Digital Literacy and Moral Values in the Digital Environments: Secondary Students' Perceptions

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Ertan Altinsoy[1]*, Serkan Boyraz[2]

[1] *School of Foreign Languages, Aksaray University*

[2] *Faculty of Education, Aksaray University*

Abstract

This paper examines secondary school students' perceptions of moral values in the digital environments (MVDE) and digital literacy (DL). The study used a quantitative methodology and correlational survey design encompassing 250 participants. Results show that participants' perceptions of DL are mostly high, while their perceptions of MVDE are mostly intermediate. Gender is not a source of significant difference in terms of either DL or MVDE. While grade is not a variable affecting DL, lower grades have statistically significant higher values in terms of MVDE. Participants who use social media have significantly higher DL scores, while the difference in MVDE is not significant in terms of the same variable. Like gender, online gaming is not a source of significant difference in terms of both DL and MVDE. Daily online time is not related to a significant difference in DL; however, those who are online for more than 3 hours daily have a significantly lower MVDE than those who spend less time online. Finally, results show that MVDE and DL are positively correlated at a moderate level, and MVDE explains 19.6% of DL. To conclude, MVDE should be fostered amongst individuals as it would help them become "better" citizens in the digital world, much like moral values do in real life.

Keywords: digital literacy, moral values, digital environment, secondary school students

* ertanaltinsoy@gmail.com

Introduction

With the rapid development of technology, digital tools have begun to impact every aspect of our lives in the 21st century. This involves the ability to navigate and accomplish tasks and duties on digital platforms. Perhaps one of the fundamental impacts of technology has been on education, revolutionizing the ways we provide education and the ways students reach information (Bulman & Fairlie, 2016). It is now compulsory for learners to possess a set of certain skills to fulfill educational tasks that require searching for information in the digital environment, synthesizing it, and applying it to the new learning contexts in a safe and secure way. In other words, it is vital to become a digital citizen today to be able to operate effectively in the digital world. In this respect, we assume that successful education prepares learners for the digital world and trains them as individuals who can use digital technology effectively and appropriately.

Digital citizenship has been defined as the ability to uncover information and interact with people digitally, which entails a range of skills to process and evaluate information and realize the consequences responsibly (Prasetiyo et al., 2021). According to Hobbs and Jensen (2009), digital citizenship is:

> the skills and knowledge needed to be effective in the increasingly social media environment, where the distinction between producer and consumer has evaporated and the blurring between public and private worlds creates new ethical challenges and opportunities for children, young people, and adults. (p. 5)

Perhaps the most concise definition is forwarded by Ribble et al. (2004), who proposed that digital citizenship is the norms of behaviour with regard to technology use, and identified nine general areas of behaviour that constitute digital citizenship: (a) etiquette, (b) communication, (c) education, (d) access, (e) commerce, (f) responsibility, (g) rights, (h) safety, and (i) security.

As made clear from the definitions above, digital literacy imposes a number of responsibilities on individuals that are intended to regulate the users' digital acts in the digital world. Although there are certain policies and legislations against inappropriate behaviour in relation to digital technology use, they become outdated due to the rate that technology evolves. In this sense, rather than establishing rules and regulations on the appropriate use of digital tools, it is vital to increase awareness about becoming responsible digital citizens who have a grounded understanding of technology and its appropriate use, as suggested by Ribble and Bailey (2007).

The foundation and prerequisite for digital citizenship are the digitally skilled and literate individuals who can read and understand digital information and navigate the digital world. Digital literacy in the 21st century has become essential in both the public and private sectors since technology has revolutionized the way services are provided.

