Measuring Change in Undergraduate Students' Attitudes towards On-line Exams Depending on Gender and Some Technological Variables

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ABSTRACT

The purpose of this study is to determine and compare how undergraduate students' attitudes towards on-line exams vary depending on gender and some technological variables. This study was carried out by using a survey method. As data collection tool, the Undergraduate Students Attitude Scale Towards On-line Exams which consists of 21 items, each with five response alternatives covering attitudes of undergraduate students towards on-line exams was used. Scale was developed by Author & Author (2022).In this research, scale was administered to 1361 undergraduate school students from four different universities 2020–2021 academic year in Turkey. The convenience sampling method was used for selecting participants. The data were analyzed by One-Way ANOVA and independent-sample t- tests using a statistical package program (SPSS 10.0). As a result, Wi-Fi-using undergraduate students had higher attitude scores in Taking Precautions, Individual Characteristics dimensions and in total scores of USASOE. Female undergraduate students had higher attitude scores in the Taking Precautions dimension. Moreover, students who spend more hours on the internet had higher attitude scores and in on-line exams computer using students also had higher attitudes.Finally, in the Taking Precautions dimension, students who always or sometimes attend on-line courses had more positive attitudes than the ones who never attend on-line courses.

Keywords: *On-line exam, undergraduate student, attitude*

INTRODUCTION

For many years in the global world, change has been experienced in all areas of life with the development of technology.From industry to health, from science to community. One of them is also education. These changes caused the educational environment to gain a more dynamic, different and dynamic structure. Moving from a traditional classroom to on-line environment, student and teacher interaction, communication, academic paradigms, learning processes and assessment techniques fundamentally changed. With the support of technology, traditional education has left its place to modern education practices (Twigg, 2003). In information society, using more on-line teaching tools, which have no time and place limits, are low-cost and student-oriented, makes learning more effective, and enables information to be conveyed, shared and spread to large masses. Therefore, on-line education, which

completes and supports formal education, increases its importance gradually (Kırali & Alcı, 2016).

Unlike traditional education, on-line technologies have created diversity in education by providing easy access to many resources at the same time, providing students with an opportunity to learn at their own pace, and have created the opportunity to research, analyze and generate information by giving responsibility to the student within constructive approach (Akgün, 2018). On-line education provides students with easy and fast access to the information they want at any time by helping students within the scope of lifelong learning, and has become one of the most essential learning environments that provide new and rich learning experiences for students (Durmuş & Bağcı, 2013). Therefore on-line education presents many advantages to the students. Considering the advantages mentioned above, it is clear how beneficial on-line education is. However, on-line assessment, an critical stage of educationan important educational stage of education, reveals a different structure. In on-line assessment, determining the effectiveness of learning becomes difficult unless the student is actively participating in a virtual classroom. Students need to participate in activities such as discussions, homework, performance, quizzes or group work. However, most of the time, students are reluctant to attend classes in the virtual environment for some reasons.

On-line assessment is more complicated than traditional assessment. Recording the number of times a student attends a lesson, how long they completes study, and how many times a student was absent are all difficult apart from teaching in the technological environment. However, the important thing is to determine what and how much a student learned with the education they received on the computer. A positive attitude toward on-line technologies and web-based teaching makes on-line education function smoothly and be beneficial (Akgün, 2018).

On-line Exams

Hamed and Abdullatif (2017) define the on-line exam as a web-based exam where exams are administered over the internet or intranet using a computer system. The main purpose of this is to not only reduce the time required but also to obtain fast and accurate results by effectively evaluating students with a fully automated system. In another definition, on-line exam can be expressed as the use of a computer in any summative, formative or diagnostic assessment process (JISC 2006), in this case, on-line exams are submission of an on-line assignment, assessment of an e-portfolio, examination of a blog post, an audio file or exams in computer environment in general (Jordan, 2013). Trivedi, (2010) adds that it enables larger groups of students to take the exam at the same time, Kawachi (2003) states that on-line education is a structure that provides faster feedback to students, Sarrayrih and Ilyas (2013) focus that on-line exams are less tiring than face-to-face exams for teachers, and Terzis and Economides (2011) indicate that they are more advantageous than face to face exams. However, despite these definitions and advantages, instructors may be reluctant to use on-line exams, depending on scalability and security. Scalability is not a problem if the student brings their device, exam security is seen as the biggest obstacle of on-line exams (Sindre & Vegendla, 2015). For security Cluskery, Ehlen, and Raiborn (2011) indicate that on-line exams are accessible exams for a long time for students; however, this extended period should be followed carefully and arranged in a way that prevents students from cheating. To solve this problem, Oskar and James (2008) suggest proctored testing in on-line exams. On-line exams administered in a proctored environment can eliminate academic dishonesty between these and face-to-face exams.

On-line exams have progressed depending on developments in information technology and the internet.On-line exams' success reflects on-line education's success (Aye & Thwin, 2008). Therefore, students should be guided in on-line exams and exams should be appropriate to student level. They should be designed based on a specific plan and strategy (Arend, 2006). In on-line exams, similar to traditional education, problems such as insufficient knowledge about measurement and assessment processes, instructors' lack of time problem, and inadequate measurement and assessment studies in institutions are encountered (Retnawati, Hadi & Nugraha, 2016). When studies in the literature are examined it is clear that there are studies that focus on the comparison of on-line and traditional assessment (Parsons-Pollard, Lacks & Grant, 2008), security in on-line exams (Ramu & Arivoli, 2013; Yi-qi (2010), problems in on-line education (Roberts & McInnerney, 2007), assessment in on-line education (Alley & Jansak, 2001), motivation in on-line education (Kawachi, 2003). There is limited study in the literature to determine students' attitudes toward on-line

exams. Determining students' attitudes can be helpful to solve problems related to on-line exams and can shed light to educators to take precautions for suggesting solutions to these problems.

