($\bar{X}$=2.82), and usability ($\bar{X}$=2.65) sub-dimensions of the scale were also found to be at high level. The findings on whether the students' attitudes towards e-learning differ significantly according to the gender variable are given in Table 4.

Table 4. Analysis Results of Attitudes towards E-learning by Gender Variable

Variable	Gender	N	$\bar{X}$	S	sd	t	p
Attitude Towards E-Learning	Female	523	2.76	.39	818.182	-5.431	.000*
	Male	407	2.91	.44			

* p<.05

When Table 4 is examined, it is seen that the e-learning attitude levels of the students show significant difference according to gender variable ($t_{(818.182)}$ = -5.431, p<.05). When the mean scores are examined, it is seen that mean scores of the males ($\bar{X}$=2.91) are higher than female students ($\bar{X}$=2.76). Based on this finding, it can be said that male students' attitudes towards e-learning are higher than female students' attitudes towards e-learning. The results of the analysis regarding whether the students' attitudes towards e-learning differ significantly according to the e-learning experience variable are given in Table 5.

Table 5. Analysis Results of Attitudes towards E-learning by E-Learning Experience Variable

Variable	E-learning Experience	N	$\bar{X}$	S	sd	t	p
Attitude Towards E-Learning	Yes	447	2.87	.46	865.182	2.998	.003*
	No	483	2.79	.37			

* p<.05

Tablo 5 shows that the e-learning attitude levels of the students show significant difference according to e-learning experience variable ($t_{(865.182)}$ = 2.998, p<.05). It is seen that the mean scores of the students who had e-learning experience ($\bar{X}$=2.87) were higher than the students who had no e-learning experience ($\bar{X}$=2.76). The findings on whether the

students' attitudes towards e-learning show significant difference according to having home internet variable are given in Table 6.

Table 6. Analysis Results of Attitudes towards E-learning by Having Home Internet Variable

Variable	Home Internet	N	$\bar{X}$	S	sd	t	p
Attitude Towards E-Learning	Yes	737	2.86	.42	928	4.245	.000*
	No	193	2.71	.37			

* p<.05

Tablo 6 shows that the attitude level of the students towards e-learning shows significant difference in terms of having home internet variable ($t_{(928)} = 4.245$, $p<.05$). When the mean scores are examined, it is seen that the mean scores of the students who had home internet ($\bar{X}=2.86$) were higher than the those who did not have home internet ($\bar{X}=2.71$). Based on this finding, it can be said that the level of attitude towards e-learning of students who had internet at home was higher than the level of attitudes towards e-learning of students who did not have internet at home. The results of the analysis on whether the students' attitudes towards e-learning show significant difference according to having a computer variable are given in Table 7.

Tablo 7. Analysis Results of Attitudes towards E-learning by Having Computer Variable

Variable	Having Computer	N	$\bar{X}$	S	sd	t	p
Attitude Towards E-Learning	Var	558	2.89	.43	868.473	9.091	.003*
	Yok	372	2.73	.37			

* p<.05

The findings show that the attitude level of the students towards e-learning shows significant difference in terms of having a computer variable ($t_{(868.473)} = 9.091$, $p<.05$). It was found that the mean scores of the students who had computer ($\bar{X}=2.89$) were higher than the students who did not have a computer ($\bar{X}=2.73$). Accordingly, it can be said that the level of attitude towards e-learning of students who had a computer is higher than the level of attitudes towards e-learning of students who did not have a computer. The descriptive analysis data on whether the students' attitudes towards e-learning differ significantly according to the type of program studied are shown in Table 8.

Table 8. Analysis Results of Attitudes towards E-learning by the Type of Program Studied Variable

Variable	Group	Program Type	N	$\bar{X}$	S
Attitude Towards E-Learning	1	Social Sciences	364	2.77	.39
	2	Technical Sciences	359	2.91	.41
	3	Health Sciences	207	2.78	.45

When Table 8 is examined, it is seen that the mean scores of students obtained from attitudes towards e-learning scale differ from each other according to the type of program

studied variable. The results of the analysis conducted to determine whether this difference between the mean scores is significant are given in Table 9.