The term digital literacy often has been substituted for computer literacy, which is narrow in scope and implies the knowledge and ability to use the technology. This has led to terminological confusion, which brings about interchangeable use of both terms in scientific studies. There are many definitions of digital literacy in the literature, and the common ground in each is that digital literacy is multidimensional and multidisciplinary (Chetty et al., 2018); it implies more than the functional matter of how to use a computer and carry out online research (Buckingham, 2015) and requires the use technical, cognitive, and metacognitive skills (Eshet, 2004). Clearly, digital literacy is far more than the ability to surf the internet and to search for and retrieve information, and thus presenting a concise definition is problematic. Eshet (2004) proposes an extensive conceptual framework for digital literacy to attract attention to its multidimensional nature, which incorporates five types literacy—photo-visual, reproduction, information, branching, and socio-emotional—and defines digital literacy as the survival skill in the digital era which enables: reading online instructions from graphical displays; using digital reproduction to create new and meaningful materials from already existing ones; constructing knowledge from a nonlinear, hypertextual navigation; evaluating the validity and reliability of the information; and being aware of the rules of the digital environments and having mature understanding of them.

It wouldn't be wrong to claim that the definition of the term digital literacy is technology-dependent and evolving because, with the emergence of new technological tools and applications that have significant implications for education, the scope of the term widens further as new dimensions are added to its multidimensional nature. In this respect, Law et al. (2018) draw attention to the inclusive and dimensional nature of digital literacy, encompassing computer literacy, ICT literacy, media literacy, and information literacy, and define digital literacy as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies. Stričević (2018) similarly stated that digital literacy is the combination of certain sub-skills and listed the crucial components of digital literacy as information acquisition, interaction, communication, and dissemination skills. Hongthong and Temdee (2018) offer another extensive definition for digital literacy, pointing out that it involves information literacy as the individual assimilates and accommodates the process of learning to use various forms of literacy such as visual, reproduction, branching, and socio-emotional literacy, among others, and they emphasize the various forms of constituent elements of digital literacy such as culture, cognition, construction, communication, confidence, creativity, critical thinking, and civic. In their systematic review of digital literacy in 45 articles, Tinmaz et al. (2022) revealed that digital literacy revolves around computer literacy, media literacy, and cultural literacy and is far more extensive than the specific task involving computer operation and media use in a cultural context.

Most notably, recent literature in response to rapid technological change and its impact on education underscores the significance of moral values and ethical considerations in individuals' engagement with digital tools. Pangrazio (2016), in his article that reconceptualized critical digital literacy and proposed a framework, stated that digital literacy requires constructive use of digital media that is ethical and moral and avoids the exploitation and manipulation of others. Similarly, Chetty et al. (2018), who intended to define the components of digital literacy to assess the latter based on a systematic review of relevant studies, proposed another framework for digital literacy that consists of information, computer, media, communication, and technology literacy, each of which is discussed under three perspectives: technical, cognitive, and ethical. The authors scrutinize each component of literacy from an ethical perspective, which requires appropriate use and truthfulness.

Undoubtedly, digital literacy could not be considered independent of context and culture as it is portrayed in recent literature (Hongthong & Temdee, 2018; Pangrazio et al., 2020; Tinmaz et al., 2022). Özerbas and Kuralbayeva (2018) define digital literacy as conducting research on the internet seriously and effectively, evaluating it, and gathering information by using various digital technologies. According to Aslan (2016), digital literacy is the awareness of various digital technologies, the ability to use such technologies effectively, the ability to reach correct information, the ability to create information, the awareness of information-sharing, and the use of digital technology in education.

On the basis of these definitions, we have interpreted that digital literacy is associated with a set of competences—namely, information literacy, information-processing, critical thinking, problem solving, and online safety—and define digital literacy as the ability to access and select digital information, process and critically evaluate digital information, and use digital information effectively in a most secure way for a variety of communication purposes.

Technology has evolved into an integral and indispensable component of education and enhances the teaching and learning process. Electronic tools are considered vital factors in realizing learning environments, and mastery of those tools is a must both for the teacher and the learners to enable successful learning (Martin, 2006). Distance education has become a growing trend globally, and online courses or digitalized learning environments that enable communities of remote learners to learn together have been highly valued by education institutions, which is evidenced the increasing number of enrollments in such programs. However, the growing demand for virtual learning environments has brought about various challenges, and education institutions have been constrained to meet the demand in terms of quality and quantity, which entails digital literacy.