The aim of this study is to investigate the attitudes of students towards on-line exams depending on gender, daily internet usage, on-line course attendance, internet connection and technological device variables. Literary review indicated that gender, having PC and use of internet were investigated as variables that affect e-learning (Cheng, 2006; Keller & Cernerud, 2002; Roca et al., 2006; Bertea, 2009; Zabadi & Al-Alawi, 2016). Some studies emphasize that female students adopt technology easily than males (Egbo et al. 2011; Sacks & Bellisimo, 1993; Silverman & Pritchard, 1996), some others (Liaw & Huang, 2011; Bame et al., 1993; Boser, Palmer & Daugherty, 1998) claim that males are more positive towards technology than females. However, Burn, (1996) and Oakes (1994) stated that the accepted prior knowledge about the attitudes of females or males should not be adopted as correct without question. Similarly, when the technological variables are examined in literature the previous research present some clues. Attending online courses can be an important factor in attitudes towards on-line exams. Since in their study Cabı and Kalelioğlu (2019) claim that courses taken through distance education has had a significant impact on students' acquisition of Computer and Internet Self-Efficacy. It has also been effective in developing undergraduate students' self-directed learning skills and their familiarity with e-learning. In addition, the course was found to be effective in reducing e-learning escapism attitudes. An attitude towards something is affected by its experience Allport (1935). In the study conducted by Drennan, Kennedy and Pisarski (2005), it was stated that as the rate of participation in online courses increased, the satisfaction of students with online courses increased. This means that attending online courses can be an experience for the environment of on-line exam.

Using Web can be listed for experience in on-line education. In the study conducted by Tekinarslan (2009), it was stated that long-term use of the Web had a positive effect on students' attitudes towards technology. In the same study, it was stated that having an individual computer and having internet facilities had a positive effect on students' attitudes towards technology. Moreover, In the study conducted by Rosen et al., (2013), it was stated that having an individual mobile phone eliminates the negative attitudes of students. Similarly,in the study conducted by Hilao and Wichadee (2017), it is stated that the individual mobile phone increases the student's participation in the lesson and increases the interest in the lesson. Zabadi and Al-Alawi (2016) also found that technology usage had statistically significant impact on positive attitudes of students towards e-learning.

Technology has had a profound impact on the lives of both males and females all students. Whether acquired through parents, peers, school, or one's daily life experience, students' attitudes towards technology play an important role in their ability to actively participate in their current and future technological worlds. Therefore this study focus on the change in students attitudes towards online exams.

Research Problem

This study examines undergraduate students' attitudes towards on-line exams in terms of their gender, device, internet connection, course attendence, daily internet usage ?on-line

RESEARCH METHOD

This study examined undergraduate students' attitudes towards on-line exams depending on different variables. This study was conducted as survey research. The Survey method describes quantitative data obtained from a large population to examine the relationships among different variables. Survey research findings can later be generalized to the population (Kraemer, 1991). Surveys can also elicit information about attitudes that are otherwise difficult to measure using observational techniques (McIntyre, 1999). In this study, authors aimed to determine many undergraduate students' attitudes towards on-line exams; therefore survey method was used. The universities where this study was conducted are moderately successful (accept students who score above the average in the university exam) that can reflect the profile of most universities in Turkey. In this context, generalizability of data obtained from undergraduate students of these universities is high.

Participants

Participants of this study were selected through the convenience sampling method. This study was conducted during the 2020-2021 academic year with 1361 undergraduate university students. Nine participants were excluded depending on the inaccurate or incomplete filling of the instrument. Participants were students from four different universities. The distribution of participants concerning their gender, on-line exam device, participation to the on-line course and daily internet usage are shown in Table 1.

Table 1. Participants by Demographic Characteristics (N =1361)

Variable		Participants
Gender	Male	352
	Female	1009
Device	Computer	1005
	Mobile Phone	356
Internet Connection	Wi-Fi	1123
	Cellular Data	238
Participation to On-line Courses	1.I always attend on-line classes	374
	2.I sometimes attend on-line classes	912
	3.I never attend on-line classes	75
Daily Internet Usage	1.1-2 hours a day	175
	2. 2-3 hours a day	382
	3. 4 hours and more a day	746
	4. less than an hour	58

Data Collection Tool

USASOE (Undergraduate Students Attitude Scale Towards On-line Exams) used as data collection tool in this study, was developed by Author and Author (2022). To determine university students' attitudes towards on-line exams, the key concepts related to the subject were determined by first reviewing the literature. The opinions of 25 university students were taken with nine open-ended questions. As a result of the answers taken from the interview questions and the literature review, key concepts related to the attitude toward on-line exams were determined. These concepts are as follows; hardware, software, social control, lack/insufficiency of course documents, problems related to tools, affective features, time (preparation), information about the exam, internet connection problem, system problem, tool problem, question structure, duration, communication, exam security, pedagogical effect, motivation-anxiety, technical system and exam content.The items prepared in the concepts of hardware, software, tools-related problems, internet connection problem, system problem, tool problems, and key concepts formed the 1st sub-dimension called Technical Structure. The items prepared in the key concepts of exam security, lack/insufficiency of course documents formed the second sub-dimension called Taking Precaution. The items prepared in the key concepts of pedagogical effect, affective feature, time (preparation), motivation-anxiety, and social control formed the third sub-dimension, Individual Characteristic. Finally, key concepts of information about the exam, question structure, time technical system, exam content formed fourth sub-dimensions called the Structure of Exam. Exploratory factor analysis (EFA) was performed to determine the construct validity of the data. In the study, the compliance of the data with EFA was also examined with the Kaiser-Meyer-Olkin (KMO) coefficient and the Barlett Sphericity Test. As a result of the analysis, the Kaiser-Meyer-Olkin value was found to be .831, and the Bartlett Test value was found to be .00 significant ($p < .05$). These results showed that the data were suitable for factor analysis. Within the scope of the study, it was determined that the four dimensions of the attitude scale toward on-line exams for university students could be evaluated separately. However, the scale is expected to form a single general structure and give a total attitude score. In this context, second-order CFA (Secondary CFA) was used to determine the factorial validity and the tendency toward a single attitude structure with the sub-dimensions of the scale. When the second-order CFA results were examined, it was determined that the factor loads of 21 scale items were between 0.34 and 0.86. In this context, it has been considered that the factor load being .30 and above is acceptable.