Table 9. Analysis Results of Attitudes towards E-learning by the Type of Program Studied Variable

Variable	Source of Variance	Sum of Squares	sd	KO	F	p	Difference
Attitude Towards E-Learning	Between G.	4.069	3	2.035	11.649	.000*	2>1 2>3
	Within G.	161.910	927	.175			
	Total	165.979	929				

* p<.05

According to the findings in Table 9, it was determined that the students' attitude scores towards e-learning differed significantly in terms of the studies program type [$F_{(3,927)}$ =11.649, p<.05]. As a result of the analysis, it was determined that the attitudes of the students studying in technical sciences is higher than the students studying in social sciences and health sciences. The opinions of university students on the strengths of e-learning are given in Figure 1.

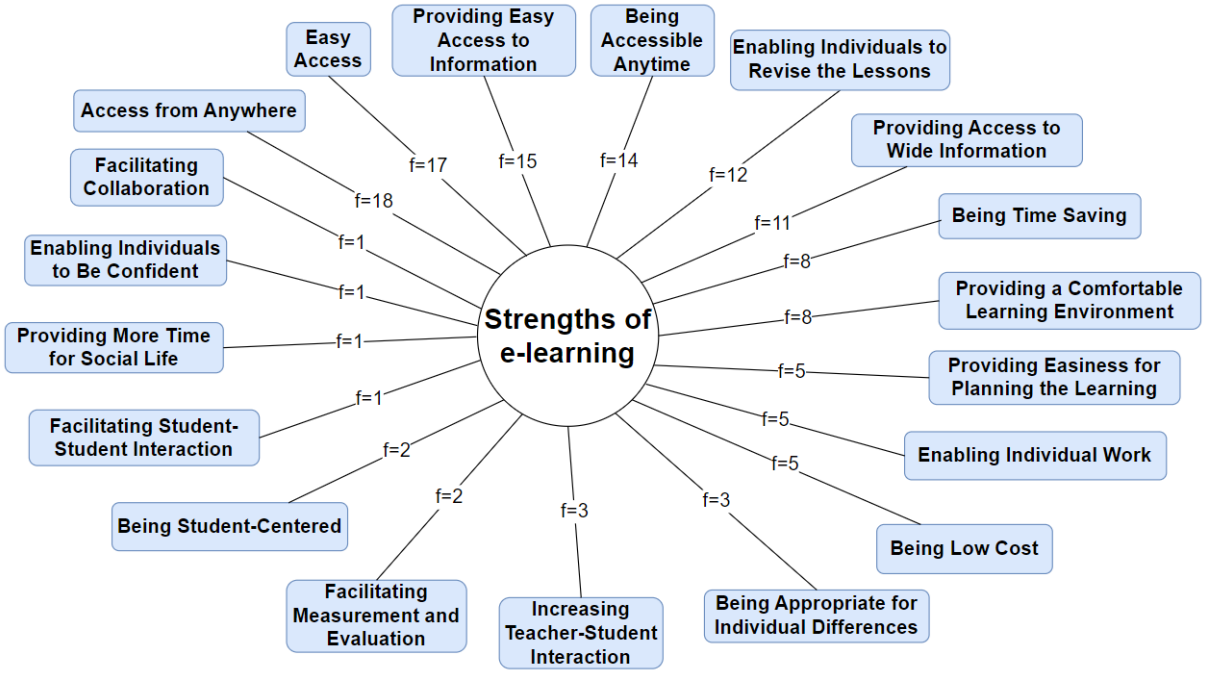

Figure 1. Strengths of e-learning

As seen in Figure 1, students listed the strengths of e-learning as: the providing access from anywhere, ease of access, providing easy access to information, being accessible at any time, enabling to revise the lessons, providing access to a wide range of information,

saving time, providing a comfortable learning environment, providing easiness for planning the learning, enabling individual work, being low-cost, being appropriate for individual differences, increasing teacher-student interaction, facilitating measurement and evaluation, being student-centered, facilitating student-student interaction, providing more time for social life, enabling individuals to be confident, and facilitating collaboration. Some quotes from students' opinions on this topic are given below:

