Kastamonu Education Journal, 2022, Vol. 30, No:3, 587-608
doi: 10.24106/kefdergi. 927496

| Research Article / Araştırma Makalesi |

Examining Online Learning Motivations of University Students Studying Via Distance Education In The Covid-19 Pandemic By Digital Literacy Variable

Covid-19 Pandemisinde Uzaktan Eğitim Aracılığıyla Öğrenim Gören Üniversite Öğrencilerinin Çevrimiçi Öğrenme Motivasyonlarının Dijital Okuryazarlık Değişkenince İncelenmesi

Özlem KARAKIŞ[1]

Keywords

1. COVID-19 pandemic
2. Digital literacy
3. Distance education
4. Online learning motivation
5. University students

Anahtar Kelimeler

1. COVID-19 pandemisi
2. Dijital okuryazarlık
3. Uzaktan eğitim
4. Çevrimiçi öğrenme motivasyonu
5. Üniversite öğrencileri

Received/Başvuru Tarihi
25.04.2021

Accepted / Kabul Tarihi
14.01.2022

Abstract

Purpose: 422 university students participate in this study where the digital literacy of university students studying via distance education during the Covid-19 pandemic by online learning motivation variable is examined.

Methodology: The study used the Personal Information Form, Digital Literacy Scale (DLS) and Online Learning Motivation Scale (OLMS). The research is structured in descriptive and relational scanning models.

Findings: According to the data obtained, it is stated that the digital literacy and online learning motivation of the students within the scope of the research are at a medium level; digital literacy levels do not differ by gender and grade level; there is a statistically significant difference in online learning motivation level of students in favour of female students; moreover, in the score of the whole online learning motivation scale, there is a significant difference between 2nd and 4th-grade students in favour of 2nd-grade students and between 3rd and 4th-grade students in favour of 3rd-grade students; there is a moderately positive and statistically significant relationship between students' digital literacy and online learning motivation levels and their online learning motivation and digital literacy predict each other by 21.8 %.

Highlights: Given that 21.8 % of students' online learning motivation is interpreted by their digital literacy or vice versa, increasing the development of students' digital literacy and online learning motivation levels with in-school and out-of-school training is suggested.

Öz

Çalışmanın amacı: COVID-19 pandemisinde uzaktan eğitim aracılığıyla öğrenim gören üniversite öğrencilerinin dijital okuryazarlıklarının çevrimiçi öğrenme motivasyonu değişkenince incelendiği bu çalışmaya toplam 422 üniversite öğrencisi katılmıştır.

Yöntem: Araştırmada, Kişisel Bilgi Formu, Dijital Okur-yazarlık Ölçeği (DOÖ) ve Çevrimiçi Öğrenme Motivasyonu Ölçeği (ÇÖMÖ) kullanılmıştır. Mevcut araştırma betimsel ve ilişkisel tarama modellerinde yürütülmüştür.

Bulgular: Elde edilen verilere göre, araştırma kapsamındaki öğrencilerinin, dijital okuryazarlık ve çevrimiçi öğrenme motivasyonlarının orta düzeyde olduğu; dijital okuryazarlık düzeylerinin cinsiyete ve sınıf düzeyine göre farklılaşmadığı; öğrencilerin çevrimiçi öğrenme motivasyon düzeylerinde cinsiyet değişkenine göre kadın öğrencilerin lehine istatistiksel olarak anlamlı farklılık olduğu; çevrimiçi öğrenme motivasyonu ölçeğinin bütününe ilişkin puanda 2. ve 4. sınıf düzeyleri arasında 2. sınıf öğrencileri lehine ve 3. ve 4. sınıf düzeyleri arasında 3. sınıf öğrencilerinin lehine manidar farklılık olduğu; öğrencilerinin dijital okuryazarlık ve çevrimiçi öğrenme motivasyon düzeyleri arasında orta düzeyde pozitif ve istatistiksel olarak manidar bir ilişki olduğu ve öğrencilerin çevrimiçi öğrenme motivasyonları ve dijital okuryazarlıklarının birbirlerini % 21,8 oranında yordadığı belirlenmiştir.

Önemli Vurgular: Öğrencilerin çevrimiçi öğrenme motivasyonlarının %21,8'inin dijital okuryazarlıkları ile yorumlandığı ya da tam tersi olduğu göz önüne alındığında, okul içi ve okul dışı eğitimlerle öğrencilerin hem dijital okuryazarlık hem de çevrimiçi öğrenme motivasyon düzeylerinin geliştirilmesi önerilmektedir.

[1] Ass. Prof. Dr. Özlem KARAKIŞ, Bolu Abant İzzet Baysal University School of Foreign Languages, Bolu, TURKEY; https://orcid.org/0000-0001-8934-3912

Citation/Alıntı: Karakış, Ö. (2022). Examining online learning motivations of university students studying via distance education in the Covid-19 pandemic by digital literacy variable, *Kastamonu Education Journal, 30*(3), 587-608. doi: 10.24106/kefdergi. 927496

INTRODUCTION

Technologies concerning information and communication, an inseparable part of life by the transition to the information society in the 21st century, consist of digital technologies. These digital technologies are increasingly used daily, referring to non-analogue phones, computers, media players, the internet, and related software. According to the 2017 Digital Report, revealing how technologies concerning digital life, a part of daily life, change individuals' lives, 50 % of the world's population uses the internet, 37 % of the world's population uses social media, 34 % of the world's population uses mobile social media and 22 % of the world's population uses e-commerce (We Are Social & Hootsuite, 2017). In Turkey, 59.6 % of the population used a computer in 2018, and the rate of internet use was 79 % in 2020 (Turkish Statistical Institute [TÜİK], 2020). In 2018, the rate of computer use between the ages of 16-24 was 75.1 % for males and 60.1 % for females, and the rate of internet use was 94.7 % for males and 86.5 % for females (TÜİK, 2018). This rate change reveals the increased interaction between technology and people in the digital age. Information pollution has also risen incredibly with the increase of information, and individuals need "digital literacy skills" to get the correct information (Ng, 2012). According to Hamutoğlu et al. (2017a, p.410), digital literacy skills are essential to make information and communication technologies a safer platform by using these new and different technologies, examining the accuracy or validity of the information obtained, and solving the problems encountered at the same time. That is why digital literacy, the skill that makes up the talents of the digital generation (Spires, Paul & Kerkhoff, 2018), has become even more important than literacy these days (Çubukçu & Bayzan, 2013). The COVID-19 pandemic, which spread to the world from Wuhan, China, in December 2019 (WHO, 2020a; 2020b), was an intermediary to use digital devices, online resources, social media technology and e-learning activities more effectively that mediate the digital literacy skills (Mulenga & Marbán, 2020). The need for digital literacy skills in education has been reinforced due to the COVID-19 pandemic and emphasized in the study carried out by Onyema et al. (2020). This rapid development of digital technologies has also exposed individuals to situations that require them to benefit from technical, cognitive, and sociological skills (Eshet-Alkalai & Amichai-Hamburger, 2004: 421). One of these technical skills needed is "online learning", which has been widely and intensely used due to the precautions taken during the COVID-19 pandemic (Bozkurt, 2020). Some studies point out that dropouts will increase, students will have difficulty re-interacting in the COVID-19 pandemic (Buckler et al., 2020) and students are determined to be less motivated for learning-teaching activities after the pandemic (Aguilera-Hermida, 2020). Ramírez-Correa et al. (2015) and Xu and Jaggars (2013) state that students drop education in online learning due to a lack of motivation; therefore, "motivation" emerges as an essential factor in online learning.

Online Learning Motivation

With the COVID-19 pandemic, a factor that significantly affects human life, our perspective on education and how we interpret education has changed (Bozkurt & Sharma, 2020). Educational institutions were temporarily closed due to the COVID-19 pandemic, and about 1.6 billion students in 191 countries were severely affected by that (UNESCO, 2020); immediately afterwards, countries started to implement distance education in schools at all levels to provide that students do not fall behind in their education. Distance education, which started with mailing, has evolved into "online learning", influenced by the developments in the internet and technology. Online learning, which is defined by Christensen et al. (2008) as a disruptive innovation, is an approach that offers well-designed and interactive learning environments by using different digital technology features and resources and learning materials suitable for open and flexible learning environments without time and space limitations (Khan, 2005). Online learning, a student-centred approach (Aoki, 2010), is one of the most dynamic forms of current learning opportunities (Miltiadou & Yu, 2000). In addition to its advantages, various factors are essential for online learning (McIsaac & Gunawardena, 1996). During the pandemic, motivation is thought to emerge as one of the most significant determinants in online learning, according to the declarations of Buckler et al. (2020) and Aguilera-Hermida (2020).

In educational settings, motivation, one of the most important psychological concepts, explains the degree to which learners devote attention and energy to various learning requirements. Motivation is a feature that persuades students to learn and do learning activities (Green & Sulbaran, 2006) and is a significant factor in students' choices and the degree of their participation, effort, and persistence in learning processes (Dörnyei, 2001; Dörnyei & Ushioda, 2011). It is separated into two intrinsic and extrinsic motivations; In contrast, extrinsic motivation consists of appreciation and praise for good work; intrinsic motivation is an internal desire to learn about a particular subject (Knowles & Kirkman, 2007). In other words, motivation is the psychological power that energizes individuals to realize certain situations, activates them and enables the action to continue (Karakış, 2014). Motivation, a significant factor for maintaining students' satisfaction in the online learning environment (Chen & Jang, 2010), stems from the fact that online learning environments have a more autonomous nature than traditional classroom contexts (Artino Jr., & Stephens, 2009). Motivation enables the learner to cope with various difficulties and achieve learning goals (Bekele, 2010; Hoskins & van Hooff, 2005; Jones & Issroff, 2007; Muilenburg & Berge, 2005; Song et al., 2004; Ucar & Kumtepe, 2019). Studies also show that the relation between motivation and online learning satisfaction is positive (Biner et al., 1994; Chute et al., 1999; Lim, 2004). Research indicates that low motivation levels contribute to low retention rates (Artino, 2008; Keller, 2008), and high motivation is related to distance learner retention in distance education (Levy, 2007). In the relevant literature, some studies determine that high motivation explains class participation and academic achievement (de Barba, Kennedy & Ainley, 2016; Giesbers et al., 2013; Guay et al., 2008; Lopéz-Pérez et al., 2011; Rovai & Wighting, 2005; Yi & Hwang, 2003). The study by Albelbisi and Yasop (2019) determined that a lack of motivation in online learning can cause individuals to spend extra time completing

their homework, submit homework late, or do poor-quality work. It is clear, then, that motivation is a vital consideration for distance education.

Since online learning evokes human-computer interaction, unlike face-to-face education (McIsaac & Gunawardena, 1996), an effectively designed website is an essential factor affecting the motivation of online students (Arnone & Small, 1999; Small, 1997). Level of interaction with learning materials (Gao & Lehman, 2003), the general climate of the instructional environment (Kim & Frick, 2011), social presence (Visser, Plomp & Kuiper, 1999), getting education to use the required technology (Schramm et al., 2000) is also important factors affecting the motivation of online students. Moreover, students sometimes experience technical difficulties and communication interruptions in online classes (Essex & Çağiltay, 2001; Hara & Kling, 2000). These discouraging technical difficulties prevent the student from accessing resources, activities and tasks, instructor, and classmates. Since technology is the only link students have in online learning, any technical problem experienced increases the likelihood of students being unwilling to learn or even quitting the course (Kim & Frick, 2011). In online learning environments, students have high motivation when they do not experience a technological problem (Kim & Frick, 2011). Therefore, at least a little technological competence is needed for online learning. This competence is also essential to reducing cognitive load, as the excessive cognitive load can cause a student's attention to shift from subject to technological problem and decrease motivation (Hartley, 1999; Kim & Frick, 2011; Pintrich & Schunk, 2002). Moreover, studies have determined that computer or internet self-efficacy are important factors affecting students' online learning satisfaction and class participation (Hill & Hannafin, 1997; Joo et al., 2000; Lim, 2001). Also, Hudson et al. (1998) state that student support is vital to overcoming technical difficulties. Perceived difficulty in learning can also adversely affect learning motivation in online environments, as it may increase student anxiety (Reinhart, 1999). Fostering the motivation of learners engaged in distance education, therefore, requires attention to a range of factors, including the design of learning activities and digital technologies used etc. (Hartnett, 2016).