The second-order CFA result shows that 21 items of the scale can measure a single general attitude structure with its sub-dimensions. Scale includes 21 items with four dimensions as Technical Structure (6 items), Taking Precautions (6 items), Individual Characteristics (6 items) and Structure of Exam (3 items). Each item has five alternative responses as "strongly agree", "agree", "undecided", "disagree", and "strongly disagree". High scores from the questionnaire shows positive attitudes. The minimum score which can be get from the questionnaire is 21 and the maximum one is 105. The Cronbach-Alpha was found as .825.

Sample items of the scale :

Technical Structure;

- If I have a problem with the system during the exam, the question of whether my exam will be repeated makes me unhappy.
- I hate to experience technical problems (power cut-sound, etc.) in the on-line exam.

Taking Precautions
- It motivates me that institutions take precautionary measures against the problems related to the examination system.
- Pre-checking the assigned questions in the on-line exam increases my confidence.

Individual Characteristic:
- In on-line exams, I feel restless until the time runs out.
- I can't sleep before the on-line exam.

Structure of Exam ;
- Being unable to return to the questions and change my answer during the exam makes me nervous.
- I am uncomfortable with different questions for everyone in on-line exams.

Collection of Data and Analysis

For this study ethical approval was obtained by XXXX University Ethics Committee. Due to the Covid-19 Pandemic study was conducted on-line with Google forms. Scores obtained from USASOE (Undergraduate Students Attitude Scale Towards On-line Exams) formed the basis of data for this study. First data was coded and transferred to electronic storage, then results were analyzed by One-Way ANOVA and Independent-Samples using SPSS. In this study data analysis was based on The Central Limit Theorem (CLT) that justifies the assumption that the distribution of a sample statistic (e.g., mean, sum score, and test statistic) is normal. The Central Limit Theorem states that, for a large sample of n observations from a population with a finite mean and variance, the sampling distribution of the sum or mean of samples of size n is approximately normal (Anderson, 2010).

The analysis of independent samples t-test was used to specify whether there was a significant difference in university students' attitudes and gender, device and internet connection variables. Also, the analysis of one-way ANOVA was administered to examine whether there were differences in university students' attitudes and on-line course attendance and daily internet usage variables.

FINDINGS

In this section, findings were presented according to research problems.

Does undergraduate students' attitudes significantly differ depending on gender variables?

Table 1 summarizes the independent sample t-test analysis of undergraduate students' attitudes depending on gender variables.

Table 1. *Independent Sample t-Test Result of Undergraduate Students' Attitudes Depending on Gender Variable*

Instrument	Gender	N	Mean	Std. Dev.	t	p
Technical Structure	Female	1009	2.38	1.61	.330	.742
	Male	352	2.35	1.47		
Taking Precautions	Female	1009	4.39	.60	1.92	.043*
	Male	352	4.31	.67		
Individual Characteristics	Femle	1009	3.12	.96	1.29	.185
	Male	352	3.04	1.01		
Structure of Exam	Female	1009	2.86	1.17	1.58	.111
	Male	352	2.74	1.19		
USASOE	Female	1009	3.23	.79	1.47	.140
	Male	352	3.16	.76		

Table 1 shows a significant difference between male and female undergraduate students' attitudes in the Taking Precautions dimension of USASOE (t=1.92, p<.05) scores. Female undergraduate students' mean scores were higher than male undergraduate students'. However, there was no significant difference between male and female undergraduate students' attitudes in terms of other dimensions of USASOE scores.

Does undergraduate students' attitudes significantly differ depending on the device variable?

Table 2 summarizes the independent sample t-test analysis of undergraduate students' attitudes depending on device variables.

Table 2. *Independent Sample t-Test Result of Undergraduate Students' Attitudes Depending on A Device Variable*

Instrument	Device	N	Mean	Std. Dev.	t	p
Technical Structure	Computer	1005	2.33	1.57	-1.417	.157
	Mobile Phone	356	2.47	1.60		
Taking Precautions	Computer	1005	4.42	.56	4.529	.000*
	Mobile Phone	356	4.22	.77		
Individual Characteristics	Computer	1005	3.14	.94	2.131	.033*
	Mobile Phone	356	3.00	1.07		
Structure of Exam	Computer	1005	2.80	1.16	-1.618	.106
	Mobile Phone	356	2.92	1.21		
USASOE	Computer	1005	3.23	.75	.784	.434
	Mobile Phone	356	3.19	.86		

As seen in Table 2, there was a significant difference between computer-using undergraduate students' attitudes and mobile phone-using undergraduate students' attitudes in the Taking Precautions dimension of USASOE (t=4.529, p<.05) scores in favor of computer-using undergraduate students. Similarly, there was a significant difference between computer-using undergraduate students' attitudes and mobile phone-using undergraduate students' attitudes in the Individual Characteristics dimension of USASOE (t=2.131, p<.05) in favor of computer-using undergraduate students. However, there was no significant difference between computer using and mobile phone-using undergraduate students' attitudes in terms of other dimensions of USASOE scores.