Other than the rapid development of information technology (IT), sudden and unexpected calamities around the world also enforced a paradigm shift in education and thus increased the

significance of digital literacy for both learners and teachers. The COVID-19 pandemic demonstrated the importance and urgency of the digitalization of education, which allowed for continuous education during such moments of crisis. The sudden closure of educational institutions because of lockdowns led to an immediate transition to online teaching, which caught the key agents of education off guard as they immediately had to adapt to digital educational platforms (Daniel, 2020; Sari & Nayir, 2020). This challenge brought us back to the same phenomenon of digital literacy. Teachers needed to possess an adequate level of digital literacy to deliver instruction effectively in virtual learning environments. Meanwhile, students had to follow instructions online and fulfill certain tasks to survive in the digital world.

Much research has investigated students' digital literacy, though relatively few studies have focused on primary school students. Of those, Kim et al. (2019), in their extensive study involving 15,000 elementary and middle school students in Korea, compared the digital literacy levels of the participants and found that both groups had low levels of digital literacy. They further revealed that regarding abilities within digital literacy, problem-solving and information analysis were higher among elementary school students, while information utilization and management abilities were higher when compared to the others. Clearly, digital literacy changes over time and differs across different age groups, as suggested by Jin et al. (2020). As an example, Perdana et al. (2019) wondered about the digital literacy level of 193 students studying at an Indonesian senior high school and conducted research to assess it. Their findings revealed that the digital literacy level of the participating students was deficient, and differed based on the grades in which they were enrolled. Similarly, findings from Karagul et al.'s (2021) study of the pandemic-induced remote teaching process on Turkish high school and university students' digital literacy suggested that the participants had sufficient digital literacy levels, which had a significant relationship with gender and school degree, while age was not observed to be a significant variable. Rini et al. (2022) in turn sought to identify the effect of self-directed learning on the digital literacy level of 947 university students, and they found a significant positive impact of self-directed learning on the digital literacy level, which implied that the higher the participants' self-directed learning level, the higher the digital literacy level would be.

Despite the increasing significance of digital literacy as a key competency for becoming a digital citizen or learner in the 21st century, technological developments have brought about various moral and ethical concerns (Buchanan, 2019; Dennis & Harrison, 2021; Reamer, 2017), and traditional norms and moral values have been considered invalid in the digital space (Danaher & Sætra, 2022) and needed to be transformed into the digital world. Modern digital media requires developing ethical regulatory mechanisms in the digital world for users to deal with right or wrong and to differentiate between true and false information (Bose, 2020; Buchanan, 2019; Lievens, 2010). In this sense, it could be argued that moral and ethical issues are as

important as digital literacy or competence in today's digital world to be able to operate safely and benefit effectively.

Definitions for the concept of morality are numerous, and it is commonly used as a synonym for ethics, but in lay terms, it can be interpreted as an individual's perception of what is right and wrong. As Chippendale (2001) suggests, "what we value guides not only our personal choices but also our perceptions of the worth of others" (p. 1). Because individuals are members of society, moral values are shaped by a set of principles and norms that are imposed on them (Kaur, 2019). In other words, it could be argued that moral values are culture-specific, and each society defines norms about what is good or bad and what is right or wrong, which in turn determines the way people think and behave. However, ethics are the standards by which behaviours are evaluated depending on their morality—their rightness or wrongness (Chippendale, 2001). Ethics encompass norms, rules, and values that are external to the individual, such as the norms of a social community (Fransson, 2017). As can be understood from the definitions, morals are personal and prone to change depending on the society and culture, while ethics are a universal and systematic set of guidelines prescribing moral human behaviour. Clearly, moral values and ethics are closely related and could be considered interdependent since moral values determine ethical behaviour and ethics are firmly connected to moral values.