Digital Literacy

Gilster, who popularized the concept, described digital literacy as the ability to use and understand the information provided by computers from several sources in different ways (Gilster, 1997:15); Eshet-Alkalai (2002) defined it as a process that includes thinking skills, obtaining data from the internet and using technology correctly by establishing relationships; Bawden (2001:23) associated the concept with how technological devices work and awareness of technology; Ng (2012: 1066-1067) defined it as the intersection of technique, cognitive and social-emotional dimensions and Belshaw (2011) defined it as applications that support effective learning in this digital age and left the types of applications open because of the changes in applications with developing technologies. The reason why digital literacy is divided into sub-disciplines such as computer, communication, and visual literacy with the development of digital technologies is its dynamic and comprehensive structure. In short, digital literacy can be defined as the ability to develop a positive attitude towards new technologies, understand information using digital technologies, create and share new information, evaluate existing information effectively and critically, and obtain digital information within the framework of ethical rules and solve problems encountered. Digital literacy is not an alternative to literacy but an extension that contributes to it and is essential for working, learning, and socializing in the contemporary world (Churchill et al., 2008). Knobel and Lankshear (2006) stated that digital literacy is increasingly being defined as an official goal of education; therefore, it is essential for today's students to get this knowledge and skills (Martin, 2005); therefore, educational institutions should accelerate the practices that will increase students' digital literacy (Donohue, 2014; Gillen et al., 2018; Ihmeideh & Alkhawaldeh, 2017; Karabacak & Sezgin, 2019).

In the related literature, there are some study results in which the digital literacy levels of university students are found to be 'high' (Can et al., 2020; İşioğlu & Kocakuşak, 2012; Khalid et al., 2015; Kozan, 2018; Kozan & Özek, 2019; Üstündağ et al., 2017; Ocak & Karakuş, 2019; Özoğlu, 2019; Öztürk & Budak, 2019; Svensson & Baelo, 2015); 'low' (Campbell, 2016; Coşkun et al., 2013; Cote & Milliner, 2016; Kuru, 2019; Rambousek et al., 2016) and 'moderate' (Çetin, 2016; Çukurbaşı & İşman, 2014; Tyger, 2011). There are many studies in which there is a significant difference between the digital literacy levels of students in terms of the gender variable (Çam & Kyici, 2017; Çetin, 2016; Deryakulu, 2007; Gökçearslan & Bayır, 2011; Göldağ & Kanat, 2018; Gui & Argentin, 2011; Gürtekin, 2019; Hamutoğlu et al., 2017a; Horne, 2007; Korkut & Akkoyunlu, 2008; Kozan, 2018; Markauskaite, 2005; Nasah et al., 2010; Ocak & Karakuş, 2019 ; Özden, 2018; Özerbaş & Kuralbayeva, 2018; Özoğlu, 2019; Öztürk & Budak, 2019; Sakal, 2019,2020; Sarıkaya, 2019; Sulak, 2019; Tsai et al., 2001; Yaman, 2019; Yontar , 2019). In the related literature, few studies have been found in which there is no important difference between digital literacy levels of students in terms of gender (Can et al., 2020; Ertaş et al., 2019; Korkmaz & Mahiroğlu, 2009; Kozan, 2018; Polat, 2018; Sarıkaya, 2019; Yaman, 2019; Yılmaz et al., 2019). In studies examining the level of digital literacy according to grade level, there are very few studies in which there is no significant difference between the level of digital literacy in terms of class level (Çukurbaşı & İşman, 2014; Sarıkaya, 2019) and there are more studies in which students' digital literacy levels differ significantly in terms of grade level (Can et al., 2020; Carrington & Robinson, 2009; Göldağ & Kanat, 2018; Hamutoğlu et al., 2017b; Kozan, 2018; Marsh et al., 2017; Öztürk & Budak, 2019; Pew Research Center, 2005; Techataweewan & Prasertsin, 2017; Witten et al., 2018; Yaman, 2019).

Importance of the Research

Life has come to a standstill from time to time. Information and communication technologies have been mainly used to adapt to the uncertainties and follow the agenda because of the Covid-19 pandemic (Junio, 2020). The quarantine practices carried out during this process have led to the intensification of the use of digital technology to mediate people's business and education needs. According to Mulenga and Marban (2020), the Covid-19 pandemic has been a mediator for busier utilization of digital devices and online learning. Thus, students having online education during the pandemic have been in dire need of knowledge and skills such as using necessary computer programs in online learning environments and having an awareness of technological devices, obtaining data from the internet within the framework of ethical rules to do their homework, understanding that the data is up-to-date and reliable, and communicating correctly with teachers and friends on the internet. Since familiarity with technology is substantial in online learning (Agarwal et al., 2000; Marrakas & Johnson, 1998), these needs, knowledge, skills, services, and technologies require students to be digital literate at a certain level. As some degree of technical competence is required for online learning, this competence is also essential to reduce cognitive load, as the excessive cognitive load can cause a student's attention to shift from subject to technological problem and decrease motivation (Hartley, 1999; Kim & Frick, 2011; Pintrich & Schunk, 2002). Students exposed to online learning intensely in the COVID-19 pandemic also need the motivation to cope with the challenges they face in digital environments and achieve their learning goals. Motivation, an essential factor in online learning, is the driving force that enables students to act and energize to access and evaluate information in lessons, use different software applications and hardware, and produce digital content. Computer or internet self-efficacy (Hill & Hannafin, 1997; Joo et al., 2000; Lim, 2001) and technical and communication difficulties (Essex & Çağiltay, 2001; Hara & Kling, 2000; Kim & Frick, 2011) are decided to be some of the problems that decrease motivation in online learning. Effectively designed website (Arnone & Small, 1999; Small, 1997), level of interaction with learning materials (Gao & Lehman, 2003), the general climate of the instructional environment (Kim & Frick, 2011), social presence (Visser, Plomp & Kuiper, 1999) and training to use the required technology (Schramm et al., 2000) increase the motivation in online learning environments as well. Since technology is the only link students have in online learning, any technical problem experienced increases the likelihood of students being unwilling to learn or even quitting the course (Kim & Frick, 2011). Fostering the motivation of learners engaged in distance education, therefore, requires attention to a range of factors, including the design of learning activities and digital technologies used etc. (Hartnett, 2016). Therefore, the current research is central in stating the relation between digital literacy and online learning motivation levels and how much digital literacy predicts online learning motivation or vice versa in the context of university students studying via distance education in the COVID-19 pandemic.

Purpose of the Research

This research aims to examine the digital literacy levels of university students studying via distance education in the Covid-19 pandemic by the variable of online learning motivation. With this aim, answers to the following questions were examined:

1-What is the digital literacy and online learning motivation levels of university students studying via distance education during the COVID-19 pandemic?

2- Do the digital literacy and online learning motivation levels of university students studying via distance education during the COVID-19 pandemic differ by gender and grade levels?

3-Is there a significant relationship between the digital literacy and online learning motivation levels of university students studying via distance education during the COVID-19 pandemic?

METHOD

Research Model

The research was structured in descriptive scanning model as it aimed to reveal the digital literacy and online learning motivation levels of university students studying via distance education in the COVID-19 pandemic. According to Gay and Airasian (2000), descriptive scanning models aim to reveal a current situation. In addition, the research was structured in relational scanning model since it examined how digital literacy of students effect their online learning motivation levels. According to Karasar (2012), relational scanning models aim to determine the co-change between two and / or more variables. The dependent variables of the study are digital literacy and online learning motivation levels of university students; its independent variables are gender and grade level.

Participants

The participants of the study are students studying at a university (approximately 31000) in Turkey's Black Sea region in the 2020-2021 academic year. The frequency and percentage values for independent variables are given in Table 1.

Table 1. Percentage and Frequency Values Regarding the Variables

Variables		F	%
Gender	Female	292	69,2
	Male	130	30,8
Grade level	1	109	25,8
	2	183	43,4
	3	51	12,1
	4	79	18,7

When Table 1 is examined, of the study group consisting of 422 students, 292 (69.2%) are female, 130 (30.8%) are male; 109 (25.8%) 1st year, 183 (43.4%) 2 nd year, 51 (12.1%) 3rd year and 79 (18.7%) 4th year students.

Data Collection Tools and Its Process

In the study, "Digital Literacy Scale" (DLS) and "Online Learning Motivation Scale" (OLMS) were used. In the study, "Personal Information Questionnaire" prepared by the researcher was also used for demographic data about students' gender and grade levels.

Online Learning Motivation Scale (OLMS)

Data on the online learning motivation levels of students were gathered by Online Learning Motivation Scale (OLMS) developed by Chen and Jang (2010) which was adapted to Turkish by Özbaşı et.al. (2018). OLMS consists of a total of 28 items and seven sub-dimensions called as intrinsic motivation to know (IMTK), intrinsic motivation to succeed (IMTS), intrinsic motivation to experience stimulation (IMTES), determined regulation (DR), introjected regulation (IR), extrinsic regulation (ER) and lack of motivation (LOM). The scale is a 7-point Likert type and the 5th, 12th, 19th and 26th items of it are reverse coded as in the original scale. The lowest score that can be acquired from the scale is 28 and the highest score is 196. In the present study, points between 28-83 were evaluated as low, points between 84-140 as medium, and points between 141-196 as high for the whole scale; and points between 4-11 were evaluated as low, points between 12-20 as medium, and points between 21-28 as high for all sub-dimensions.

Digital Literacy Scale (DLS)

Data on students' digital literacy levels were collected by Digital Literacy Scale (DLS) developed by Ng in 2012 which was adapted to Turkish by Hamutoğlu et al. (2017a). DLS consists of four sub-dimensions: attitude, technique, cognitive and social, and a total of 17 items. There are no items scored in reverse in the scale where 5-point Likert type rating is used. There are seven items in the attitude sub-dimension, six items in the technique sub-dimension, and two items in each of the cognitive and social sub-dimensions. The lowest score that can be obtained from the scale is 17 and the highest score is 85. In the present study, for the whole scale, points between 17-39 were considered low, points between 40-62 were considered medium, points between 63-85 were considered high; for the attitude sub-dimension points between 7-16 were considered low, points between 17-26 were considered medium and points between 27-35 were considered high; for the technique sub-dimension points between 6-13 were considered low, points between 14-22 were considered medium and points between 23-30 points were considered high; for the cognitive and social sub-dimensions points between 2-4 were considered low, points between 5-7 were considered medium and points between 8-10 were considered high.

Confirmatory factor analysis (CFA) was performed with the LISREL 8.80 program to determine the construct validity. While the survey model was created for OLMS without modification, the survey model was created by defining the error covariance of the 8th and 9th items for the DLS. Model data fit indices calculated for both scales are given in Table 2.

Table 2. Model Data Fit Indices Obtained for OLMS and DLS

	RMSEA	χ^2_{sd}	GFI	AGFI	NNFI	CFI	Λ	ε	$r_{(interfactorial)}$
OLMS	0,080	$700{,}93_{112}$	0,91	0,90	0,94	0,95	0,40-0,85	0,28-0,80	No
DLS	0,070	$1002{,}99_{329}$	0,92	0,90	0,98	0,98	0,38-0,92	0,15-0,86	No

In Table 2, the models were examined with the Robust Maximum Likelihood estimation, considering the case of not meeting the multiple normality distribution assumption of the data in the research. RMSEA value, being examined as a strong statistic in model fit indices, was 0.080 and below, which was an indicator of good fit (Hu & Bentler, 1999). In the context of this criterion, it was seen that OLMS and DLS fitted well for the model data fit RMSEA value. Chi-square statistics were affected by the sample size

and known as poor fit. Since the chi-square value increases as the sample size increases, the fact that the χ2 / df index obtained in CFA is less than three states that the model has good fit values (Kline, 2005). The chi-square value for OLMS was found to be greater than three when divided by degrees of freedom, and less than three when divided by degrees of freedom. It was understood that the model data fit for the chi-square fitted index in the DLS data, while the fit was not achieved in the OLMS data. The 'good fit' criterion for GFI, AGFI, NNFI and CFI fit indices is 0,90 and above (Hu & Bentler, 1999). When the CFA result obtained in the context of these indexes was examined, it was seen that the model fit was ensured for OLMS and DLS. According to Tabachnick and Fidell (2001), to be a good indicator of a dimension, the factor load should be at least 0.32. When the factor loads were examined, it was greater than 0.32 without discarding the items. Error values were less than 0.90. These findings could be shown as evidence that the items were good representatives for the specified dimensions. When the model data fit indices were evaluated as a holistic one, it was found that the model data fit was achieved for both scale data. Structure validity was ensured with the result of CFA.