Does undergraduate students' attitudes significantly differ depending on the internet connection variable?

Table 3 summarizes the results of an independent sample t-test analysis of undergraduate students' attitudes depending on internet connection variable

Table 3. *Independent Sample t-Test Result of Undergraduate Students' Attitudes Depending on Internet Connection Variable*

Instrument	Internet Connection	N	Mean	Std. Dev.	t	p
Technical Structure	Wi-Fi	1123	2.40	1.58	1.50	.133
	Cellular data	238	2.23	1.54		
Taking Precautions	Wi-Fi	1123	4.40	.58	2.67	.008*
	Cellular data	238	4.25	.79		
Individual Characteristics	Wi-Fi	1123	3.16	.94	4.76	.000*
	Cellular data	238	2.81	1.07		
Structure of Exam	Wi-Fi	1123	2.86	1.18	1.77	.077
	Cellular data	238	2.71	1.15		
USASOE	Wi-Fi	1123	3.25	.76	3.82	.000*
	Cellular data	238	3.04	.84		

As seen in Table 3, there was a significant difference between Wi-Fi using undergraduate students' attitudes and cellular data using undergraduate students' attitudes in Taking Precautions dimension of USASOE (t=2.67, p<.05) scores in favor of Wi-Fi, Individual Characteristics dimension of USASOE (t=4.76, p<.05) in favor of Wi-Fi and total score of USASOE (t=3.82, p<.05) in favor of Wi-Fi. However, there was no significant difference between Wi-Fi and cellular data using undergraduate students' attitudes regarding other dimensions of USASOE scores.

Does undergraduate students' attitudes significantly differ depending on on-line course attendance variables?

One-way ANOVA was applied to explore differences in undergraduate students' attitudes and on-line course attendance variables.

The result of one way ANOVA test is shown in Table 4.

Table 4. *One-Way ANOVA Result of Undergraduate Students' Attitudes Depending on On-Line Course Attendance Variable*

Instrument	Groups	Sum of Squares	df	Mean Square	F	Sig.
Technical Structure	Between Groups	28.085	2	14.043	5.664	.004*
	Within Groups	3366.859	1358	2.479		
	Total	3394.944	1360			
Taking Precautions	Between Groups	4.417	2	2.208	5.635	.004*
	Within Groups	532.224	1358	.392		
	Total	536.641	1360			
Individual Characteristics	Between Groups	5.535	2	2.768	2.886	.056
	Within Groups	1302.133	1358	.959		
	Total	1307.668	1360			
Structure of Exam	Between Groups	4.029	2	2.014	1.447	.236
	Within Groups	1890.664	1358	1.392		
	Total	1894.693	1360			
USASOE	Between Groups	2.364	2	1.182	1.916	.148
	Within Groups	837.952	1358	.617		
	Total	840.317	1360			

As shown in Table 4, there was no statistical difference in the Structure of the Exam (F(1,447), p=.236)), Individual Characteristics (F(2,886), p=.056)) and total USASOE scores(F(1,916), p=.148). However, a significant difference was found in Technical Structure (F(5.664), p=.004)) and Taking Precautions dimensions (F(5.635), p=.004)).

Table 5 shows the Tukey test results according to students' scores relatedto on-line course attendance.

Table 5. *Results of Tukey Test Related To On-Line Course Attendance*

Instrument	Significant Difference	Mean differences	Std. Error	Sig.
Technical Structure	3>1	.66188	.19921	.003*
	3>2	.60014	.18914	.004*
Taking Precautions	1>3	.26557	.07921	.002*
	2>3	.21521	.07520	.012*

As a result of the Tukey test performed to determine the source of significant differentiation observed, in Technical Structure dimension 3 (I never attend on-line courses) was found to have a more positive attitude than 1(I always attend on-line courses) and 2 (I sometimes attend on-line courses) (p<0.05). Moreover, in Taking Precautions, dimensions 1(I always attend on-line courses) and 2(I sometimes attend on-line courses) had more positive attitudes than 3(I never attend on-line courses) (p<0.05).

Does undergraduate students' attitudes significantly differ depending on daily internet usage variables?

Oneway ANOVA was applied to explore differences in undergraduate students' attitudes and daily internet usage variables. The result of One-way ANOVA test is shown in Table 6.

Table 6. *One-Way ANOVA Test Result of Undergraduate Students' Attitudes Depending on Daily Internet Usage Variable*

Instrument	Groups	Sum of Squares	df	Mean Square	F	Sig.
Technical Structure	Between Groups	10.367	3	3.46	1.386	.246
	Within Groups	3384.577	1357	2.494		
	Total	3394.944	1360			
Taking Precautions	Between Groups	3.520	3	1.173	2.987	.030
	Within Groups	533.120	1357	.393		
	Total	536.641	1360			
Individual Characteristics	Between Groups	12.635	3	4.212	4.413	.004
	Within Groups	1295.033	1357	.954		
	Total	1307.668	1360			
Structure of Exam	Between Groups	9.571	3	3.190	2.296	.076
	Within Groups	1885.122	1357	1.398		
	Total	1894.693	1360			
USASOE	Between Groups	6.055	3	2.018	3.283	.020
	Within Groups	834.262	1357	.615		
	Total	840.317	1360			

As shown in Table 6, there was no statistical difference found in Technical Structure (F(1,386), p=.246)) and Structure of Exam (F(2,296), p=.076). However, a significant difference found in Taking Precautions(F(2.987), p=.030)), Individual Characteristics (F(4.413), p=.004)) and total score of USASOE(F(3,283), p=.020)). Table 7 shows the results of the Tukey test performed according to the scores of students related to daily internet usage variable.