S14: "*Among the strong points of e-learning is the advantage it provides for individuals who are unable to come to school and live in remote areas such as villages far from city centers."*

S15: *"The benefits for students include no time constraints, no location restrictions, the ability for each student to learn at their own pace and to access the desired information more easily. It enables them to make their learning flexible and progress in a disciplined manner."*

S22: *"There is no hassle of getting ready to go to school, we listen to the lesson comfortably from where we sit, and only the voice of the teacher is heard, there is no other voice coming in and out. We can also listen to it later without the worry of being late."*

S29*: "There is no limit to time, place, or duration. It saves labor and budget because additional costs such as transportation to a location are eliminated. E-learning is budget-friendly."*

S2: *"In addition, it makes things easier for individuals with physical disabilities."*

S21: *"Ease of transportation is paramount. Therefore, it saves time. It enables instant access to information."*

S28: *"Although not as effective as books and face-to-face education, I can access information quickly and cheaply."*

S10: *"Through e-learning, problems arising from individual differences can be eliminated, as some students understand a lesson better by listening to it multiple times, and e-learning provides this opportunity. The ability of e-learning to allow a lesson to be watched multiple times is a significant advantage."*

S9: *"The learning speed and understanding levels of all students are different. Thanks to e-learning, we have the chance to watch a lesson multiple times, so I am in favor of e-learning."*

S25: *"E-learning provides us with time savings. It brings knowledge to us without wasting time on the road. At the same time, I think it helps us to find the resources we want."*

S31: *"The opportunity for people to receive education at their desired time and pace is an advantage for them."*

S18: *"It has strong aspects such as opportunities for collaboration, communication with people in other countries, and assisting in knowledge transfer."*

The opinions of university students on the weaknesses of e-learning are shown in Figure 2.