After providing validity proof, the Cronbach's alpha reliability coefficient was calculated for the sub-dimensions of the scale and the whole scale, and the results were given in Table 3. Tukey additivity test results (Tukey Nonadditivity p> .05) showed that the sub-dimensions of the scale were summable.

Table 3. Reliability Coefficients Calculated for OLMS and DLS

Scale	Dimensions	Reliability Coefficient (α)
OLMS	Intrinsic motivation to know (IMTK)	0,868
	Intrinsic motivation to succeed (IMTS)	0,828
	Intrinsic motivation to experience stimulation (IMTES)	0,835
	Determined regulation (DR)	0,787
	Introjected regulation (IR)	0,831
	Extrinsic regulation (ER)	0,752
	Lack of motivation (LOM)	0,866
	The whole scale	0,912
DLS	Attitude	0,883
	Technique	0,879
	Cognitive	0,767
	Social	0,725
	The whole scale	0,933

The alpha coefficients examined in Table 3 were found to be above 0.70 (α IMTK = 0.868; IMTS = 0.828; α IMTES = 0.835; α DR =0.787; α IR = 0.831; α ER = 0.752; α M = 0.866; α0.912 WholeScale; αAttitude = 0.833; Technique = 0.879; α Cognitive = 0.767; αSocial = 0.725; α WholeScale= 0.933). In this case, it can be said that scales measure with few errors and their reliability is high.

Analysis of Data

CFA was applied for construct validity to determine whether the scales measured the desired level in the study group. Model fit was achieved by modifying the four-factor DLS. Error covariance was defined between item 8 and item 9 for the modification. After proving that the desired structure could be measured with survey scales, the reliability of the sub-dimensions of the scale and the total scale was calculated. It was proved by Tukey additivity test that the sub-dimensions of the scales could be summed up. It was determined whether the independent variables in the sub-problem sentences of the research had a normal distribution according to the sub-dimensions and total scores of the scales by comparing the Kolmogorv-Shapiro Wilk's test, kurtosis-skewness values and the 1.96 critical value of the coefficient calculated when these values were divided by their standard error values. In the context of the total scores obtained from the scales used in the study, the distribution of the participants at the low-medium-high levels in the context of the previously determined cut-off scores was reported. According to the gender variable, the total score of DLS, the attitude, social sub-dimension scores and the total score of OLMS and IMTK, IMTES, DR, IR and LOM sub-dimension scores were examined with the unrelated sample t-test; the technique and cognitive sub-dimension scores of DLS and IMTS and ER sub-dimension scores of OLMS were examined with the Mann Whitney U test. According to the grade variable, total score of DLS, technique sub-dimension score and total score of OLMS, IMTK, IMTES, IR sub-dimension scores with the ANOVA test; the attitude, cognitive, social sub-dimension scores of DLS and the scores of the IMTK, DR, ER and LOM sub-dimensions of OLMS were examined with the Kruscal Wallis H test. In addition to the test statistics used, the effect sizes were reported. Since the scores for both scales had normal distribution, the values obtained using the Pearson correlation coefficient were reported.

FINDINGS

This section presents the findings of each research question, respectively.

Findings Regarding the First Research Question

The answer to the first research question "What is the digital literacy and online learning motivation levels of university students studying through distance education during the COVID-19 pandemic?" is given in Table 4 and Table 5.

Table 4. Distribution of DLS by Levels

	Attitude		Technique		Cognitive		Social		The whole scale	
	f	%	f	%	f	%	f	%	f	%
Low	93	21,8	34	8	75	17,6	56	13,1	44	10,3
Medium	198	46,4	187	43,8	161	37,7	232	54,3	218	51,1
High	136	31,9	206	48,2	191	44,7	139	32,6	165	38,6

In Table 4, the distribution of the scores of the sub-dimensions and the whole scale according to the levels determined in the standard score range is given. In the attitude sub-dimension, it was found that 93 students (21.8%) were at low level, 198 students (46.4%) were at medium level and 136 students (31.9%) were at high level; for this sub-dimension, those with a medium level were in the majority. In the technique sub-dimension, it was found that 34 students (8%) were at low level, 187 students (43.8%) were at medium level and 206 students (48.2%) were at high level; for this sub-dimension, those with a high level are in the majority. In the cognitive sub-dimension, it was found that 75 students (17.6%) were at low level, 161 students (37.7%) were at medium level and 191 students (44.7%) were at high level; for this sub-dimension, those with a high level were in the majority. In the social sub-dimension, it was found that 56 students (13.1%) were at low level, 232 students (54.3%) were at medium level and 139 students (32.9%) were at high level; for this sub-dimension, those with a medium level were in the majority. The combination of the scores obtained from the sub-dimensions was provided by Tukey's additivity analysis and the total score was obtained for the scale. When the scores acquired from the whole scale were examined, 44 students (10.3%) were at low level, 218 students (51.1%) were at medium level and 165 students (38.6%) were at high level. It can be denoted that digital literacy level of the students within the scope of the research is medium.

Table 5. Distribution of OLMS by Levels

	IMTK		IMTS		IMTES		DR		IR		ER		LOM		Whole scale	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Low	23	5,5	47	11,1	32	7,6	43	10,2	65	15,4	23	5,5	144	34,1	23	5,5
Medium	399	94,5	235	55,7	181	42,9	181	42,9	202	47,9	136	32,2	189	44,8	223	52,8
High	0	0	140	33,2	209	49,5	198	46,9	155	36,7	263	62,3	89	21,1	176	41,7

In Table 5, the distribution of the scores of the sub-dimensions and the whole scale according to the levels determined in the standard score range is given. In IMTK, 23 students (5.5%) were at low level, 399 students (%) were at medium level; for this sub-dimension, those with a medium level were in the majority. In IMTS, 47 students (11.1%) were at low level, 235 students (55.7%) were at medium level and 140 students (33.2%) were at high level; for this sub-dimension, those with a medium level were in the majority. In IMTES, 32 students (7.6%) were at low level, 181 students (42.9%) were at medium level and 209 students (49.5%) were at high level; for this sub-dimension, those who have a high level were in the majority. In DR, 43 students (10.2%) were at low level, 181 students (42.9%) were at medium level and 198 students (46.9%) were at high level; for this sub-dimension, those with a high level were in the majority. 65 students (15.4%) were at low level, 202 students (47.9%) were at medium level and 155 students (36.7%) were at high level in the IR; for this sub-dimension, those with a medium level were in the majority. In ER, 23 students (5.5%) were at low level, 136 students (32.2%) were at medium level and 236 students (62.3%) were at high level; for this sub-dimension, those with a high level were in the majority. In LOM, 144 students (34.1%) were at low level, 189 students (44.8%) were at middle level and 89 students (21.1%) were at high level; for this sub-dimension, those with a medium level were in the majority. The combination of the scores obtained from the sub-dimensions was provided by Tukey's additivity analysis and the total score was obtained for the scale. When the scores obtained from the whole scale were examined, it was seen that 23 students (5.5%) were at low level, 223 students (52.8%) were at medium level and 176 students (41.8%) were at high level. It can be pointed out that the online learning motivation level of the students is medium.

Findings Regarding the Second Research Question

The answer to the second research question "Do the digital literacy and online learning motivation levels of university students studying through distance education during the COVID-19 pandemic differ by gender and grade levels?" is given in Table 6, Table 7, Table 8, Table 9, Table 10, Table 11, Table 12 and Table 13.

For the second research question of the study, a significant difference in DLS scores by gender was examined. In this process, if the data had a normal distribution or not was interpreted in a holistic manner by comparing it with the desired limit value compared with the 1.96 criterion for Kolmogorov-Shapiro-Wilk's test, kurtosis-skewness and standard error values of these indices. It was observed that there was a normal distribution by gender variable for the attitude and social sub-dimensions for DLS and for the whole scale. Significant differences according to the gender variable were examined with unrelated samples t-test and given in Table 6.

Table 6. Unrelated Samples T-Test Result of DLS according to the Gender Variable

Sub-dimension	Gender	N	$\bar{\chi}$	Sx	df	t	p
Attitude	Female	292	22,63	6,920	420	0,944	0,346
	Male	130	21,93	7,253			
Social	Female	292	6,48	1,934	420	-1,501	0,134
	Male	130	6,79	2,071			
Whole scale	Female	292	57,42	14,597	420	-0,266	0,79
	Male	130	57,84	15,496			

p> 0.05

In Table 6, it was examined if the scores related to the attitude and social sub-dimensions and the whole scale had a significant difference according to gender or not. A significant difference was not found according to the gender variable, t (420) Attitude = 0.944; t (420) Social = -1,501; t (420) Whole Scale = -0.266. With this finding, it can be asserted that male and female students' total score, attitude, and social sub-dimension scores of the DLS scale are at equal levels.

Mann Whitney U test was applied to determine whether the technique and cognitive sub-dimension scores that did not provide a normal distribution differ according to gender and are given in Table 7.

Table 7. Mann Whitney U Test Result of DLS according to Gender Variable

Sub-dimension	Gender	N	Mean Rank	U	p	r
Technique	Female	292	202,04	16219	0,017*	0,00567
	Male	130	232,74			
Cognitive	Female	292	217,73	17160,5	0,112	
	Male	130	197,5			

p> 0.05

In Table 7, the Mann Whitney U test was applied to examine if there was a significant difference according to the scores of technique and cognitive sub-dimensions or not. It was determined that there was a significant difference in the scores of the technique sub-dimension according to gender; U = 16219, r = 0.00567. When the mean rank of the technique sub-dimension was examined, it was seen that the mean ($\bar{\chi}$ = 232) of male students was higher than that of female students ($\bar{\chi}$ = 202.04). In line with the reported effect size data, the gender variable explained 0.5% of the technique sub-dimension; this effect was low. When the cognitive subscale scores differed significantly according to gender, it was seen that there was no significant difference, U = 17160.5; it can be said that the cognitive literacy of male and female students is at the same level.

It was investigated if there was a significant difference in OLMS scores according to gender or not. In this process, Kolmogorov-Shapiro-Wilk's test, in which the data did not have a normal distribution, was interpreted in a holistic manner by comparing it with the desired limit value when compared with the 1.96 criterion for kurtosis-skewness and standard error values and ratios of these indices. It was observed that there was a normal distribution according to the gender variable for the sub-dimensions of IMTK, IMTS, IMTES, DR, IR, ER and M and the whole scale for OLMS. Significant differences by gender variable were examined with unrelated samples t-test and given in Table 8.

Table 8. Independent Samples T-Test Result of OLMS according to the Gender Variable

Sub-dimension	Gender	N	$\bar{\chi}$	S_x	df	t	p	η^2
IMTK	Female	292	18,4589	5,37862	420	2,948	0,003*	0,020273
	Male	130	16,7846	5,40454				
IMTES	Female	292	20,7808	5,21034	420	4,523	0,00*	0,046446
	Male	130	18,2923	5,2362				
DR	Female	292	20,0068	5,41666	420	3,794	0,00*	0,033137
	Male	130	17,8462	5,36781				
IR	Female	292	18,6267	5,78192	420	3,705	0,00*	0,031649
	Male	130	16,3385	6,02264				
LOM	Female	292	13,9041	6,84068	420	-4,038	0,00*	0,037372
	Male	130	16,7462	6,28683				
Whole scale	Female	292	135,5993	26,34871	420	3,579	0,00*	0,029596
	Male		125,7154	25,83467				

p <0.05

In Table 8, it was examined if the scores related to the sub-dimensions of IMTK, IMTES, DR, IR ve LOM and the whole scale had a significant difference by gender or not. A significant difference was found according to the gender variable, t (420) IMTK = 2.948; t (420) IMTES = 4.523; t (420) DR = 3.794; t (420) IR = 3.705; t (420) LOM = 4.038; t (420) the whole scale = -3.579. When the effect sizes calculated with the result of significant difference were examined, the gender variable had 2.02% of IMTK sub-dimension scores, 4.64% of IMTES sub-dimension scores, 3.31% of DR sub-dimension scores, 3% of IR sub-dimension scores, 3,17 and 2.96% of the scores calculated from the whole scale. Reported effect sizes were medium. For the LOM sub-dimension, the scores of the male students ($\bar{\chi}$LOM = 16.75) were higher than the scores of the female students ($\bar{\chi}$LOM = 13.90). When the effect sizes calculated with the result of significant difference were examined, the gender variable explained 3.73% of the LOM sub-dimension scores and this effect was at a medium level.