Table 7. *Results of Tukey Test Related To Daily Internet Usage*

Instrument	Significant Difference	Mean differences	Std. Error	Sig.
Taking Precautions	2>4	.23303	.08833	.042
	3>4	.25023	.08544	.018
Individual Characteristics	2>4	.49264	.13767	.002
	3>4	.40916	.13317	.012
USASOE	2>4	.31381	.11049	.024

As a result of Tukey test performed to determine source of significant differentiation observed, in Taking Precautions and Individual Characteristics dimensions 2 (2-3 hours a day) and 3 (4 hours and more a day) had more positive attitude than 4 (less than an hour), and in total scores of USASOE 2 (2-3 hours a day) had more positive attitude than 4(less than an hour) ($p<0.05$).

DISCUSSION AND CONCLUSION

This study aims to determine and compare how undergraduate students' attitudes toward on-line exams vary depending on some variables. The results are presented below;

• Female undergraduate students had higher attitude scores than male undergraduate students in the Taking Precautions dimension.

• Computer-using undergraduate students had higher attitude scores than mobilphone-using undergraduate students in the Taking Precaution dimension.

• Wi-Fi-using undergraduate students had higher attitude scores in Taking Precautions, Individual Characteristics dimensions, and in total scores of USASOE.

• Undergraduate students who never attended on-line courses had higher attitude scores than the ones who always and sometimes attend in the Technical Structure dimension. Moreover, in the Taking Precautions dimension, students who always attend on-line courses and sometimes attend on-line courses had more positive attitudes than the ones who never attend on-line courses.

• In Taking Precautions and Individual Characteristics dimensions, students, who spend 2-3 hours a day and 4 hours and more a day on the internet, had a more positive attitude than those who spend less than an hour on-line. In total, scores of USASOE students who spend 2-3 hours a day, had more positive attitudes than the ones who spend less than an hour on the internet.

First of all, female undergraduate students had higher attitude scores than male undergraduate students in the Taking Precautions dimension. There was no significant difference in undergraduate students' attitude scores in other dimensions. While female students want to take more decisive steps due to their nature, male students are freer and more comfortable. This difference may be due to the personal differences of male and female students. When the studies in the literature are examined, Khaddage and Knezek (2013) and Taleb, Sohrabi (2012), which will support this study, state that the attitude scores of female students are high. Kırali and Alcı (2016) stated that students' attitudes toward distance education do not differ according to gender. Akgün (2018), Ateş and Altun (2008), Uzun, Es, and Ervan (2020), Yurdagül and Öz (2018), and Durmuş and Bağcı (2013) indicate that there is no significant difference between Web-based teaching attitudes and gender variable in their studies. Sırakaya, Sırakaya and Çakmak (2015), Wen and Tsai (2006), and Liu et al. (2001) state that male students' attitude scores towards on-line exam are higher than female students.

Secondly, computer-using undergraduate students had higher attitude scores than a mobile phone using undergraduate students in the Taking Precaution dimension. There was no significant difference in undergraduate students' attitude scores in other dimensions. The higher scores in the Taking Precaution dimension of the students taking the exam using computers may be since the computer is a more reliable technological tool than the phone. Meletiou et al. (2012) state that when students participate in on-line exams using a computer, they can take exam in a separate room without being disturbed, in which case a student faces less problems. Furthermore, students who have individual responsibility for exams are

expected to have high attitude scores. Similarly, Pearce and Rice (2013) found that -based internet activities are preferred more, offer more variety, and that the computer is a more effective technological device than the telephone.

Thirdly, Wi-Fi-using undergraduate students had higher attitude scores in Taking Precautions, Individual Characteristics dimensions and in total scores of USASOE than cellular data-using students. There was no significant difference in undergraduate students' attitude scores in other dimensions. Wi-Fi connection is easier to use than cellular data, and internet access speed is higher, more affordable and a more secure connection (Henry & Luo, 2002). In the study conducted by Lee et al. (2010), it was determined that the Wi-Fi connection creates more space on the phone compared to cellular data, and the vehicle's battery remained full with the Wi-Fi connection. Considering many advantages expressed in the literature, it can be said that undergraduate students trust Wi-Fi connections more than cellular data, and therefore, students who use this connection have higher attitude scores. There are studies supporting this finding. In their studies, Uzun, Es and Evram (2020) state that the attitude scores of students with internet connection problems are lower than those of students who do not have connection problems. Moreover, Tella and Bashorun (2012) state that connection problem is an essential factor affecting on-line exams.

Undergraduate students who never attended on-line courses had higher attitude scores than the ones who always and sometimes attend in the Technical Structure dimension. Moreover, in the Taking Precautions dimension, students who always attend on-line courses and who sometimes attend on-line courses had more positive attitudes than the ones who never attend on-line courses. Items in Technical Structure dimension are mainly related to technical problems stemming from the system. (If I experience a system-related problem during on-line exam, the question of whether my exam will be repeated makes me unhappy. If my internet connection drops during on-line exam, I will be nervous. I am afraid of making mistakes when coding the answers in the on-line exam due to the system problem. Missing questions during the exam makes me uneasy) The reason for students who always and sometimes attend on-line courses may have a more negative attitude because they worry that potential problems arising from the system or technical infrastructure are not solved. Technical structure dimension scores of students who never attend on-line courses are higher than the others. This may be due to students being less responsible and therefore not worried about problems that may arise.