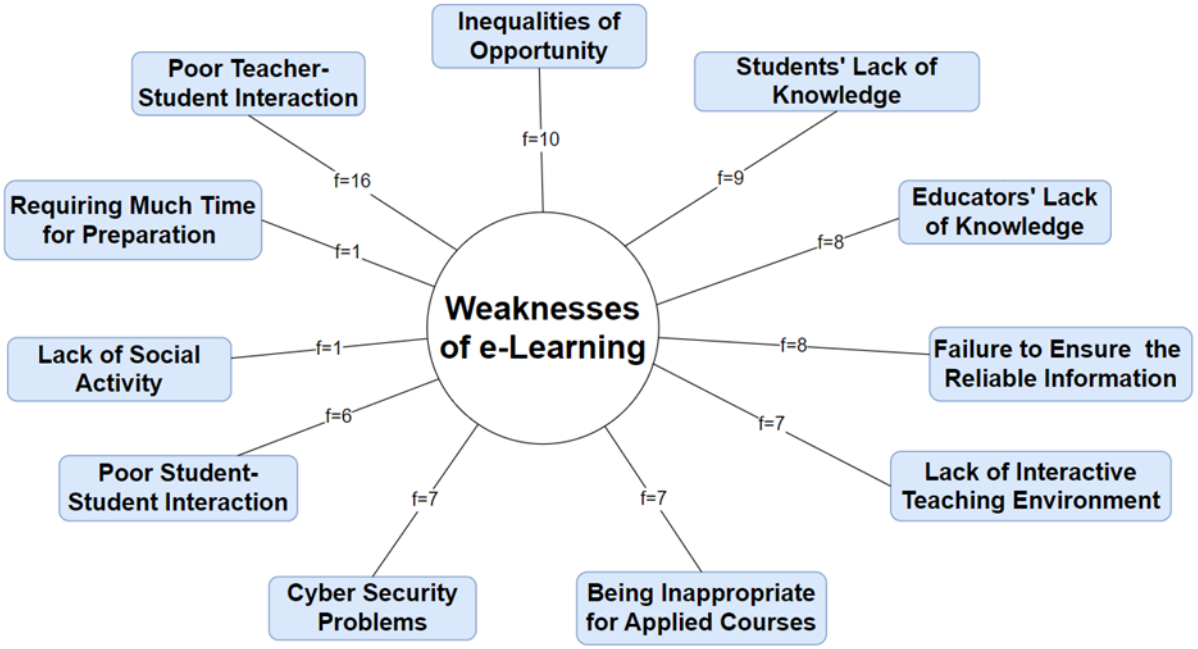

Figure 2. Weaknesses of e-Learning

As seen in Figure 2, the students expressed the weaknesses of e-learning as follows: poor teacher-student interaction, inequalities opportunities, students' and educators' lack of knowledge, failure to ensure reliable information, lack of interactive teaching environment, being inappropriate for applied courses, cyber security problems, poor student-student interaction, lack of social activities, requiring much time for preparation. Below are some quotes from students regarding students' opinions.

S14: *"I am a supporter of the learner and teacher having not only an exchange of information but also an emotional and social bond by facing each other more often. I think computers or tablets kill the love and connection between individuals. I prefer the best education to be based on face-to-face intimacy and love. E-learning is only an example of how robotic individuals can find their way more quickly."*

S10: *"The fact that not every student has the same opportunities. Some individuals are deprived of their right to education due to problems such as lack of internet access or not having a computer."*

S18: *"The instructors not knowing how to explain what an effective e-learning experience is or how to deliver it, the instructors and students having insufficient knowledge about e-learning and not wanting to learn about it, the instructors not knowing how to transfer the course content and notes to the online platform. Another problem is that it takes up too much of the instructors' time. Preparing and uploading course materials is a time-consuming and laborious task."*

S13: *"We can reach multiple results on the same subject and cannot be sure which one is correct.*

S20: *"I also think that the environment plays a very effective role. E-learning cannot provide the same impact as the classroom environment. I believe that the interaction within the class is low in this method."*

S22: *"It is not appropriate for courses that involve practical applications, face-to-face education is a must because seeing and feeling the knowledge makes it easier to retain and learn."*

The opinions of university students regarding the problems encountered in the e-learning process are given in Figure 3.