Table 9. Mann Whitney U Test Result of OLMS according to Gender Variable

Sub-dimension	Gender	N	Mean Rank	U	p	η^2
IMTK	Female	292	228,63	66759	0,00*	-0,01027
	Male	130	173,03			
ER	Female	292	225,37	65807	0,00*	-0,00832
	Male	130	180,35			

p <0.05

In Table 9, if there was a significant difference according to gender in the IMTK and ER sub-dimension scores or not was examined with Mann Whitney U test and it was found that there was a significant difference; IMTK = 66759, r = -0.01027; U-ER = 65807, r = -0.00832. When the mean rank of the IMTK sub-dimension was examined, it was seen that the female students ($\bar{\chi}$ = 228.63) were higher than the male students' scores ($\bar{\chi}$ = 173.03). In line with the reported effect size data, the gender variable explained 0.1% of the IMTK sub-dimension; this effect was low. When the mean rank of ER sub-dimension was examined, it was identified that female students ($\bar{\chi}$ = 225,37) were higher than male students' scores ($\bar{\chi}$ = 180,35). In line with the reported effect size data, the gender variable explained 0.08% of the IMTK sub-dimension; this effect was low. A statistically significant difference was found in favor of female students in the IMTK and ER sub-dimensions.

In the context of the second research question of the study, it was examined if there was a significant difference in DLS scores according to grade level or not. In this process, if the data had a normal distribution or not was interpreted in a holistic manner by comparing it with the desired limit value compared with the 1.96 criterion for Kolmogorov-Shapiro-Wilk's test, kurtosis-skewness, and standard error values of these indices. It was observed that the attitude, technique, cognitive and social sub-dimensions for DLS and the whole scale provided a normal distribution by class level variable. Significant differences by class level variable were examined with unrelated samples t-test and given in Table 10.

Table 10. One-way Analysis of Variance (ANOVA) of DLS according to Grade Level

	Grade level	$\bar{\chi}$	S_x	N	Variance Source	Sum of Squares	df	Mean Square	F	p
Technique	1	20,97	4,93	109	Intergroup	135,259	3	45,086	1,57	0,197
	2	22,23	5,691	183	In-group	12029,8	418	28,779		
	3	22,51	5,045	51	Total	12165,06	421			
	4	21,66	5,356	79						
Whole	1	55,18	13,648	109	Intergroup	1061,646	3	353,882	1,69	0,187
scale	2	58,49	15,707	183	In-group	91936,81	418	219,945		
	3	59,88	13,698	51	Total	92998,46	421			
	4	57,14	14,994	79						

p> 0.05

When the analysis result presented in Table 10 was examined, it was seen that there was no significant difference in terms of the class levels of the students' DLS total score and technique sub-dimension scores F (3,418) = 1,567.

Table 11. DLS's Kruskal Wallis H Test Result According to Grade Level

Sub-dimensions	Grade level	N	Mean Rank	df	x^2	p	Significant Difference
Attitude	1	109	187,4	3	7,069	0,07	No
	2	183	223,63				
	3	51	227,2				
	4	79	206,52				
Cognitive	1	109	190,45	3	4,946	0,176	No
	2	183	219,17				
	3	51	227,43				
	4	79	212,48				
Social	1	109	193,58	3	4,864	0,182	No
	2	183	217,56				
	3	51	234,68				
	4	79	207,22				

p> 0.05

In Table 11, whether the differentiation of DLS scores according to grade levels was significant was examined with the Kruscal Wallis H test and no significant difference was found, H3 (attitude) = 7,069; H3 (cognitive) = 4.946; H3 (social) = 4.864; it can be stated that the digital literacy levels of the participants at different grade levels are the same.

While investigating whether there was a significant difference in OLMS scores by class level, whether the data had a normal distribution or not was interpreted in a holistic way by comparing the Kolmogorov-Shapiro-Wilk's test with the desired limit value compared with the 1.96 criterion for kurtosis-skewness and standard error values of these indices. It was observed that the whole of OLMS and the sub-dimensions of IMTK, IMTS, IMTES, DR, IR, ER, LOM provide normal distribution by class level variable. Significant differences by class level variable were examined with unrelated samples t-test and given in Table 12.

Table 12. One-way Analysis of Variance (ANOVA) Result of OLMS according to Grade Level

Sub-dimensions	Grade level	$\bar{X}$	S_x	N	Variance Source	Sum of Squares	df	Mean Squares	F	p	Significant Difference	n
IMTK	1	17,69	5,33	109	Intergroup	381,039	3	127,013	4,403	0,005*		0,030634
	2	18,48	5,56	183	In-group	12057,6	418	28,846			2nd and 4th	
	3	19,24	5,43	51	Total	12438,64	421				3rd and 4th	
	4	16,22	4,91	79							2nd and 3rd	
IMTES	1	20,01	4,97	109	Intergroup	141,274	3	47,091	1,661	0,175		
	2	20,34	5,56	183	In-group	11852,64	418	28,356				
	3	20,63	5,30	51	Total	11993,92	421					
	4	18,87	5,25	79								
IR	1	18,25	5,66	109	Intergroup	308,068	3	102,689	2,946	0,033*		0,020706
	2	18,09	6,17	183	In-group	14570,35	418	34,857				
	3	19,16	5,78	51	Total	14878,42	421				4th grade	
	4	16,28	5,68	79							3rd grade	
Whole	1	132,18	24,01	109	Intergroup	7625,634	3	2541,878	3,673	0,012*		0,025683
scale	2	134,28	27,03	183	In-group	289288,6	418	692,078			2nd and 4th	
	3	139,22	28,36	51	Total	296914,2	421				3rd and 4th	
	4	124,76	26,26	79							2nd and 3rd	

When the analysis result presented in Table 12 is examined, it is observed that there is not a significant difference in terms of the class levels of the IMTES sub-dimension scores of the students, F (3,418) = 1,661, p> 0.05. In other words, the scores of IMTES of students at 1st, 2nd, 3rd, and 4th grades are similar. A significant difference was observed in the IMTS sub-dimension score according to the grade levels, F (3,418) = 4,403, p <0.05. The Tukey test was used to determine the grade level of the significant difference, since it provided the assumption that the variances were equal. There was a significant difference between the 2nd

and 4th grade levels in favor of the 2nd grade students ($\bar{\chi}$ 2nd Grade = 18.48). In the IMTS sub-dimension score, there was a significant difference between the 3rd and 4th grade levels in favor of the 3rd grade students ($\bar{\chi}$ 3rd Grade = 19,24). When the size of the calculated effect was examined, the class level variable explained 3.06% of the IMTS scores and this effect was at a low level. On the other hand, a significant difference was observed in the scores of the IR sub-dimension by grade level, F (3,418) = 2,946, p <0,05. Tukey test was used to determine which grade level the significant difference was in favor of it, since it provided the assumption that the variances were equal. There was a significant difference in favor of the 3rd grade students between the IR sub-dimension levels of 3rd and 4th grade students ($\bar{\chi}$ 3rd grade = 19,16). When the size of the calculated effect was examined, the grade level variable explained 2.07% of the intrinsic motivation scores for success and this effect was at a low level. A significant difference was observed in the score of the whole scale according to the grade level F (3,418) = 4.403, p <0.05. Tukey test was used to determine which grade level the significant difference was in favor of it, since it provided the assumption that the variances were equal. There was a significant difference between the levels of the 2nd and 4th grade students in favor of the 2nd grade students ($\bar{\chi}$ 2nd grade = 134.28) and there was a significant difference between the levels of 3rd and 4th grade students in favor of 3rd grade students ($\bar{\chi}$ 3rd grade = 139,22). When the calculated effect size was examined, the class level variable explained 2.56% of the total scores of the scale and this effect was at a low level.

Table 13. Kruskal Wallis H Test Result of OLMS according to Grade Level

Dimensions	Grade Level	N	Mean Rank	df	x^2	p	Significant Difference	r
IMTK	1	109	211,1927	3	9,751944	0,02	4th grade	0,101594
	2	183	225,5328				4th grade	
	3	51	218,4804				4th grade	
	4	79	174,9114				1st.-2nd.3rd. grade	
DR	1	109	219,0963	3	15,75581	0,00	4th grade	0,139904
	2	183	223,2322				4^{th} grade	
	3	51	228,549				4^{th} grade	
	4	79	162,8354				1^{st} 2^{nd} 3^{rd}grade	
ER	1	109	209,8073	3	7,6946	0,05	No	
	2	183	214,2923					
	3	51	245,4118					
	4	79	185,4747					
LOM	1	109	190,2798	3	7,7293	0,05	No	
	2	183	208,4754					
	3	51	236,5					
	4	79	231,6456					

In Table 13, it was examined with the Kruscal Wallis H test whether the differentiation of OLMS scores according to class levels was significant or not. When the digital literacy levels of the participants for ER and LOM sub-dimensions were compared according to their class levels, no significant difference was found. H3 (ER) = 7.6946; H3 (LOM) = 7.7293, p> 0.05. Significant difference was observed in the sub-dimensions of IMTK and DR according to the class level, H3 (IMTK) = 9,751944; H3 (DR) = 15.75581, p <0.05. The Mann Whitney U test was used as a post hoc test to determine the differences in the grade levels in IMTK and DR sub-dimension scores. As a result of the analysis, it was seen that there was a significant difference between 1.st, 2nd., 3rd and 4th grade students in favor of 1st, 2nd and 3rd grades separately for the IMTK and DR sub-dimensions; the effect size of the class level variable affecting the IMTK and DR sub-dimensions was low.

Findings Regarding the Third Research Question

The answer to the third research question “Is there a significant relationship between the digital literacy and online learning motivation levels of university students studying through distance education during the COVID-19 pandemic?” is given in Table 14.

Table 14. Correlation Results Regarding OLMS and DLS

		IMTK	IMTS	IMTES	DR	IR	ER	LOM	OLMS
Attitude	r	0,451**	0,445**	0,442**	0,457**	0,406**	0,299**	-0,287	0,436**
	p	0	0	0	0	0	0	0	0
	N	422	422	422	422	422	422	422	422
Technique	r	0,415**	0,395**	0,410**	0,374**	0,279**	0,249**	-0,184	0,384**
	p	0	0	0	0	0	0	0	0
	N	422	422	422	422	422	422	422	422
Cognitive	r	0,453**	0,479**	0,467**	0,496**	0,453**	0,388**	-,248**	0,494**
	p	0	0	0	0	0	0	0	0
	N	422	422	422	422	422	422	422	422
Social	r	0,357**	0,374**	0,375**	0,347**	0,302**	0,272**	-,134**	0,378**
	p	0	0	0	0	0	0	0,006	0
	N	422	422	422	422	422	422	422	422
DLS	r	0,479**	0,474**	0,477**	0,470**	0,398**	0,327**	0,264**	0,467**
	p	0	0	0	0	0	0	0	0
	N	422	422	422	422	422	422	422	422

In Table 14, the results of the correlation calculated by using the sub-dimension scores of the scales used and the total score results for the whole were reported. It was seen that the attitude sub-dimension score of DLS had a low-level significant relationship with the ER and LOM sub-dimension scores of OLMS. While a positive correlation was calculated between the attitude and technique sub-dimension scores and the DD sub-dimension score, a negative correlation was calculated between the attitude and technique sub-dimension and the LOM sub-dimension score. A low level of significant relationship was observed between the technique subscale score and the IR, ER and LOM sub-dimensions. The relationship between LOM and the technique sub-dimension was negative. There was a low and negative significant relationship between the cognitive sub-dimension score and the LOM sub-dimension score. A low level and significant relation was found between the social subscale and ER and LOM subscale scores. The relationship between social and LOM scores was negative. A low, positive, and significant relationship was observed between the total DLS score and the LOM subscale scores. All the correlations examined between other sub-dimensions and total scores of DLS, and OLMS showed that there was a moderately positive and significant relationship between DLS and OLMS. The correlation value calculated between the two variables considered in the study was significant ($r_{CDM-RLS}=0.467$, $p<0.05$). The variance value explained for the two variables was calculated as 0.218. With this finding, we can say that 21.8 % of online learning motivation level of students is interpreted by their digital literacy level or vice versa.