On the other hand, students who attend the lesson with a higher sense of responsibility may be more anxious about exams, which may negatively affect their attitudes. The positive attitudes of those who never attend on-line courses may depend on their disregard for on-line courses. Unlike the finding obtained in this study, in a study conducted by Longhurst (1999), students with a more positive attitude towards studying have less absenteeism records. Similarly, Adıgüzel and Karadaş (2013) stated that students with less absenteeism have more positive attitudes towards school than others. This difference may be that the positive attitude in this study is valid only for statements about Technical Structure. Indeed, in the Taking Precautions dimension, the attitude scores of students who always and sometimes attend on-line courses are higher than those who never attend. Items in Taking Precautions dimension are related to the necessary checks to avoid problems in the on-line exam, detailed information about the exam and what can be done in case of a problem. While there is no connection between attendance and attitude in a study conducted by Moore (2006) in the literature, Mombourquette (2007) stated that there is a relationship among Decision Making skills, attendance and attitude. Considering the connection between the items in the taking precaution dimension and responsibility, the finding obtained in the study by Cabı (2016) supports this study. According to the study results, students who are responsible and highly motivated in e-assessment are more successful. This study determined that students attending on-line courses had high attitude scores in Taking Precaution dimension. Joyce and Farenga (1999) and Thorndike-Christ (1991) similarly, found relation between positive attitude and participation in that course.

Finally, in Taking Precautions and Individual Characteristics dimensions, students, who spend 2-3 hours a day and 4 hours and more a day on the internet, had more positive attitudes than the ones who spend less than an hour on the internet. In total scores of USASOE students who spend 2-3 hours a day, had more positive attitudes than the ones who spend less than an hour on internet. Similarly, in their study Reiko, Takahira and Sakamoto (2004) found that having more daily internet usage time positively affects the student's attitude toward learning. Website browsing and message-posting had positive effects on motivation for learning. In

this context, the increase of daily internet usage time, designing a web page or using educational applications can also increase his self-confidence in on-line environment. Daily internet use also increases the ability to use a computer. In their studies, Ateş and Altun (2008), Chang and Tung, (2008), Liu, Papathanasiou and Yung-Wei (2001) and Kışla (2005) state that increased computer use skill has a positive effect on attitude towards on-line education. A student who knows the use of technological tools knows what to do in on-line education or on-line exam, in this context, self-confidence increases and this situation can lead to a positive attitude. However, the results of some studies contradict this study. In the studies conducted by Akgün (2018) and Durmuş and Bağcı (2013), no significant difference was found between web-based teaching attitudes and daily internet use.

In this study, daily internet usage is considered to have the necessary skills in the computer environment, perform the given tasks, and participate in on-line lessons and exams. As Van der Aaet al. (2009) state as long as it is used for the right purpose and properly, the negative impact of daily internet use will be reduced. However, the negative effect of excessive internet use is a fact that must be accepted. Fayazbakhsh, et al. (2011) focus on daily internet usage time of youth is increasing day by day and the negative effects of this situation on the health of youth also increases. They suggest that preparing a curriculum and internet-based control for this purpose can eliminate many negativities.

Suggestions

- The relationship between undergraduate students' attitudes and their motivation, academic achievement and learning levels can be examined, and their attitudes towards on-line exams. Moreover, factors that prevent students from developing a positive attitude towards the on-line exam can be identified.

REFERENCES

Adıgüzel, A. & Karadaş. H. (2013). Ortaöğretim öğrencilerinin okula ilişkin tutumlarının devamsızlık ve okul başarıları arasındaki ilişki. *YYÜ Eğitim Fakültesi Dergisi (YYU Journal of Education Faculty*), 10(1), 49-66.

Akgün, F. (2018). Uzaktan eğitim öğrencilerinin web tabanlı öğretime yönelik tutumları ve çevrim içi teknolojilere yönelik öz-yeterlik algılarının incelenmesi. In 9th International Computer & Instructional Technologies Symposium-ICITS2015 Full Paper Proceedings.

Alley, L. R., & Jansak, K. E. (2001). The ten keys to quality assurance and assessment in on-line learning. *Journal of Interactive Instruction Development*, 13(3), 3-18.

Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.), Handbook of Social Psychology (pp. 798-844). Worcester: Clark University Press.

Anderson, C. J. (2010). Central limit theorem. *The Corsini Encyclopedia of Psychology*, 1-2.

Arend, B. D. (2006). Course assessment practices and student learning strategies in on-line college courses (pp. 1-243). University of Denver.

Ateş, A., & Altun, E. (2008). Bilgisayar öğretmeni adaylarının uzaktan eğitime yönelik tutumlarının çeşitli değişkenler açısından incelenmesi. *Gazi University Journal of Gazi Educational Faculty (GUJGEF),* 28(3), 125-145

Aye, M. M., & Thwin, M. M. T. (2008, May). *Mobile agent based on-line examination system*. In 2008 5th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (Vol. 1, pp. 193-196). IEEE.

Bame, A. E., Dugger, WE. Jr., de Vries, M., & McBee,]. (1993). Pupils' attitudes toward technology-PATT-USA. *The Journal of Technology Studies*, 19(1), 40-48.

Bertea, P. (2009). *Measuring students attitude towards E-Learning: A Case Study*. Proceedings of 5th International Scientific Conference on eLearning and Software for Education, Bucharest, April 9th-10th.

Boser, R. A., Palmer, J.D., & Daugherty, M. K. (1998, Fall). Students' attitudes toward technology in selected technology education programs. *Journal of Technology Education*, 10(1), 4-18.