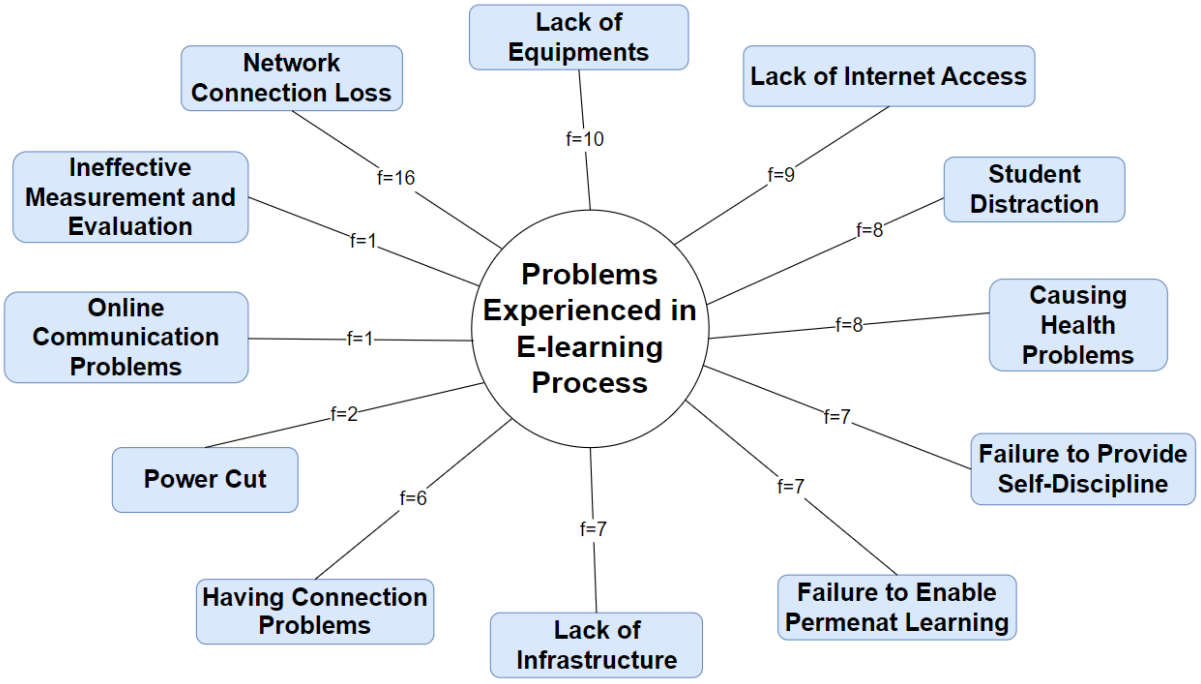

Figure 3. Problems Experienced in E-learning Process

As seen in Figure 3, students expressed the problems encountered during the e-learning process as network connection loss, lack of equipment, lack of internet access, students' distractions, health problems, failure to provide self-discipline, failure to enable permanent

learning, lack of infrastructure, connection problems, power cut, online communication problems, and ineffective measurement and evaluation. Some of students' opinions on this theme are given below.

S19*: "Due to insufficient infrastructure, we have difficulty in accessing information and therefore cannot understand. During internet interruptions, the sound goes on and off, and this is a very disturbing situation."*

S8: *"Internet disruptions and power cuts can interrupt education. If you don't understand something at that moment, you cannot ask questions in time."*

S2: *"The problems experienced in the process can be attributed to the inability of people with financial difficulties to access the internet or to obtain the necessary tools and equipment, as well as the existence of regions without infrastructure."*

S30: *"The adaptation process can be difficult. There is always a distraction in front of the screen. It can also cause eye problems. It can also cause communication problems in cities."*

S25: *"Trying to focus on online classes for a long time is very difficult. The light from the computer tires us and makes us sleepy after a while. Although it is a low probability, being exposed to radiation for a long time endangers our health. Another problem is that during the e-learning process, students usually listen to classes while lying down, which causes another carelessness and inefficiency."*

S34: *"The lack of sufficient support for students who do not have self-learning responsibility is one of the most important problems in the e-learning process."*

S18: *"The lack of variety and inadequacy of assessment types, as well as their limited effectiveness."*

The recommendations of university students on how to improve e-learning are given in Figure 4.