DISCUSSION and CONCLUSION

It was determined that there is a moderately positive and statistically significant relationship between the digital literacy and online learning motivation levels of the students within the scope of the study. The correlations between the digital literacy and online learning motivation levels obtained according to the gender and grade levels of the students were also found as equal. Moreover, 21.8 % of students' digital literacy is interpreted by their online learning motivation. Based on these findings, it can be said that there is a moderately positive and statistically significant relationship between students' digital literacy levels which refers to understanding and using the information provided through computers, obtaining data from the internet within the framework of ethical rules and using this data in the right place and at the right time, establishing relationships through the internet, obtaining the necessary information and solving the problem when they encounter any technical and technological problem, being aware of technologies, paying attention to these technologies and having a positive attitude towards them and online learning motivation, which is a characteristic convincing student to learn and fulfil the learning activities and the force that encourages students to fulfil their choices and participation. Since familiarity with technology is essential in online learning environments (Agarwal et al., 2000; Marrakas & Johnson, 1998), these needs, knowledge, skills, services, and technologies require students to be digital literate at a certain level.

Moreover, as some degree of technological competence is required for online learning, this competence is also vital to reducing cognitive load, as the excessive cognitive load can cause a student's attention to shift from subject to technological problem and decrease motivation (Hartley, 1999; Kim & Frick, 2011; Pintrich & Schunk, 2002). Motivation, an essential factor in online learning, is the driving force that enables students to act and energize to access and evaluate information in lessons, use different software applications and hardware, and produce digital content. Ramírez-Correa et al. (2015) and Xu and Jaggars (2013) state that one of the leading reasons for dropping education in online learning is motivation; therefore, motivation emerges as an essential factor in online learning and thus in digital literacy. Training to use the required technology is also an essential factor affecting the motivation of online students (Schramm et al., 2000). Studies have determined that computer self-efficacy is essential to students'

online learning satisfaction and class participation (Hill & Hannafin, 1997; Joo et al., 2000; Lim, 2001). Technology in online learning, needed within the scope of distance education and used by the precautions taken in the COVID-19 pandemic, is the only connection that students have, so any technical problem experienced increases the possibility of students being unwilling to learn and even quitting the course (Essex & Çağıltay, 2001; Hara & Kling, 2000; Kim & Frick, 2011); therefore, students need to adopt technology and develop their digital skills in line with the emerging global trends and realities in education. In online learning environments, students have higher motivation when they do not have a technical problem (Kim & Frick, 2011) because these technical difficulties can be very discouraging if they prevent the student from accessing course resources, activities and tasks, the instructor, and other students. University students who are exposed to online learning intensely during the COVID-19 pandemic within the scope of the present research are digitally literate individuals at a moderate level; so we can say that they have some technical and operational skills, can follow technologies, use digital products and perform essential computer-based works in order to continue their education by learning the developing communication and information technologies and need to have motivation, which is a psychological feature that encourages them to learn and do learning activities in online learning environments at a moderate level and these variables affect each other moderately.

It has been determined that the digital literacy levels of the students within the scope of the research are at a medium level. Based on this finding obtained in the study, it can be said that the students within the scope of the study have a medium level of basic technical and operational skills in obtaining the information they need from digital sources, evaluating the timeliness and reliability of the information obtained, socializing on the internet, obtaining, and using information without violating the ethical rules and knowing what to do when personal security is harmed. In addition, it can be said that the students' skills within the scope of the study have a medium level of skills in following the developing technologies, generating new information and distinguishing the correct information. As Martin (2005) emphasized, recognizing digital resources and tools, reaching them, managing, evaluating, analyzing, synthesizing, generating new information from what they have acquired and being aware of them are among the skills that today's students should acquire. Therefore, we can say that university students within the scope of this research have those skills at a moderate level. Knobel and Lankshear (2006) stated that digital literacy was increasingly defined as an official goal of education. So, that university students within the scope of this research have a moderate level of digital literacy means they have that official education goal indicated by Knobel and Lankshear. Studies conducted by Çetin (2016), Çukurbaşı and İşman (2014) and Tyger (2011) in which university students have moderate digital literacy in the relevant literature also support this finding of the current research.

There is no difference in terms of the cognitive, attitude and social sub-dimension scores of the digital literacy scale of male and female students within the scope of the research; it is seen that there is a significant difference in favour of male students in the technique sub-dimension. The fact that the male students within the scope of the study have higher scores in the technique sub-dimension of the digital literacy scale may be due to higher knowledge and skills than female students of having technical and operational skills to learn communication and information technologies and use them in daily activities, performing essential computer-based works, accessing different software applications and hardware devices, and using them, choosing and using the most appropriate technological tools to complete the task. According to the study done by the Turkish Statistical Institute in Turkey, the rate of people between the ages of 16-24 using computers was 75.1% for males and 60.1% for females in 2018; the internet usage rate for the same year was 94.7% for males, and 86.5% for males between January and March 2018 was found (TÜİK, 2018). This data, which can be considered proof that males are more concerned with computers and the internet in Turkey, also supports the fact that male students within the scope of the study got more points in the technique sub-dimension of the scale. This finding of the study is also supported by some research findings in the relevant literature (Deryakulu, 2007; Gui & Argentin, 2011; Korkmaz et al., 2015; Korkut & Akkoyunlu, 2008; Ocak & Karakuş, 2019; Sulak, 2019; Tsai et al., 2001). That there is no difference in terms of the cognitive, attitude, and social sub-dimension scores of the digital literacy scale of male and female students within the scope of the research means both male and females students can think critically, evaluate and use digital information in online search and use the internet for communication, keep personal information, protect personal security, know what to do in danger and against this danger based on internet ethics at the same level.

Moreover, all students within the scope of the present research have the same level of digital literacy attitude, a tendency that affects both social perception and behaviour, which is attributed to an individual and regularly forms her thoughts, feelings, and behaviours about a psychological object; therefore, those students are found to have the same level of thoughts, feelings, and behaviours about the process of thinking skills, obtaining data from the internet and using technology correctly by establishing relationships. Moreover, it was determined that the digital literacy levels of the students within the scope of the study did not differ according to gender. The finding that there is no difference in terms of the total score of the digital literacy scale of female and male students within the scope of the research is also supported by some research findings in the literature (Can et al., 2020; Ertaş et al., 2019; Korkmaz & Mahiroğlu, 2009; Kozan, 2018; Polat, 2018; Sarıkaya, 2019; Yaman, 2019; Yılmaz et al., 2019).

It was determined that DLS total score and technique, cognitive, affective, and social sub-dimension scores did not differ according to grade levels; in other words, the total score and sub-dimension scores of the DLS of all students studying at 1st, 2nd, 3rd and 4th grade are similar. Based on this data obtained from the research, it can be said that students of all grade levels equally have the skills of using communication and information technologies in their daily lives, distinguishing accurate and current information in online search, researching and protecting their personal information without ignoring internet ethics, using essential technological resources and digital technologies, having a positive attitude towards digital technologies and establishing

healthy communication with people on the internet. When the relevant literature was examined, it was determined in the studies conducted by Çukurbaşı and İşman (2014) and Sarıkaya (2019) that the digital literacy of university students did not differ in terms of grade level; the findings of these studies support the current research findings. However, there are also studies in the literature in which the level of digital literacy differs according to the level of students' grade levels (Baker et al., 2003; Can et al., 2020; Carrington & Robinson, 2009; Göldağ & Kanat, 2018; Hamutoğlu et al., 2017b; Kozan, 2018; Marsh et al., 2017; Öztürk & Budak, 2019; Pew Research Center, 2005; Techataweewan & Prasertsin, 2017; Witten et al., 2018; Yaman, 2019). The fact that the current research finding does not coincide with some research findings in the literature may probably be since all of the students within the scope of the research are very intensely and suddenly exposed to the digital environment, especially as a necessity of online learning, due to the COVID-19 pandemic.

It has been determined that the online learning motivation of the students within the scope of the research is at a medium level. Based on this finding, it can be said that both female and male students within the scope of the study have moderate motivation levels for online learning, an innovative approach that offers well-designed and interactive learning environments, using different digital technological features and resources, and learning materials suitable for open and flexible learning environments, without time and space limitations. In addition, it can be said that the student's motivation to concentrate on, participate in and complete learning activities and their level of interaction with learning materials, expectations of appreciation and praise for their learning, their inner desire to learn about their lessons, and their mental and psychological energy to perform online courses are moderate. Since human-computer interaction evoked by online learning (McIsaac & Gunawardena, 1996) and effort to use the required technology (Schramm et al., 2000) are essential factors affecting the motivation of online students and those skills are needed for distance education during the COVID-19 period, that the university students within the scope of the current research have moderate online learning motivation is inevitable.

In the study, a statistically significant difference was found in favour of male students only in the lack of motivation sub-dimension; a statistically significant difference was found in favour of female students in the total scale score. These findings mean that the online learning motivation levels of male students within the scope of the study are lower than that of female students. This is an indication that the psychological conditions that persuaded the female students within the scope of the study to learn and complete the learning activities were higher than that of the male students; it can be said that the degree of participation, effort and persistence of female students in learning processes, their inner desire to acquire information about a subject, the psychological powers that enable them to realize their educational situation and the continuation of this action, and their concentration towards teaching are higher. We can say that lack of motivation, the state of not feeling the competence to do activity according to Ryan and Deci (2000), is felt more intensely by male students. Moreover, the current research finding that indicates a statistically significant difference in favour of female students in the total score of the scale is supported by the findings of some studies in the related literature (Fredericksen et al., 2000; Swan et al., 2000).

In the study, it was found that "external regulation", "lack of motivation", and "intrinsic motivation to experience stimulation" sub-dimension scores of the online learning motivation scale did not differ according to students' grade levels; there is a significant difference between the 2nd and 4th grades in favour of 2nd-grade students and between 3rd and 4th grades in favour of 3rd-grade students in the "intrinsic motivation to succeed" sub-dimension score and the score regarding the whole scale; there is a significant difference between 3rd and 4th grades in favour of 3rd-grade students in the "introjected regulation" sub-dimension; there are significant differences in favour of the 1st, 2nd and 3rd-grade students separately between 1st, 2nd, 3rd and 4th-grade students according to the grade level in terms of "intrinsic motivation to know" and "determined regulation" sub-dimensions. In the whole online learning motivation scale score, a significant difference was found between the 2nd and 4th-grade levels in favour of the 2nd-grade students and between the 3rd and 4th-grade levels in favour of the 3rd-grade students. Based on these study findings, it can be said that the online learning motivation of the students studying in lower grades is higher than those studying in upper grades. This may be since the younger the students are, the more they are competent in online environments.

Suggestions

In the study, it was determined that the digital literacy and online learning motivation of university students were at a medium level, and 21.8 % of online learning motivation of students within the scope of the study is explained by their digital literacy or vice versa. Based on this finding, the reasons for students' medium level of digital literacy and online learning motivation can be determined by instructors. These levels can be increased with in-school and out-of-school training. The rise of one factor will trigger the rise of the other factor anyway.

The study determined that as the students' grade levels increased, their digital literacy and online learning motivation levels decreased. The reasons underlying the decrease in students' digital literacy and online motivation, e.g. learning content and level of interaction, should be investigated, and instructors should plan training on this subject.

It was also determined that female students within the scope of the research scored less than male students in the technique sub-dimension of DLS; to eliminate the technical literacy gap between the genders, training for female students can be organized by instructors.

In the study, a statistically significant difference was found in favour of male students only in the lack of motivation sub-dimension of the online learning motivation scale and in favour of female students in the total score of the scale. For this reason, training and seminars should be organized to increase male students' motivation to learn from online instructors.

It is thought that it would be beneficial to conduct a similar study by new researchers with faculty members who interact the most with university students. In addition, awareness of digital literacy can be created in parents through joint training organized with legal and non-governmental organizations.

Longitudinal and experimental studies can be conducted by new researchers on digital literacy and online learning motivation. By curriculum development experts, goals related to digital literacy and online learning motivation can be included in the curriculum.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, author-ship, and/or publication of this article.

Statements of publication ethics

I hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Ethics Committee Approval Information

This study was conducted under the permission of "Bolu Abant İzzet Baysal University Human Research Ethics Committee in Social Sciences" met on 24.12.2021 with the number 2012/12.

REFERENCES

Agarwal, R., Sambamurthy, V., & Stair, R. (2000). The evolving relationship between general and special computer self-efficacy-An empirical assessment. *Information Systems Research*, 11(4), 418-430. doi:10.1287/isre.11.4.418.11876

Aguilera-Hermida, A. P. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, September, 1. https://doi.org/10.1016/j.ijedro.2020.100011

Albelbisi, N., & Yusop, F. (2019). Factors influencing learners' self-regulated learning skills in a massive open online course (MOOC) environment. *Turkish Online Journal of Distance Education*, 20, 1-16. 10.17718/tojde.598191.

Aoki, K. (2010). The use of ICT and e-learning in higher education in Japan. *World Academy of Science, Engineering and Technology*, 66, 868-872.