Compared to the studies assessing students' digital literacy, the number of studies investigating students' moral values in digital environments seems scarce. Therefore, various types of research are needed to reveal the results. Of the limited number of studies, Masrom et al. (2012) aimed to analyze the ethical awareness level of Malaysian primary school students using a structured questionnaire in which the students rated whether the given IT-related scenarios about four major ethical issues (namely, privacy, accuracy, property, and accessibility) were ethical or unethical. The findings of their research revealed the students had a high level of awareness about cyber ethics and internet behaviour, and they were able to differentiate between good and bad in making decisions while using digital tools and the internet. In a more recent study, Piragauta and de Oliveira (2023) intended to understand the ethical experience of digital learning environments from university students' and professors' perspectives. The study provided important findings, revealing that responsibility, commitment, and respect were the moral values inherent in virtual education. In her master's thesis, Kovancı (2021) explored the ethical-value judgment of 1,832 middle school students in real and digital environments, suggesting that participants' moral value perception was higher in digital environments. The findings further indicated that the participants' perceptions of DL and MVDE differ depending on certain variables, such as gender and time spent in online environments (Mahadir et al., 2021; Walters et al., 2019). From this perspective, the present study aims to investigate secondary school students' perceptions of digital literacy and moral values in digital

environments and determine if there is a relationship between these variables that can be generalized to similar contexts.

Our study is framed by the following research question: Is there a relationship between secondary school students' perceptions of digital literacy and moral values in digital environments?

Sub-problems:

1. What level are secondary school students at in terms of digital literacy perceptions?
2. What level of perception do secondary school students have in terms of moral values in digital environments?
3. Is there a significant difference in secondary school students' digital literacy and perception of moral values in digital environments in terms of gender, grade, social media use, online gaming, and daily online time?
4. Is there a significant correlation between secondary school students' perceptions of digital literacy and moral values in digital environments?
5. Is secondary school students' perception of moral values in digital environments a significant predictor of their digital literacy?

Method

This research, which aims to investigate if there is a statistically significant relationship between participants' perceptions of digital literacy and moral values in digital environments, used a quantitative methodology and descriptive correlational survey design. In this design, researchers employ correlation statistical tests to characterize and quantify the level of association (or relationship) between two or more variables or sets of scores (Creswell, 2012) of a specific group at one time (Lavrakas, 2008).

Sample

The research employed convenience sampling to collect information from a sample that is easiest to reach, which saves time and energy for the research but may also raise some questions about accurate representation of the population (Cozby & Bates, 2012). The data collection process took place in a public secondary school in Aksaray, Turkey, during the 2022-2023 spring term. It should be noted that primary schools in Turkey include students from 1st to 4th grades, while students from 5th to 8th grades receive education at secondary schools due to legal regulation that organizes primary, secondary, and high schools as four by four by 4 years. The city is in the middle of the country, and its economy is based on mostly agriculture and breeding, while the industry develops year by year, opening a place in all these fields for citizens of the city (Aksaray Yatırım Destek Ofisi [Aksaray Investment Office], 2017), and it is

similar to other cities in the country in terms of economic status (Ministry of Environment, Urbanism, and Climate Change, 2022). The school is placed in a low-status socio-economic neighbourhood, so its students have limited opportunities in terms of reaching the internet, especially through a personal device. The school provides 1 hour of technology and design courses weekly to 7th and 8th graders, and it is only when students are provided with digital literacy skills. Other courses, on the other hand, provide limited input on digital literacy through the use of the smartboard, as all classrooms have one. There was a total of 297 students at school, and 263 of them were given the two scales; however, only 250 were appropriate for data analysis due to missing information and/or answers to items. Table 1 presents the demographics of the sample.