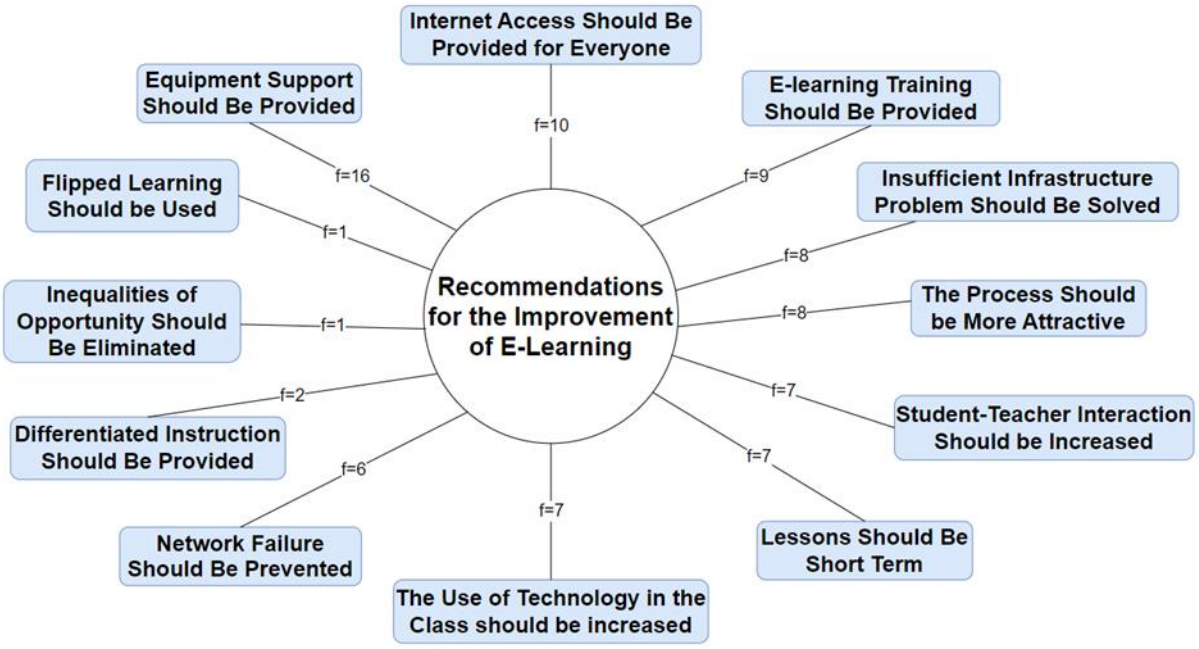

Figure 4. Recommendations for the Improvement of E-Learning

As seen in Figure 4, students made suggestions regarding the improvement of e-learning, including providing equipment support, ensuring internet access for everyone, providing training on e-learning, resolving infrastructure deficiencies, making it more interesting, increasing teacher-student interaction, keeping lessons short, increasing the use of technology in class, preventing network failure, conducting differentiated instruction, eliminating inequalities of opportunities, and using flipped learning. Here are some sample quotes from students:

S18: "*Ensuring students' free and easy access to the internet. Additionally, technological equipment support should be provided to teachers and students".*

S28: *"To provide fast and secure access to the internet, provide assistance for university students to obtain computers. Teachers need to develop themselves more."*

S29: *"Technical training and support should be provided to educators and students. Because if they don't know how to use technology, they can fall behind in education."*

S1: *"More infrastructure deficiencies need to be addressed."*

S27: *"Infrastructure should be developed, and abundant animation should be used."*

S19: *"Visuals can be used frequently to make the teaching even more enriching, and the subjects can be made more interesting."*

S23: *"In this process, a more beneficial e-learning can be observed by asking questions in a mutual question-and-answer format during each lesson for each student, conducting activities to increase communication among students, and resorting to repeated explanations."*

S32: *"If efficient learning is desired, lesson times must be kept short, and cameras must remain on to ensure interaction between teacher and student."*

S10: *"This situation can be turned into an advantage by teaching lessons more in sync with technology."*

S9: *"It may be ideal for teachers who want to use the flipped learning method."*

4. Results, Discussion and Suggestions

It was obtained that students' attitudes towards e-learning were at high level. There are different reports on students' attitudes towards distance learning across different studies. While some studies have found that students hold positive attitudes towards distance learning (Mathew & Chung, 2020; Erdel, 2022), others have reported negative attitudes (Yurdal et al., 2021; Liu et al., 2022). Some studies have suggested that students' attitudes were at moderate level (Akcil & Bastas, 2021). Unger and Meiran (2020) also indicated that the shift to distance learning has caused anxiety for some students. As can be seen, there are various studies in the literature on attitudes towards e-learning with different findings. Students' attitudes towards e-learning at universities can vary depending on various factors. Some students may prefer e-learning due to its flexibility and convenience, allowing them to balance their academic commitments with work, family, or personal obligations. Others may prefer traditional classroom learning due to the social interaction, collaborative learning, and face-to-face interactions with instructors. Moreover, students' attitudes towards e-learning can also be influenced by their prior experience with online courses, their technological literacy, and their learning style. Overall, universities need to be aware of these differences in attitudes and preferences towards e-learning and provide a range of options that cater to the diverse needs and learning styles of their students. Additionally, students' positive attitudes towards e-learning among university students can have several benefits such as higher engagement and motivation, leading to better learning outcomes. Therefore, it is crucial for universities to promote positive attitudes towards e-learning among their students to ensure their academic success and future career prospects.