Arnone, M. P., & Small, R. V. (1999). Evaluating the motivational effectiveness of children's websites. *Educational Technology*, 39(2), 51-55.

Artino, A. R. (2008). Motivational beliefs and perceptions of instructional quality: Predicting satisfaction with online training. *Journal of Computer Assisted Learning*, 24(3), 260-270. doi: 10.1111/j.1365-2729.2007.00258.x

Artino Jr., A. R., & Stephens, J. M. (2009). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *Internet and Higher Education*, 12, 146-151. doi: 10.1016/j.iheduc.2009.02.001

de Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC. *Journal of Computer Assisted Learning*, 32(3), 218e231. http://dx.doi.org/10.1111/jcal.12130.

Balcı, A. (2020). *Sosyal bilimlerde araştırma yöntem, teknik ve ilkeler [Research Methods, Techniques and Principles in Social Sciences].* Pegem Akademi [Pegem Academy]. [In Turkish]

Bawden, D. (2001). Information and digital literacies: A review of concepts. *Journal of Documentation*, 57(2), 218-259.

Bekele, T. A. (2010). Motivation and satisfaction in internet-supported learning environments: A review. *Educational Technology & Society*, 13(2), 116-127.

Belshaw, D.A.J. (2011). *What is digital literacy? A Pragmatic investigation*. Unpublished Doctoral Dissertation, Durham University. http://neverendingthesis.com/index.php/Main_Page

Biner, P. M., Dean, R. S., & Mellinger, A. E. (1994). Factors underlying distance learner satisfaction with televised college-level courses. *The American Journal of Distance Learning*, 8(1), 60-71.

Bozkurt, A. (2020), Koronavirüs (Covid-19) Pandemi Süreci ve Pandemi Sonrası Dünyada Eğitime Yönelik Değerlendirmeler: Yeni Normal ve Yeni Eğitim Paradigması [Coronavirus (Covid-19) Pandemic Process and Evaluations on Education in the World after the Pandemic: New Normal and New Education Paradigm]. *Açık Öğretim Uygulamaları ve Araştırmaları Dergisi [Journal of Open Education Applications and Research]*, 6(3), 112-142. [In Turkish]

Bozkurt, A., & Sharma, R. C. (2020), Emergency remote teaching in a time of global crisis due to corona virus pandemic. *Asian Journal of Distance Education*, 15(1), 1-6.

Brophy, J. (2010). *Motivating Students to Learn* (3rd ed.). New York, NY: Routledge.

Buckler, A., Chamberlain, L., Stutchbury, K., & Hedge, C. (2020). *Minimising distance in distance learning programmes during a global health crisis: Framing an international education response to COVID-19.* UKFIET, https://www.ukfiet.org/2020/minimising-distance-indistance-learning-programmes-during-a-global-health-crisis-framing-aninternational-education-response-to-covid-19/, (Retrived on: 05. 06. 2020).

Campbell, E. (2016). *Pre-service teachers' perceptions and practices: Integrating digital literacy in English education*. Unpublished Master's Thesis, University of Cape Town.

Can, Ş., Çelik, B., & Çelik, C. (2020). Fen Bilgisi öğretmen adaylarının dijital okuryazarlık düzeyine çeşitli değişkenlerin etkisi [The effects of different variables on the digital literacy Level of Pre-Service Science Teachers]. *Eğitim Kuram ve Uygulama Araştırmaları Dergisi [Eğitim Kuram ve Uygulama Araştırmaları Dergisi]*, 6(3), 352-358. doi: 10.38089/ekuad.2020.33 [In Turkish]

Carrington, V., & Robinson, M. (2009). *Digital literacies: Social learning and classroom practices*. London: SAGE Publications.

Chen, K., & Jang, S. (2010). Motivation in online learning: testing a model of self-determination theory. *Computers in Human Behavior*, July, 26(4), 741-752.

Cho, M.-H., & Jonassen, D. (2009). Development of the human interaction dimension of the self-regulated learning questionnaire in asynchronous online learning environments. *Educational Psychology*, 29(1), 117–138. http://dx.doi.org/10.1080/01443410802516934

Christensen, C., Johnson, C. W., & Horn, M. B. (2008). *Disrupting class: How disruptive innovation will change the way the world learns.* New York: McGraw-Hill.

Churchill, N., Ping, L.Ç., Oakley, G., & Churchill, D. (2008). *Digital storytelling and digital literacy learning.* International Conference on Information Communication Technologies in Education, Island. https://www.academia.edu/2818859/Digital_storytelling_and_digital_literacy_learning

Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning*. McGraw-Hill.

Chyung, Y., Winiecki, D. J., & Fenner, J. A. (1998). *A case study: Increase enrollment by reducing dropout rates in adult distance education* [Conference presentation]. Annual Conference on Distance Teaching & Learning, Madison, WI, United States.

Coşkun, Y.D., Cumaoğlu, G.K., & Seçkin, H. (2013). Bilgisayar öğretmen adaylarının bilişim alanıyla ilgili okuryazarlık kavramlarına yönelik görüşleri [Computer teacher candidates' opinions on literacy concepts related to informatics]. *Internatioanal Journal of Human Sciences*, 10(1), 1259-1272. [In Turkish]

Cote, T., & Milliner, B. (2016). *Japanese university students' self-assessment and digital literacy test results. S. Papadima-Sophocleous*, In L. Bradley & S. Thouësny (Eds), CALL communities and culture – short papers from EUROCALL 2016 (s. 125-131). doi: 10.14705/rpnet.2016.eurocall2016.549

Çam, E., & Kiyici, M. (2017). Perceptions of Prospective Teachers on Digital Literacy. *Malaysian Online Journal of Educational Technology*, 5(4), 29-44.

Çetin, O. (2016). Pedagojik formasyon programı ile lisans eğitimi fen bilimleri öğretmen adaylarının dijital okuryazarlık düzeylerinin incelenmesi [Examination of digital literacy levels of pre-service science teachers with pedagogical formation program]. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi [Erzincan University Journal of Education Faculty]*, 18(2), 658-685. https://dergipark.org.tr/download/article-file/286833 [In Turkish]

Çubukçu, A., & Bayzan, Ş. (2013). Türkiye'de dijital vatandaşlık algısı ve bu algıyı internetin bilinçli, güvenli ve etkin kullanımı ile artırma yöntemleri [Perception of digital citizenship in Turkey and methods to increase this perception with conscious, safe and effective use of the internet]. *Middle Eastern & African Journal of Educational Research*, 5, 148-174. [In Turkish]

Çukurbaşı, B., & İşman, A. (2014). Öğretmen adaylarının dijital yerli özelliklerinin incelenmesi (Bartın Üniversitesi örneği) [Investigation of pre-service teachers' digital native features (Bartın University example)]. *Bartın Üniversitesi Eğitim Fakültesi Dergisi [Bartın University Journal of Education Faculty]*, Yaz [Summer], 3(1), 28-54. [In Turkish]

Daniels, B.M. (2008). *Motivation, academic success, and learning environments: Comparing high school face-to-face and online courses*. Unpublished Doctoral Dissertation. http://ezproxy.um.edu.my:2110/pqdweb?did=1674096401&sid=1&Fmt=2&clientId=18803&RQT=309&VName=PQD (Retrieved on:22.01.2020).

Dayanıklı, F. (2019). *Hemşirelik öğrencilerinde sağlıklı yaşam biçimi davranışları, sağlık okuryazarlığı ve dijital okuryazarlık arasındaki ilişki* [The relationship between healthy lifestyle behaviors, health literacy and digital literacy among nursing students]. Yayınlanmamış Yüksek Lisans Tezi [Unpublished Master's Thesis], Düzce Üniversitesi [Duzce University]. [In Turkish]

Deryakulu, D. (2007). Seçmeli bilgisayar dersi ve bilgisayar öz-yeterlik algısının 8. sınıf öğrencilerinin seçmek istedikleri mesleklerle ilişkisi [The relationship between the elective computer course and the perception of computer self-efficacy with the professions that 8th grade students want to choose]. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi [Ankara University Journal of Educational Sciences]*, 40(2), 1-22.https://doi.org/10.1501/Egifak_0000000146 [In Turkish]

Dobson, T., & Willinsky, J. (2009). *Digital literacy*. In D. Olson & N. Torrance (Eds.), The Cambridge handbook of literacy. Cambridge University Press.

Donohue, C. (2014). *Technology and digital media as tools for teaching and learning in the digital age.* In Technology and Digital Media in the Early Years (pp. 53-67). Routledge.

Dörnyei, Z. (2001). *Teaching and researching motivation*. Longman.

Dörnyei, Z., & Ushioda, E. (2011). *Teaching and researching motivation* (2nd ed.). Pearson Education Limited.

Ertaş, H., Kıraç, R., & Demir, R. H. (2019, 10-13 Ekim). *Dijital Okuryazarlık ve e-sağlık okuryazarlığı arasındaki ilişkinin incelenmesi [Examining the relationship between digital literacy and e-health literacy].* 3. Uluslararası 13. Ulusal Sağlık ve Hastane İdaresi Kongresi [3rd International 13th National Health and Hospital Management Congress], Sakarya Üniversitesi [Sakarya University], Bildiri Kitabı [Proceedings Book], 557-570. [In Turkish]

Eshet-Alkalai, Y. (2002). *Digital literacy: A new terminology framework and its application to the design of meaningful technology-based learning environments*. P. Barker, & Rebelesky, S., In Proceedings of EDMEDIA, 2002 World Conference on Educational Multimedia, Hypermedia, ve Telecommunication (pp. 493-498). Norfolk, NA: Association for the Advancement of Computing in Education.

Eshet-Alkalai, Y., & Amichai-Hamburger, Y. (2004). Experiments in digital literacy. *CyberPsychology & Behavior*, 7(4), 421-429.

Essex, C., & Cagiltay, K. (2001). Evaluating an online course: Feedback from "distressed" students. *Quarterly Review of Distance Education*, 2(3), 233-239.

Fredericksen, E., Pickett, A., Shea, P., Pelz, W., & Swan, K. (2000). Student satisfaction and perceived learning with on-line courses: principles and examples from the SUNY learning network. *Journal of Asynchronous Learning Networks*, 4(2), 7-41.

Fryer, L., & Bovee, N. (2016). Supporting students' motivation for e-learning: teachers matter on and offline. *Internet and Higher Education*, 30, 21–29. http://dx.doi.org/10.1016/j.iheduc.2016.03.003.

Fryer, L., Bovee, N., & Nakao, K. (2014). E-learning: Reasons students in language learning courses don't want to. *Computers & Education*, 74, 26–36. http://dx.doi.org/10.1016/j.compedu.2014.01.008.

Gao, T., & Lehman, J. D. (2003). The effects of different levels of interaction on the achievement and motivational perceptions of college students in a web-based learning environment. *Journal of Interactive Learning Research*, 14(4), 367-386.

Gay, L. R. & Airasian, P. (2000) *Educational Research: competencies for analysis and application* (6th edition), Prentice Hall.

Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2013). Investigating the relations between motivation, tool use, participation, and performance in an e-learning course using web-videoconferencing. *Computers in Human Behavior*, 29(1), 285e292. http://dx.doi.org/10.1016/j.chb.2012.09.005.

Gillen, J., Arnott, L., Marsh, J., Bus, A., Castro, T., Dardanou, M.,…. & Holloway, D. (2018). *Digital literacy and young children: towards better understandings of the benefits and challenges of digital technologies in homes and early years settings*. Policy briefing of DigiLitEY COST Action IS1410 and the Digital Childhoods SIG of the European Early Childhood Research Association.

Gilster, P. (1997). *Digital literacy*. Wiley.

Gökçearaslan, Ş., & Bayır, E. A. (2011). Öğretmen adaylarının sayısal yetkinlik düzeylerinin incelenmesi [Examination of pre-service teachers' numerical competency levels]. 2nd International Conference on New Trends in Education and Their Implications, Sunulmuş bildiri [Submitted paper], Antalya. http://www.iconte.org/ FileUpload/ks59689/File/200.pdf [In Turkish]

Göldağ B., & Kanat S. (2018). Güzel sanatlar eğitimi alan öğrencilerin dijital okuryazarlık durumları [Digital literacy status of students studying fine arts]. *International Journal of Social Science*, 70, 77-92. [In Turkish]

Green, M., & Sulbaran, T. (2006). *Motivation assessment instrument for virtual reality scheduling simulator*. In T. Reeves, & S. Yamashita (Eds.), Proceedings of world conference on e-learning in corporate, government, healthcare, and higher education 2006 (pp. 45e50). Chesapeake, VA: AACE.