Table 1

Demographics

Gender	F	%	Grade	F	%
Female	125	50.0	5th	74	29.6
Male	125	50.0	6th	69	27.6
Total	250	100.0	7th	60	24.0
Social media use	F	%	8th	47	18.8
Yes	161	64.4	Total	250	100.0
No	89	35.6	Daily online time	F	%
Total	250	100.0	Up to 1 hour	84	33.6
Online gaming	F	%	between 1-2 hours	98	39.2
Yes	187	74.8	between 2-3 hours	35	14.0
No	63	25.2	3 hours or more	33	13.2
Total	250	100.0	Total	250	100.0

The sample was divided equally in terms of gender, as there are 125 (50%) participants in each group. There were 74 participants (29.6%) from the 5th grade, 69 (27.6%) from the 6th grade, 60 (24.0%) from the 7th grade, and 47 (18.8%) from the 8th grade. The number of participants having at least one social media account was 161 (64.4%), while 89 participants didn't have any. Out of the total, 187 (74.8%) participants indicated that they played at least one online game continuously, and 63 (25.2%) informed us that they did not. When it comes to the average daily amount of time spent online, 84 (33.6%) participants were found to be online up to 1 hour, 98 of them (39.2%) between 1-2 hours, 35 (14.0%) between 2-3 hours, and the remaining 33 (13.2%) more than 3 hours.

Data Collection Tools and Data Analysis

The data was collected using two scales, namely the Digital Literacy Scale (DLS) developed by Pala and Başıbüyük (2020) and the Perception Scale of Middle School Students towards Moral

Values in the Digital Environment (MVDE) developed by Kovancı et al. (2021). DLS, which is a 5-point Likert-type scale, includes 21 items under four subdimensions. MVDE, which is also a 5-point Likert-type, on the other hand, has 17 items under three sub-dimensions. These scales have been preferred among the others as they were developed with a similar participant group. The explanatory factor analysis carried out on the data from 250 participants in this research revealed the same factor structure for each scale (for DLS, KMO= .869; Barlett's test p= .000 and for MVDE, KMO= .871; Barlett's test p= .000). The reliability analysis revealed that the data was reliable, as Cronbach's alpha value for DLS was .883 and for MVDE was .750.

The distribution of the data was examined using descriptives (skewness and kurtosis values) and normality tests to decide whether parametric or non-parametric tests were used in the analysis. Although normality tests (Kolmogorov-Smirnov and Shapiro-Wilks') results indicate a non-normal distribution ($p < .05$), the values of skewness that are between -2 and +2 and kurtosis that are between -7 and +7 in the data of this research are considered to be distributed normally (Byrne, 2010; Hair et al., 2010) after Q-Q plots have been examined too. As a result, parametric tests have been used in data analysis.

Findings

The first and second sub-problems of the research investigate perceptions of digital literacy (DL) and moral values in digital environments (MVDE) of the participants and the results are presented in Table 2.

As demonstrated in Table 2, a great majority of the participants (F=157; 62.8%) are at a high level in terms of digital literacy perceptions, while 88 of them (35.2%) are at intermediate level, and only five (2.0%) are at a low level. The distribution is a bit different when it comes to perception of moral values in digital environments. Most participants (F=137; 54.8%) are at an intermediate level, while the number of participants at a high level is 104 (41.6%), and nine (3.6%) are found to be at a low level.

Table 2

Participants' Perceptions of DL and MVDE Levels

	Digital literacy		Perception of moral values in digital environments	
	F	%	F	%
Low	5	2.0	9	3.6
Intermediate	88	35.2	137	54.8
High	157	62.8	104	41.6
Total	250	100.0	250	100.0

Table 2 also shows that a great majority of the participants (F=157; 62.8%) are at a high level in terms of digital literacy perceptions, while 88 of them (35.2%) are at intermediate level, and only five (2.0%) are at a low level. The distribution is a bit different when it comes to perception of moral values in digital environments. Most participants (F=137; 54.8%) are at an intermediate level, while the number of participants at a high level is 104 (41.6%), and nine (3.6%) are found to be at a low level.