It was also examined whether students' attitudes differed by gender variable. The findings showed that the attitudes of male students were higher that the female students. In some studies (Ateş & Altun, 2008; Barış, 2015; Rhema & Miliszewska, 2016; Yıldız, 2016; Özaydın Özkara & İbili, 2021) no statically significant difference was found between the female and male students' attitude scores towards e-learning. However, in some

studies, male students' attitudes towards online learning were more positive than female students (Ausburn et al., 2009; Johnson, 2011; Fidan, 2016; Yenilmez et al., 2017; Kaban, 2021). There is a significant body of literature that has identified a variety of social and biological differences between males and females. The use of technology for learning has been an extensively studied topic in relation to gender differences (Kahveci, 2010). Previous research has found that using technology for learning is more commonly observed among males and that males generally have more positive attitudes towards using technology for learning than females (Kadijevich, 2000). Additionally, when given equal access to technology, females are less likely to use computers for learning because they perceive it as a predominantly male activity (Hwang et al., 2009; Kirkup, 1995).

The findings indicated that previous e-learning experience was a significant variable affecting students' attitudes towards e-learning. Accordingly, students who had e-learning experience had higher positive attitudes towards e-learning than those with no e-learning experience. Therefore, it becomes clear that prior e-learning experience is crucial in shaping students' attitudes towards e-learning. Students who have previously engaged in e-learning activities tend to have more positive attitudes towards this mode of learning. One reason for this may be that familiarity with e-learning tools and techniques can reduce the anxiety and stress associated with the learning process. By recognizing the importance of previous e-learning experiences, educators can provide appropriate support to students, enabling them to acquire the necessary skills and knowledge to succeed in an online learning environment. Sánchez and Karaksha (2022) found that students who had received computer training before showed significantly greater confidence in connecting to the internet compared to those who had not received any previous computer training. According to Popovici and Mironov (2015), students who had more experience using technology in their daily lives were generally more positive about e-learning programs. They also discovered that students who had previous e-learning experiences were more likely to be open to using these learning tools. As a result, it is crucial to conduct an introductory workshop before the course begins, to provide students with the necessary skills and ensure their comfort in using the e-learning resources.

Similar to this finding, it was also obtained that the attitudes of the students who had home internet and personal computer were higher than those who did not have home internet and a personal computer. In order for distance learning to be effective, it is necessary to have a suitable internet connection and technical infrastructure and to be able to use it (Işık et al., 2021). A study carried out by Karadağ and Yücel (2020) on 17,939 students found that only 63% of undergraduate students had access to internet at home and many did not have a computer or tablet. The quality of hardware and internet connection speed significantly impact the efficiency of synchronous and asynchronous class attendance. One-quarter of the students stated that they could not continue their

education due to a lack of internet or a computer/tablet. The findings obtained in this study proves the importance of having required devices in e-learning process.

Students' opinions were taken on the strengths of e-learning. Students mostly (*f*=18) indicated that e-learning environment provided access from anywhere, followed by easiness of access (*f*=17) and providing easy access to information (*f*=15). When the literature is examined, it is seen that the flexibility of the e-learning environment in terms of providing access from everywhere is stated in various studies (Al-Fraihat et al., 2020; Mukhtar et al., 2020; Keis et al., 2017; Keegan, 2013; Zhu, 2012; Siemens, 2005). As seen, one of the most significant strengths of e-learning is its ability to provide access from anywhere, which has revolutionized the way education is delivered and received. With e-learning, students can access learning materials from anywhere in the world as long as they have an internet connection, which has opened up opportunities for people who are unable to attend traditional brick-and-mortar schools due to various reasons such as distance, financial constraints, or health issues. Therefore, e-learning is flexible and convenient, as learners can access course materials and complete assignments at any time, making it easier for them to balance their studies with work or other responsibilities. In summary, it can be argued that the strengths of e-learning in terms of providing access from everywhere have expanded educational opportunities, made learning more flexible and convenient.