Guay, F., Ratelle, C. F., & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology*, 49(3), 233–240. http://dx.doi.org/10.1037/a0012758

Gui, M., & Argentin, G. (2011). Digital skills of internet natives: Different forms of digital literacy in a random sample of northern Italian high school students. *New Media & Society*, 13(6), 963-980. https://doi.org/10.1177/1461444810389751

Gürtekin, A. (2019). *Üniversite Öğrencilerinin Boş Zaman Tutumları ile Sosyalleşme Taktikleri ve Dijital Okuryazarlık Düzeylerinin İncelenmesi [Investigation of University Students' Leisure Attitudes, Socialization Tactics and Digital Literacy Levels].* Yayınlanmamış Yüksek Lisans Tezi [Unpublished Master Thesis], Ağrı İbrahim Çeçen Üniversitesi [Ağrı İbrahim Çeçen University].

Hamutoğlu, N. B. Güngören, Ö. C., Uyanık, G. K., & Erdoğan, D. G., (2017a). Dijital Okuryazarlık Ölçeği: Türkçe'ye Uyarlama Çalışması [Digital Literacy Scale: A Study for Adapting to Turkish]. *Ege Eğitim Dergisi*, 18(1): 408-429. [In Turkish]

_____(2017b, 18-21 May). *Öğretmen adaylarının web 2.0 araçlarını kullanma sıklıkları ile dijital okuryazarlık düzeyleri arasındaki ilişkinin incelenmesi [Examining the relationship between pre-service teachers' frequency of using web 2.0 tools and their digital literacy level].* ERPA International Congresses on Education, Macaristan [Hungary], Özetler Kitabı [Proceedings Book], Sakarya: Edugarden, 57-63. [In Turkish]

Hara, N., & Kling, R. (2000). Students' distress with a Web-based distance education course: An ethnographic study of participants' experiences. *Information, Communication & Society*, 3(4), 557-579.

Hartley, K. W. (1999). Media overload in instructional Web pages and the impact on learning. *Educational Media International*, 36(2), 145-150.

Hill, J. R., & Hannafin, M. J. (1997). Cognitive strategies and learning from the World Wide Web. *Educational Technology Research and Development*, 45(4), 37-64.

Horne, J. (2007). Gender Differences in Computerised and Conventional Educational Tests. *The Journal of Computer Assisted Learning*, 23, 47-55.

Hoskins, S. L., & van Hooff, J. C. (2005). Motivation and ability: Which students use online learning and what influence does it have on their achievement?. *British Journal of Educational Technology*, 36, 177- 192.

Hu, L-t. & Bentler, P. M. (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. doi: 10.1080/10705519909540118

Hudson, L., McCloud, R., Buhler, T., Cramer, S., Greer, L., & Paugh, R. (1998). *Supporting adult students in Web-based courses: Real examples for serving nontraditional, adult, and minority students*. Paper presented at the National Conference on the Adult Learner, Richmond, VA.

Ihmeideh, F., & Alkhawaldeh, M. (2017). Teachers' and parents' perceptions of the role of technology and digital media in developing child culture in the early years. *Children and Youth Services Review*, 77, 139-146.

İşçioğlu, E., & Kocakuşak, S. (2012). İlköğretim sınıf öğretmeni adaylarının sayısal okuryazarlık düzeyleri ve teknoloji algıları [Digital literacy levels and technology perceptions of primary school teacher candidates]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi [Hacettepe University Journal of Education Faculty]*, 2, 15-24. http://www.efdergi.hacettepe.edu.tr/yönetim/icerik/makaleler/630- published.pdf [In Turkish]

Jones, A., & Issroff, K. (2007). *Learning technologies: Affective and social issues*. In G. Conole & M. Oliver (Eds.), Contemporary perspectives in e-learning research: Themes, methods and impact on practice (pp. 190-202). Routledge.

Joo, Y.-J., Bong, M., & Choi, H.-J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based Instruction. *Educational Technology Research and Development*, 48(2), 5-17.

Junio, D.R. (2020). *Digital divide in the time of COVID-19.* United Nations University. https://cs.unu.edu/news/news/digital-divide-covid-19.html, (Retrived on:15.04.2020).

Karabacak, Z. İ., & Sezgin, A. A. (2019). Türkiye'de dijital dönüşüm ve dijital okuryazarlık [Digital conversion and digital literacy in Turkey]. *Türk İdare Dergisi [Turkish Administrative Journal]*, 488, 319-343. [In Turkish]

Karakış, Ö. (2014). *Lise Öğrencilerinin İngilizce Dersine Yönelik Kaygıları, Motivasyonları, Öz-Yeterlik Algıları ve İngilizce Ders Başarıları Arasındaki İlişki [The Relationship Between High School Students' Anxiety, Motivation, Self-Efficacy Perceptions*

and English Course Success]. Yayınlanmamış Doktora Tezi [Unpublished Doctoral Dissertation], Abant İzzet Baysal Üniversitesi [Abant İzzet Baysal University]. [In Turkish]

Karasar, N. (2012). *Bilimsel araştırma yöntemi [Scientific research method]*. Nobel Yayıncılık [Nobel Publishing].

Keller, J. M. (2008). An integrative theory of motivation, volition, and performance. *Technology, Instruction, Cognition & Learning*, 6(2), 79-104.

Keller, J. M., & Suzuki, K. (2004). Learner motivation and e-learning design: A multinationally validated process. *Journal of Educational Media*, 29(3), 229-239.

Khalid, M. S., Slættalíð, T., Parveen, M., & Hossain, M. S. (2015). *A systematic review and meta-analysis ofteachers' development of digital literacy*. In E. K. Sorensen, A. Szucs, & M. S. Khalid (Eds.), Proceedings of the1th D4|Learning international Conference Innovations in Digital Learning for Inclusion (D4Learning, 2015) (pp.136-144). Aalborg Universitetsforlag.

Khan, B. H. (2005). *Managing e-learning: Design, delivery, implementation and evaluation*. Information Science Publishing.

Kim, K-J., & Frick, T. W. (2011). Changes in student motivation during online learning. *Journal of Educational Computing Research*, 44(1), 1-23. doi: 10.2190/EC.44.1.a

Kline, R.B. (2005). *Principles and practices of structural equation modeling*. Guilford.

Knobel, M., & Lankshear, C. (2006). Digital literacy and digital literacies: policy, pedagogy and research considerations for education. *Nordic Journal of Digital Literacy*, 1(01), 12-24.

Knowles, E. & Kirkman, D. (2007). An investigation of students attitude and motivation toward online learning. *InSight: A Collection of Faculty Scholarship*, 2, 70-80. https://files.eric.ed.gov/fulltext/EJ864281.pdf

Knutsson, O., Blåsjö, M., Hållsten, S., & Karlström, P. (2012). Identifying different registers of digital literacy in virtual learning environments. *The Internet and Higher Education*, 15(4), 237-246.

Korkmaz, Ö., & Mahiroğlu, A. (2009). Üniversiteyi yeni kazanmış öğrencilerin bilgisayar okuryazarlık düzeyleri [Computer literacy levels of newly admitted university students]. *Kastamonu Eğitim Dergisi [Kastamonu Journal of Education]*, 17, 983-1000. [In Turkish]

Korkut, E., & Akkoyunlu, B. (2008). Yabancı dil öğretmen adaylarının bilgi ve bilgisayar okuryazarlık öz yeterlikleri [Information and computer literacy self-efficacy of foreign language teacher candidates]. *Hacettepe Üniversitesi Eğitim Bilimleri Fakültesi Dergisi [Hacettepe University Journal of Educational Sciences]*, 34, 178-188. [In Turkish]

Korkmaz, Ö., Çakır, R. & Tan, S. S. (2015). Öğrencilerin e-öğrenmeye hazır bulunuşluk ve memnuniyet düzeylerinin akademik başarıya etkisi [The effect of students' e-learning readiness and satisfaction levels on academic achievement]. Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD) [Journal of Ahi Evran University Kirsehir Education Faculty], Aralık [December], 16 (3), 219-241. [In Turkish]

Kozan, M. (2018). *Bilgisayar ve öğretim teknolojileri eğitimi bölümü öğretmen adaylarının dijital okuryazarlık düzeyleri ve siber zorbalığa ilişkin duyarlılıklarının incelenmesi [Examination of digital literacy levels and sensitivity towards cyberbullying of pre-service teachers of computer and instructional technologies education department]*. Yayınlanamamış Yüksek Lisans Tezi [Unpublished Master's Thesis], Fırat Üniversitesi [Fırat University], Elazığ. [In Turkish]

Kozan, M., & Özek, M. B. (2019). BÖTE bölümü öğretmen adaylarının dijital okuryazarlık düzeyleri ve siber zorbalığa ilişkin duyarlılıklarının incelenmesi [Examining the digital literacy levels of pre-service ICT department teachers and their sensitivity towards cyber bullying]. *Fırat Üniversitesi Sosyal Bilimler Dergisi [Fırat University Journal of Social Sciences]*, 29(1): 107-120. [In Turkish]

Kuru, E. (2019). Sosyal bilgiler öğretmen adaylarının dijital okuryazarlık kavramına ilişkin görüşleri [Social studies teacher candidates' views on the concept of digital literacy]. *Electronic Turkish Studies*, 14(3), 1629-1648. [In Turkish]

Lim, C. K. (2001). Computer self-efficacy, academic self-concept, and other predictors of satisfaction and future participation of adult distance learners. *American Journal of Distance Education*, 15(2), 41-51.

Lim, D. H. (2004). Cross cultural differences in online learning motivation. *Educational Media International*, 41(2), 163-173.

López-Pérez, V., Pérez-López, C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, 56, 818-826. http://dx.doi.org/10.1016/j.compedu.2010.10.023

Marakas, M. Y. & R. Johnson, R. (1998). The multilevel and multifaceted character of computer self-efficacy: toward clarification of the construct and an integrative framework for reason. *Information Systems Research*, 9(2), 126-163. doi: 10.1287/isre.9.2.126

Markauskaite, L. (2005). Exploring differences in trainee teachers' ICT literacy: Does gender matter. (Retrieved on: 07.03.2021)

Marsh, J., Hannon, P., Lewis, M., & Ritchie, L. (2017). Young children's initiation into family literacy practices in the digital age. *Journal of Early Childhood Research*, 15(1), 47-60.

Martin, A. (2005). DigEuLit – a European framework for digital literacy: A progress report. *Journal of e-Literacy*, 2(2), 130-136.

_____(2008). *Digital Literacy and the Digital Society*. In C. Lankshear, M. Knobel (Eds.), In Digital Literacies: Concepts, Policies and Practices (pp.151-174), Peter Lang.

McIsaac, M. S., & Gunawardena, C. N. (1996). *Distance education*. In D. H. Jonassen (Eds.), Handbook of research for educational communications and technology: A project of the association for educational communications and technology (pp. 403-437). Macmillan Library Reference.

Miltiadou, M., & Yu, C. H. (2000). *Validation of the online technologies self-efficacy scale* (OTSES), ED 445 672, 10p. ERIC. https://files.eric.ed.gov/fulltext/ED445672.pdf

Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education*, 26(1), 29-48. doi: 10.1080/01587910500081269

Mulenga, E. M., & Marbán, J. M. (2020). Is COVID-19 the gateway for digital learning in mathematics education?. *Contemporary Educational Technology*, 12(2), ep269. https://doi.org/10.30935/cedtech/7949.

Nasah, A., DacCosta, B., Kinsell, C., & Seok, S. (2010). The digital literacy debate: an investigation of digital propensity and information and communication technology. *Education Technology Research Development*, 58, 531-555. doi: 10.1007/s11423-010-9151-8.

Ng, W. (2012) Can we teach digital natives digital literacy?. *Computers & Education*, 59, 1065-1078. doi: 10.1016/j.compedu.2012.04.016.

Ocak, G., & Karakuş, G. (2019). Öğretmen adaylarının dijital okuryazarlık öz-yeterlilik becerilerinin farklı değişkenler açısından incelenmesi [An analysis of pre-service teachers' digital literacy self-efficacy skills in terms of different variables]. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi [Afyon Kocatepe University Journal of Social Sciences]*, 21 (1), 129-147. doi: 10.32709/akusosbil.466549 [In Turkish]

Onyema E. M., Eucheria N. C., Obafemi F. A., Sen S., Atonye F. G., Sharma A., & Alsayed A. O. (2020), Impact of coronavirus pandemic on education. *Journal of Education and Practice*, 11(13), 108-121.