The third sub-problem aims to examine if gender, grade, social media use, online gaming, and daily online time bring any significant difference in terms of DL and MVDE perceptions; t-test analysis results for gender variables are presented in Table 3.

Table 3

Comparison of DL and MVDE in Terms of Gender

Digital literacy					
Gender	N	X	Sd	t	p
Female	125	79.12	13.49	-1.700	.090
Male	125	82.10	14.24		
Perception of moral values in digital environments					
Gender	N	X	Sd	t	p
Female	125	60.01	8.67	1.566	.119
Male	125	58.12	10.38		

When genders are compared in terms of DL, it is seen in Table 3 that the mean of female participants (F=125; 50.0%) is 79.12 and the standard deviation for this group is 13.49, while the mean is a bit higher for males (F=125; 50%) as it is 82.10, and the standard deviation is 14.24 for this group. The t-test results (t=1.700; p= .090; p> .05), however, show that the difference between the groups is not statistically significant.

When it comes to comparing the genders in terms of MVDE, the mean of females is 60.01 with a standard deviation of 8.67. The mean for males is 58.12, and standard deviation value is 10.38. The t-test used to compare if this difference is significant reveals that it is not (t=1.566; p= .119; p> .05).

Table 4 shows the mean of 5th graders (F=74; 29.6%) on the DL perception scale is 80.58, and the standard deviation value of the group is 12.01. The mean of 6th graders (F=69; 27.6%) is 83.04, which is the highest among the groups with a standard deviation of 11.32. The mean of 7th graders (F=60; 24.0%) is 79.91 with a standard deviation of 14.63. The lowest mean among the groups belongs to 8th graders (F=47; 18.8%) as it is 77.97, with the highest standard deviation value also being 18.43. When four groups from 5th to 8th grade are compared in

terms of DL through analysis of variance, it is seen that the difference among the groups is not significant statistically (F=1.136; p= .270; p> .05).

Table 4

Comparison of DL and MVDE in Terms of Grade

	Grade	F	X	Sd	df	F	p	Source
Digital literacy	5th	74	80.58	12.01	3	1.316	.270	
	6th	69	83.04	11.32	246			
	7th	60	79.91	14.63				
	8th	47	77.97	18.43				
	Total	250	80.61	13.92				
Perception of moral values in digital environments	5th	74	60.54	8.15	3	5.864	.001*	5th>8th
	6th	69	61.42	7.65	246			6th>8th
	7th	60	58.01	9.11				
	8th	47	54.63	12.90				
	Total	250	59.06	9.59				

*p< ,05

When descriptives for MVDE are examined, it is seen that the mean of 5th graders is 60.54 with a standard deviation of 8.15. The mean of 6th graders is 61.42, which is the highest among the four groups, and standard deviation value is 7.65. The mean of 7th graders is 58.01, while the standard deviation of the group is 9.11. The lowest mean, just like in DL, belongs to the 8th graders, as it is 54.63 with a standard deviation of 12.90, which is also the highest again. The analysis of variance test results (F=5.864; p= .001; p< .05) indicate that the difference between the groups is significant, and post-hoc test results show that the significant difference is between 5th and 8th graders and 6th and 8th graders, both of which are against 8th graders.

Table 5

Comparison of DL and MVDE in Terms of Social Media Use

Digital literacy					
Social media use	N	X	Sd	t	p
Yes	161	82.74	13.94	3.323	.001*
No	89	76.75	13.10		
Perception of moral values in digital environments					
Social media use	N	X	Sd	t	p
Yes	161	58.85	9.90	- .466	.641
No	89	59.44	9.06		

p< ,05

As can be seen in Table 5, most of the participants (n=161; 64.4%) express that they actively use social media, while the rest (n=89; 35.6%) do not. The mean of DL for those who use social media actively is 82.74, with a standard deviation of 13.94. The mean of DL for those who do not use social media is 76.75, with a standard deviation of 13.10. The t-test analysis that questions if this difference in favour of the group that uses social media is significant shows that it is (t=3.323; p= .001; p< .05).