Burn, S. (1996). *The social psychology of gender*. New York: McGraw-Hill.

Cabı, E. (2016). Uzaktan eğitimde e-değerlendirme üzerine öğrenci algıları. *Journal of Higher Education & Science/Yükseköğretim ve Bilim Dergisi*, 6(1), 94–101.

Cabı, E., & Kalelioglu, F. (2019). A fully online course experience from students' perspective: readiness, attitudes and thoughts. *Turkish Online Journal of Distance Education*, *20*(3), 165-180.

Cheng, K. (2006). A research study on students level of acceptance in applying e-learning for business course: A case study on a technical college in Taiwan. *Journal of American Academy of Business,* 8(2), 265-272.

Cluskery Jr, G. R., Ehlen, C. R., & Raiborn, M. H. (2011). Thwarting on-line exam cheating without proctor supervision. *Journal of Academic and Business Ethics*, 4(1), 1-7.

Durmuş, A. ve Bağcı, H. (2013). Öğretmen adaylarının web tabanlı öğretime yönelik tutumlarının farklı değişkenler açısından incelenmesi. *Eğitim ve Öğretim Araştırmaları Dergisi*,2, (4), 225-231.

Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors affecting student attitudes toward flexible online learning in management education. *The Journal of Educational Research*, *98*(6), 331-338.

Egbo et al. (2011). Gender perception and attitude towards e-learning: a case of business students. *International Journal of Computer Application,*1(2), 135-148.

Fayazbakhsh, A., Khajeh, K. R., Soleymanı, N. M., Rahimi, F., Jahangiri, L., Heydari, S., & Shams, M. (2011). The internet using and health: Students' knowledge, attitude and lifestyle related to the internet. *Hakım Research Journal*, 14 (2), 96-105.

Hameed, M. R., & Abdullatif, F. A. (2017). On-line examination system. International Advanced Research Journal in Science. Engineering and Technology, 4(3), 106-110.

Henry, P. S., & Luo, H. (2002). Wi-Fi: what's next?. *IEEE Communications Magazine*, 40(12), 66-72.

Hilao, M. P., & Wichadee, S. (2017). Gender differences in mobile phone usage for language learning, attitude, and performance. *Turkish Online Journal of Distance Education*, *18*(2), 68-79.

JISC (2010). *Effective assessment in a digital age : a guide to technology-enhanced assessment and feedback.* Available at http://www.jisc.ac.uk/ publications/programmerelated/2010/digiassess. aspx (accessed 7 June 2020).

Jordan, S. (2013). E-assessment: Past, present and future. *New Directions in the Teaching of Physical Sciences*, (9), 87-106.

Joyce, B. A., & Farenga, S. J. (1999). Informal science experience, attitudes, future interest in science, and gender of high-ability students: An exploratory study. *School Science and Mathematics*, 99(8), 431-437.

Kawachi, P. (2003). Initiating intrinsic motivation in on-line education: Review of the current state of the art. *Interactive Learning Environments*, 11(1), 59-81. DOI: 10.1076/ilee.11.1.59.13685.

Keller, C. & Cernerud, L. (2002).Students perception of e-learning in university education. *Journal of Educational Media*, 27, 1-2, 55-65.

Khaddage, F.& Knezek, G. İ. (2013). *Learn via mobile technology: A comparison of mobile learning attitudes among university students in two nations*. In Proceedings of the IEEE 13th International Conference on Advanced Learning Technologies (ICALT), Beijing, China, 15–18 July 2013; pp. 256–258.

Kırali, F. N., & Alcı, B. (2016). Üniversite öğrencilerinin uzaktan eğitim algısına ilişkin görüşleri. *İstanbul Aydın Üniversitesi Dergisi*, 30, 55-83.

Kraemer, K. L. (1991). *Introduction*. Paper presented at The Information Systems Research Challenge: Survey Research Methods.

Lee, K., Lee, J., Yi, Y., Rhee, I., & Chong, S. (2010, November). Mobile data offloading: How much can Wi-Fi deliver?. *In Proceedings of the 6th International Conference* (pp. 1-12).

Liaw, SS., & Huang, HM. (2011).*A study of investigating learners attitudes toward e-learning*. 5th International Conference on Distance Learning and Education, 28-32.

Liu M., Papathanassiou E. & Yung-Wei H. (2001) Exploring the use of multimedia examination formats in undergraduate teaching: results from the fielding testing. *Computers in Human Behavior*, 17, 225–248

Longhurst, R. J. (1999) Why aren't they here? Student absenteeism in a further education college. *Journal of Further and Higher Education*, 23(1), 61-80, DOI: 10.1080/0309877990230106.

McIntyre, L. J. (1999). The practical skeptic: Core concepts in sociology. *Mountain View*, CA: Mayfield Publishing.

Meletiou, G., Voyiatzis, I., Stavroulaki, V., & Sgouropoulou, C. (2012, October). Design and Implementation of an E-exam System Based on the Android Platform. In 2012 16th Panhellenic Conference on Informatics (pp. 375-380). IEEE.

Mombourquette, C. P. (2007). *A study of the relationship between the type of parent involvement and high school student engagement, academic achievement, attendance, and attitude toward school*. Dissertation Abstracts International Section A: Humanities and Social Sciences, 68(3-A), 823.

Moore, R. (2006). Class attendance: How students' attitudes about attendance relate to their academic performance in introductory science classes. *Research and Teaching in Developmental Education*, 19-33.