Özbaşı, D., Cevahir, H., & Özdemir, M. (2018). Çevrimiçi öğrenme motivasyon ölçeği'nin Türkçe'ye uyarlanması: Geçerlik ve güvenirlik çalışması [Adaptation of the online learning motivation scale to Turkish: validity and reliability study]. *Trakya Üniversitesi Eğitim Fakültesi Dergisi [Trakya University Journal of Education Faculty]*, Ocak [January], 8(2), 352-368. [In Turkish]

Özerbaş, M. A., & Kuralbayeva, A. (2018). Türkiye ve Kazakistan öğretmen adaylarının dijital okuryazarlık düzeylerinin incelenmesi [Examination of digital literacy levels of Turkish and Kazakhstan teacher candidates]. *Muğla Sıtkı Koçman Üniversitesi Eğitim Fakültesi Dergisi [Journal of Muğla Sıtkı Koçman University Faculty of Education],* 5(1),16-25. doi: https://doi.org/10.21666/muefd.314761

Özoğlu, C. (2019). *Öğretmen adaylarının yaşam boyu öğrenmeleri ve dijital okuryazarlıkları arasındaki ilişki (Anadolu Üniversitesi Eğitim Fakültesi Örneği) [Relationship between teacher candidates' lifelong learning and digital literacy (Anadolu University Faculty of Education Example)].* Yayınlanmamış Yüksek Lisans Tezi [Unpublished Master's Thesis], Anadolu Üniversitesi [Anatolian University], Eskişehir. [In Turkish]

Öztürk, Y., & Budak, Y. (2019). Öğretmen adaylarının kendilerine yönelik dijital okuryazarlık değerlendirmelerinin incelenmesi [Examination of pre-service teachers' digital literacy assessments]. *Kesit Akademi Dergisi [Kesit Academy Journal]*, Aralık [December], 5(21), 156-172. [In Turkish]

Pew Research Center (2005). *Trends 2005*. Pew Research Center.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research and applications* (2nd ed.). Prentice Hall Merrill.

Polat, S. (2018). Sosyal Bilgiler Öğretmen Adaylarının Dijital Okuryazarlık Düzeylerinin Farklı Değişkenler Açısından İncelenmesi [An Investigation of Digital Literacy Levels of Social Studies Teacher Candidates in Terms of Different Variables]. In H. Şahin, A. Temizer & M. Premovic (Eds.) Eğitim Bilimlerinde Akademik Çalışmalar [Academic Studies in Educational Sciences], (pp.75-93). ISBN • 978-9940-540-38-8 [In Turkish]

Rambousek, V., Štípek, J., & Vaňková, P. (2016). *Contents of Digital Literacy from the Perspective of Teachers and Pupils.* Future Academy®'s Multidisciplinary Conference, 354-362. doi: 10.1016/j.slavinsbspro.2016.02.101

Ramírez-Correa P.E., Arenas-Gaitán, J., & Rondán-Cataluña, F.J. (2015) Gender and acceptance of e-learning: A multi-group analysis based on a structural equation model among college students in Chile and Spain. *PLoS ONE* 10(10): e0140460. https://doi.org/10.1371/journal.pone.0140460.

Reinhart, J. (1999). *Student motivation, self-efficacy and task difficulty in Web-based instruction*. Unpublished doctoral dissertation, Indiana University, Bloomington.

Rodgers, D. L., & Withrow-Thorton, B. J. (2005). The effect of instructional media on learner motivation. *International Journal of Instructional Media*, 32(4), 333-340.

Rovai, A. P., & Wighting, M. J. (2005). Feelings of alienation and community among higher education students in a virtual classroom. *The Internet and Higher Education*, 8(2), 97-110. doi: 10.1016/j.iheduc.2005.03.001

Rovai, A. P., Ponton, M., Wighting, M., & Baker, J. (2007). A comparative analysis of student motivation in traditional classroom and e-learning courses. *International Journal on E-Learning*, 6(3), 413-432.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemporary Educational Psychology*, 25, 54-67. doi:10.1006/ceps.1999.1020

Sakal, M. (2020, 9-11 Aralık). *Dijital yerlilerin dijital okuryazarlık düzeyleri [Digital literacy levels of digital natives].* 7. Uluslararası Yönetim Bilişim Sistemleri Konferansı. Sağlık Bilişimi ve Analitiği [7th International Management Information Systems Conference. Health Informatics and Analytics]. Bakırçay Üniversitesi [Bakırçay University], İzmir, Türkiye. [In Turkish]

Sarıkaya, B. (2019). Türkçe öğretmen adaylarının dijital okuryazarlık durumlarının çeşitli değişkenler açısından değerlendirilmesi [Evaluation of digital literacy status of Turkish teacher candidates in terms of various variables]. *Uluslararası Sosyal Araştırmalar Dergisi [International Journal of Social Research]*, 12(62), 1098- 1107. doi: http://dx.doi.org/10.17719/jisr.2019.3122 [In Turkish]

Schramm, R. M., Wagner, R. J., & Werner, J. M. (2000). Student perceptions of the effectiveness of web-based courses. *Distance Education Report*, 4(18), 1-3.

Shroff, R. H., Vogel, D. R., & Coombes, J. (2008). Assessing individual-level factors supporting student intrinsic motivation in online discussions: A qualitative study. *Journal of Information Systems Education*, 19(1), 111-125.

Shroff, R. H., & Vogel, D. R. (2009). Assessing the factors deemed to support individual student intrinsic motivation in technology supported online and face-to-face discussions. *Journal of Information Technology Education*, 8, 59-85.

Small, R. V. (1997). *Assessing the motivational quality of World Wide Websites*. Syracuse, NY: ERIC Clearinghouse on Information and Technology.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *Internet and Higher Education*, 7(1), 59-70.

Spires, H, A., Paul, C, M., & Kerkhoff, S, N. (2018). *Digital literacy for the 21st century*. In Pour, M, K. (Eds.) Encyclopedia of information science and technology, 4th edition. IGI Global. doi: 10.4018/978-1-5225-2255-3.ch194

Styer, A. J. (2007). *A grounded meta-analysis of adult learner motivation in online learning from the perspective of the learner*. Unpublished Doctoral Dissertation. Available from ProQuest Dissertations and Theses database (UMI No. 3249903)

Sulak, S. E. (2019). Dijital okuryazarlık ölçeğinin geliştirilmesi: Geçerlik ve güvenirlik çalışması [Development of digital literacy scale: validity and reliability study]. *Social Sciences Studies Journal*, 5(31), 1329-1342. [In Turkish]

Swan, K., Shea, P., Fredericksen, E. E., Pickett, A. M. & Pelz, W. E. (2000). *Course design factors influencing the success of online learning*. In: Proceedings of WebNet 2000 world conference on the WWW and Internet, San Antonio, TX.

Svensson, M., & Baelo, R. (2015). Teacher students' perceptions of their digital competence. *Procedia - Social and Behavioral Sciences*, 180, 1527-1534. doi: 10.1016/j.sbspro.2015.02.302

Tabachnick, B.G. & Fidell, K.S. (2001). *Computer-assisted research design and analysis*. Pearson Education.

Techataweewan, W., & Prasertsin, U. (2018). Development of digital literacy indicators for Thai undergraduate students using mixed method research. *Kasetsart Journal of Social Sciences*, 39(2): 215-221.

Tsai, C. C., Lin, S. S., & Tsai, M. J. (2001). Developing an internet attitude scale for high school students. *Computers and Education*, 37(1), 41-51.https://doi.org/10.1016/S0360-1315(01)00033-1

TÜİK (2018). *Hanehalkı Bilişim Teknolojileri Kullanımı Araştırma Sonuçları [Household Information Technology Usage Research Results]*. http://tuik.gov.tr/PreIstatistikTablo.do?istab_id=2602 [In Turkish]

_____(2020). *Hanehalkı Bilişim Teknolojileri Kullanımı Araştırma Sonuçları [Household Information Technology Usage Research Results]*. https://data.tuik.gov.tr/Bulten/Index?p=Hanehalki-Bilisim-Teknolojileri-(BT)-Kullanim-Arastirmasi-2020-33679 [In Turkish]

Tyger, R. L. (2011). *Teacher candidates' digital literacy and their technology integration efficacy*. Electronic Theses and Dissertations. 557. https://digitalcommons.georgiasouthern.edu/etd/557

Ucar, H. & Kumtepe, A.T. (2019). Be motivated and motivate: Interview with John M. Keller. *e-Learn Magazine*. https://elearnmag.acm.org/archive.cfm?aid=3331178, (Retrieved on: 07.03.2021).

Üstündağ, M. T., Güneş, E., & Bahçivan, E. (2017). Dijital okuryazarlık ölçeğinin Türkçeye uyarlanması ve fen bilgisi öğretmen adaylarının dijital okuryazarlık durumları [Adapting the digital literacy scale to Turkish and digital literacy status of pre-service science teachers]. *Journal of Education and Future*, 12, 19-29. [In Turkish]

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: a measure of intrinsic, extrinsic, and motivation in education. *Educational and Psychological Measurement*, 52, 1003-1017.

Visser, L., Plomp, T., & Kuiper, W. (1999). *Development research applied to improve motivation in distance education*. Paper presented at the National Convention of the Association for Educational Communications and Technology, Houston, TX.

We Are Social & Hootsuite (2017). *Digital in 2017 global overview*. https://wearesocial.com/special-reports/digital-in-2017-globaloverview, (Retrieved on: 21.12.2020).

WHO, (2020a). https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov (Retrived on: 12.12.2020)

WHO, (2020b). https://covid19.who.int/ (Retrived on: 12.12.2020)

Wighting, M. J., Liu, J., & Rovai, A. P. (2008). Distinguishing sense of community and motivation characteristics between online and traditional college students. *Quarterly Review of Distance Education*, 9(3), 285-295.

Witten, N. A., & Humphry, J. (2018). The Electronic Health Literacy and Utilization of Technology for Health in a Remote Hawaiian Community: Lana'i. *Hawai'i Journal of Medicine & Public Health*, March, 77(3): 51–59. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5845020/ (Retrieved on: 16.03.2021).

Yaman, C. (2019). *Sosyal bilgiler öğretmen adaylarının dijital okuryazarlık düzeylerinin incelenmesi (Niğde Ömer Halisdemir Üniversitesi Örneği) [Investigation of digital literacy levels of social studies teacher candidates (Niğde Ömer Halisdemir University Example)].* Yayımlanmamış Yüksek Lisans Tezi [Unpublished Master's Thesis], Niğde Ömer Halisdemir Üniversitesi [Niğde Ömer Halisdemir University], Niğde. [In Turkish]

Yılmaz, A., Kaya, M., Akca, N., & Sönmez, S. (2019, 10-13 Ekim). *Sağlık bilimleri fakültesi öğrencilerinin dijital okuryazarlık düzeylerinin incelenmesi [Examination of digital literacy levels of health sciences faculty students].* 3. Uluslararası 13. Ulusal Sağlık ve Hastane İdaresi Kongresi [3rd International 13th National Health and Hospital Administration Congress], Sakarya Üniversitesi [Sakarya University], Bildiri Kitabı [Proceedings Book], 287-297. [In Turkish]

Yi, M. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies*, 59(4), 431-449. doi: 10.1016/S1071-5819(03)00114-9

Yontar, A. (2019). Öğretmen Adaylarının Dijital Okuryazarlık Düzeyleri [Digital Literacy Levels of Teacher Candidates]. Ana Dili Eğitimi Dergisi [Journal of Mother Tongue Education], 7(4), 815-824. [In Turkish]

YÖK, (2019). *Üniversitelerde 30 Bin Öğrenciye "Dijital Okuryazarlık" Dersi*. https://basin.yok.gov.tr/InternetHaberleriBelgeleri/%C4%B0nternet%20Haber%20Belgeleri/2019/112_univ_dijital_okuryazarlik_dersi.pdf [In Turkish]

Xu, D., & Jaggars, S. S. (2013). The impact of online learning on students' course outcomes: Evidence from a large community and technical college system. *Economics of Education Review*, 37, 46-57. doi: 10.1016/j.econedurev.2013.08.001

https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov

(Retrieved on: 12.12.2020)

https://data.tuik.gov.tr/Kategori/GetKategori?p=bilgi-teknolojileri-ve-bilgi-toplumu-102&dil=1 (Retrieved on: 27.02.2021)

http://uis.unesco.org/ (Retrieved on: 26.10.2020)