The descriptors in Table 5 for MVDE show that the mean of the group who uses social media 58.85 and the standard deviation for this group is 9.90 while the mean of the group who does not use social media is slightly higher as 59.44, with a standard deviation value of 9.06. The t-test analysis that questions if this difference in favour of the group that does not use social media is significant shows that it is not (t= -.466; p= .641; p> .05).

The descriptors in Table 6 show that a majority of the participants (n=187; 74.8%) regularly play online games, while a total of 63 (25.2%) do not. The mean of DL for those who play online games is 81.55 with a standard deviation value of 13.79, while the mean of DL for those who do not play online games is 77.82 with a standard deviation value of 14.03. The results of t-test analysis reveal that the difference in favour of online game players is not statistically significant (t=1.845; p= .066; p> .05).

Table 6

Comparison of DL and MVDE in Terms of Online Gaming

Digital literacy					
Online gaming	N	X	Sd	t	p
Yes	187	81.55	13.79	1.845	.066
No	63	77.82	14.03		
Perception of moral values in digital environments					
Online gaming	N	X	Sd	t	p
Yes	187	59.04	9.27	-.071	.943
No	63	59.14	10.56		

When two groups are compared in terms of MVDE, the mean of online game players is 59.04 with a standard deviation of 9.27, while the mean of the other group is 59.14 and the standard deviation value of the group is 10.56. The results of t-test analysis reveal that the difference in favor of the group that does not play online games is not statistically significant (t= -.071; p= .943; p> .05).

As Table 7 demonstrates, the number of participants being online for up to 1 hour in a day is 84 (33.6%), and their mean of DL is 79.15 with a standard deviation value of 16.83. There are

98 participants (39.2%) who are online between 1 and 2 hours daily, and their mean of DL is 82.42, which is the highest among the four groups, with a standard deviation value of 11.44. A total of 35 participants (14.0%) inform that they are online between 2 and 3 hours daily and DL mean of the group is 80.82 with a standard deviation of 12.64. The remaining 33 participants (13.2%) indicate that they go online at least 3 hours or more in a day, while the mean of DL for this group is 78.69, the lowest of all, with a standard deviation value of 13.70. The analysis of variance test results, on the other hand, reveal that the difference among the groups is not statistically significant (F=1.074; p= .361; p> .05).

When the descriptors of four groups for MVDE are examined in Table 7, it is seen that the mean of the group that is online up to 1 hour daily is 58.28 with a standard deviation of 11.10. The mean of the group that is online between 1 and 2 hours a day is 60.48, the highest of all, with a standard deviation of 8.74. The mean of the next group who is online between 2 and 3 hours daily is 61.37 with a standard deviation of 8.71. The group with the lowest mean (X=54.39; standard deviation=9.59) is online at least 3 or more hours. The analysis of variance test results indicates the difference among the groups' means is significant (F=4.353; p= .005; p< .05), and post-hoc test results show that the significant difference is between groups B and D and C and D, both of which are against group D.

Table 7

Comparison of DL and MVDE in Terms of Daily Online Time

	Daily online time	F	X	Sd	df	F	p	Source
Digital literacy	Up to 1 hour	84	79.15	16.83	3	1.074	.361	
	1-2 hours	98	82.42	11.44	246			
	2-3 hours	35	80.82	12.64				
	3 hours or more	33	78.69	13.70				
	Total	250	80.61	13.92				
Perception of moral values in digital environments	Up to 1 hour (A)	84	58.28	11.10	3	4.353	.005*	B>D
	1-2 (B)	98	60.48	8.74	246			C>D
	2-3 (C)	35	61.37	8.71				
	3 hours or more (D)	33	54.39	6.93				
	Total	250	59.06	9.59				

*p< ,05

Sub-problem 4 aims to examine if there is a statistically significant correlation between DL and MVDE, and Pearson correlation test results for it is given below in Table 8.