Students also mentioned about the problems of e-learning process. Network connection loss, lack of equipment, lack of internet access were among the main problems stated by the students. Similarly, when students' opinions on the problems they experienced during e-learning were examined, it is seen that they mostly expressed the problems as network connection loss, lack of equipment, lack of internet access. Önalan and Kurt (2020) concluded that limited access to technological resources is a notable barrier of online classes. Additionally, the results obtained in both international (Abdolreza Gharehbagh et al., 2021; Kutah, 2021; Subedi et al., 2020; Thapa et al., 2021) and national (Eren et al., 2021; Terkeş & Yamac, 2021) studies indicated that infrastructure and technology-related issues constitute a significant part of the negative experiences encountered in the e-learning process. Similarly, in some studies (Shi et al., 2022; Guo & Wen, 2021) lack of learning materials, limited access to the internet through a mobile phone or other devices were among the self-reported reasons for negative opinions on online learning. Therefore, it becomes more apparent that despite its many strengths, e-learning has some notable weaknesses that can impact its effectiveness. One such weakness is the vulnerability to network connection loss, which can be a major issue for students who rely on a stable internet connection to access learning materials and participate in online classes. This can be particularly challenging for students in remote areas with limited access to high-speed internet or for those who cannot afford reliable internet service. Another weakness of e-learning is the lack of equipment, which can limit students' ability to participate in online classes, complete assignments, or access digital resources. This can be especially

problematic for students who come from low-income households or who live in areas with limited access to technology. Finally, the lack of internet access is another significant weakness of e-learning, as it can prevent students from participating in online classes or accessing digital learning resources altogether. These weaknesses underscore the importance of addressing the digital divide and investing in the infrastructure necessary to ensure equitable access to technology and internet services for all learners.

Within the last sub-problem of the study, it was aimed to determine the students' recommendations for the improvement of e-learning. Students recommended providing equipment support, ensuring internet access for everyone, providing training on e-learning, and resolving infrastructure deficiencies for the improvement of e-learning. As seen, students made recommendations based on the problems they encountered during e-learning. Ensuring access to e-learning requires a multi-faceted approach that involves equipment support, internet access, training, and infrastructure improvement. First and foremost, providing equipment support such as laptops, tablets, or mobile phones is essential for individuals to participate in e-learning. Second, ensuring internet access is crucial for accessing online resources, communicating with teachers and classmates, and participating in live sessions. Moreover, providing training on e-learning tools and techniques is essential to enable individuals to navigate the digital learning environment effectively. Finally, resolving infrastructure deficiencies such as electricity supply and network coverage can make a significant impact on the quality of e-learning experiences (Brindley et al., 2009; UNESCO, 2020; UNDP, 2020). Therefore, by addressing these issues, we can improve access to e-learning and enhance the quality of education for all.

Results of this study confirmed that the majority of the students exhibited high level of attitudes towards e-learning. Additionally, male students' attitudes towards e-learning were found to be higher than female students' attitudes towards e-learning. Moreover, the role of having prior e-learning experience, home internet and personal computer on the attitude level of university students towards e-leaning was indicated in the study. Therefore, this study has strengthened the idea that students' attitude level can decrease when they do not have the required devices in the e-learning learning process. Therefore, this research can shed light for policy makers, curriculum developers, and teachers who desire to bring positive attitude level the university students to desired level.

In this study, it was obtained that male students' attitudes towards e-learning were found to be higher than female students' attitudes towards e-learning. Therefore, the reasons affecting the lower level of attitude level of the female students should be investigated, and female students should be provided the required support. Based on the quantitative and qualitative results of this study, it is recommended that to enhance the quality of e-learning and increase positive attitudes among university students, technological support should be provided, and infrastructure should be improved. Additionally, enhancing infrastructure such as high-speed internet connectivity, a reliable

electricity supply should be ensured to improve the quality of e-learning experiences. Furthermore, considering that improving the infrastructure for e-learning can lead to a more positive perception of e-learning among university students and the importance of positive attitudes of university students in the effectiveness of e-learning, students should be provided technological assistance should be given to students when necessary, so they have increased level positive attitudes.

This study lacks information regarding the factors affecting university students' positive attitudes towards e-learning. In the further studies, the factors affecting attitudes towards e-learning among university students can be conducted. This study is also limited to at a state university in Türkiye. More comprehensive studies can be conducted by including more students studying at different universities in Türkiye, and the results can be compared.

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