Oakes, P. (1994). *Stereotyping and social reality*. Oxford: Blackwell

Oskar R. H. & James L. (2008). Are on-line exams an invitation to cheat?. *The Journal of Economic Education*, 39(2), 116-125, DOI: 10.3200/JECE.39.2.116-125

Parsons-Pollard, N., Lacks, R. D., & Grant, P. H. (2008). A comparative assessment of student learning outcomes in large on-line and traditional campus-based introduction to criminal justice courses. *Criminal Justice Studies*, 21(3), 239-251.

Pearce, K. E., & Rice, R. E. (2013). Digital divides from access to activities: Comparing mobile and personal computer Internet users. *Journal of Communication*, 63(4), 721-744.

Ramu, T., & Arivoli, T. (2013). A framework of secure biometric based on-line exam authentication: an alternative to traditional exam. *Int J Sci Eng Res*, 4(11), 52-60.

Reiko, A., Takahira, M., & Sakamoto, A. (2004). Effects of the Internet use on elementary school students' attitude toward learning. In *EdMedia+ Innovate Learning* (pp. 979-984). Association for the Advancement of Computing in Education (AACE).

Retnawati, H., Hadi, S., & Nugraha, A. C. (2016). Vocational High School Teachers' Difficulties in Implementing the Assessment in Curriculum 2013 in Yogyakarta Province of Indonesia. *International Journal of Instruction,* 9(1), 33-48.

Roberts, T. S., & McInnerney, J. M. (2007). Seven problems of on-line group learning (and their solutions). *Journal of Educational Technology & Society*, 10(4), 257-268.

Roca, J. C., Chiu, C-M. & Martinez, F. J. (2006). understanding e-learning continuance intention: An extension of the TAM. *International Journal of Human-Computer Studies*, 64, 683-696.

Rosen, L. D., Whaling, K., Carrier, L. M., Cheever, N. A., & Rokkum, J. (2013). The media and technology usage and attitudes scale: An empirical investigation. *Computers in human behavior*, *29*(6), 2501-2511.

Sacks, C. H., & Bellisimo, Y. (1993). Attitudes toward computers and computer use: The issue of gender. *Journal of Research on Computing in Education*, 26(2), 256-269.

Sarrayrih, M. A., & Ilyas, M. (2013). Challenges of on-line exam, performances and problems for on-line

university exam. *International Journal of Computer Science Issues (IJCSI)*, 10(1), 439-443.

Sırakaya, M., Sırakaya, D. A., & Çakmak, E. K. (2015). Uzaktan eğitim öğrencilerinin çevrimiçi sınava yönelik tutum düzeylerinin incelenmesi. *Kastamonu Eğitim Dergisi*, 23(1), 87-104.

Silverman, S., & Pritchard, A.M. (1996). Building their future: girls and technology education in Connecticut. *Journal of Technology Education*, 7(2), 41-54.

Sindre, G., & Vegendla, A. (2015). E-exams versus paper exams: A comparative analysis of cheating-related security threats and countermeasures. *NISK Journal*, 34-45.

Taleb, Z. &Sohrabi, A. (2012). Learning on the move: The use of mobile technology to support learning for university students. *Procedia-Soc. Behav. Sci*. 69, 1102–1109.

Tekinarslan, E. (2009). *Turkish university students' perceptions of the World Wide Web as a learning tool: An investigation based on gender, socio-economic background, and web experience*. The International Review of Research in Open and Distributed Learning, 10(2).

Tella, A., & Bashorun, M. T. (2012). Attitude of undergraduate students towards computer-based test (cbt): a case study of the university of Ilorin, Nigeria. *International Journal of Information and Communication Technology Education (IJICTE)*, 8(2), 33-45.

Terzis, V., & Economides, A. A. (2011). Computer based assessment: Gender differences in perceptions and acceptance. *Computers in human behavior*, 27(6), 2108-2122.

Thorndike-Christ, T. (1991). Attitudes toward mathematics: Relationships to mathematics achievement, gender, mathematics course-taking plans, and career interests. Retrieved from https://eric.ed.gov/?id=ED347066.

Trivedi, A. (2010, July). *A relevant on-line examination system*. In 2010 International Conference on Technology for Education (pp. 32-35). IEEE.

Twigg, C. (2003). Improved learning and reducing costs: New models for on-line learning. *Educause Review*, 28–38.

Uzun, G. Ö., Eş, A. Ç., & Evram, G. (2020). Examination of attitudes of university students in distance education according to some variables. *Near East University On-line Journal of Education*, 3(2), 104-115.

Van der Aa, N., Overbeek, G., Engels, R. C., Scholte, R. H., Meerkerk, G. J., & Van den Eijnden, R. J. (2009). Daily and compulsive internet use and well-being in adolescence: a diathesis-stress model based on big five personality traits. *Journal of Youth and Adolescence*, 38(6), 765-776.

Wen, M.L. & Tsai, C. (2006). University students' perceptions of and attitudes toward (on-line) peer assessment. *Higher Education*, 51,27-44

White, R. J. & Hammer, C. A. (2000). Quiz-o-Matic: A free Web-based tool for construction of self-scoring on-line quizzes. *Behavior Research Methods, Instruments, & Computers*, 32(2), 250-253. DOI.10.3758/BF03207791.

Yi-qi, L. I. (2010). Distance education on-line exam marking system design and security [J]. *Journal of Northwest University (Natural Science Edition)*, 2.

Yurdagül, C., & Öz, S. (2018). Attitude towards mobile learning in English language education. *Education Sciences*, 8(3), 142.

Zabadi, A. M., & Al-Alawi, A. H. (2016). University students' attitudes towards e-learning: university of business & technology (ubt)-Saudi Arabia-Jeddah: A Case Study. *International Journal of Business and Management*, 11(6), 286-295.