The two-way Pearson correlation analysis results given in Table 8 represent that there is a statistically significant positive correlation (p= .000) between DL and MVDE at a moderate level (R= .443) according to Schober et al. (2018).

Table 8

Correlation Analysis Results for DL and MVDE

		A	B
Digital literacy (A)	R	1	.443
	p		.000*
	N	250	250
Perception of moral values in digital environments (B)	R	.443	1
	P	.000*	
	N	250	250

*p< ,001

The two-way Pearson correlation analysis results given in Table 8 represent that there is a statistically significant positive correlation (p= .000) between DL and MVDE at a moderate level (R= .443) according to Schober et al. (2018).

Sub-problem 5 asks if secondary school students' perception of moral values in digital environments is a significant predictor of their digital literacy; findings are given in Table 9.

Table 9

Regression Analysis Results of MVDE Effect on DL

	Sum of squares	df	Mean square	F	p
Regression	4493.970	1	4493.970	60.427	.000*
Residual	18443.874	248	74.370		
Total	22937.844	249			
$R= .443$; $R^2= .196$; Adjusted R Square= .193					

*p< .001

According to the results of simple linear regression analysis performed to determine if participants' MVDE affects their DL, it is observed that there is a significant relationship between DL and MVDE ($R= .443$; $R^2= .196$). It is also seen that the MVDE variable is a significant predictor of DL ($F_{(1-524)}= 60.427$; $p< .05$). The significance test of the coefficient of the main effect variable in the regression equation shows that MVDE is a significant predictor (*p< .001) of DL. Accordingly, participants' MVDE explains 19.6% of their DL. The regression equation that predicts MVDE according to the results of the regression analysis is as follows: DL = (0.305*MVDE) + 34.477.

Results and Discussion

This study questioned whether a meaningful relationship exists between perceptions of DL skills and MVDE of secondary school students aged between 11 and 14. To answer this

question, the current perception level of 250 participants, both in terms of DL and MVDE, was first examined. It has been found that only a very small number of participants have a low level of DL, while most have an intermediate or high level. The literature provides similar results in the Turkish context (Çelik & Kılıçoğlu, 2022; Üstündağ, 2021). This result is not surprising for two reasons: First, digital literacy is, directly or indirectly, a part of science, Turkish, social studies, and mathematics curricula in Turkey, starting from primary education (Altun & Bangir-Alpan, 2021). Second, the digital era that we live in not only provides many opportunities for interaction but also forces everyone to use digital tools for a variety of reasons, from banking to getting news. Secondary school students are also surrounded by digital environments and tools as part of their daily and educational lives, especially after COVID-19 forced education at all levels to adopt a virtual environment and increased the amount of time students interacted digitally for many reasons, such as online lessons and exams (Mega et al., 2022).

Participants' perceptions of MVDE are also found to be mostly at intermediate to high levels. The situation is a bit complicated, as it is possible to see contradictory situations about transferring moral values to the digital world. According to Trubina and Mirkushina (2022), young generations tend to preserve traditional moral values even in digital environments. However, the literature also provides much research showing how cyberbullying that ignores many important moral values in the digital environment is common in schools (Cantone et al., 2015). These contradictory results lead us to think that perceptions of MVDE are context-specific, just as moral values in real life cannot be universalized completely since they differ depending on the culture. Then it would be advised to develop moral codes for digital environments specific to the target groups' needs, such as age, culture, and so on. More in-depth research that is qualitative in nature is required to understand it better.

The comparison of participants' DL and MVDE in terms of gender revealed that the difference is not significant, while the mean of males is higher in DL and the mean of females is higher in MVDE. In another research in the Turkish context, Erdoğan (2021) and Taşçı-Ağaoğlu and Durmaz (2021) also inform that gender is not a significant variable in DL among secondary school students, while a similar result is reported in the international context (Argelagós & Pifarré, 2017). However, the literature provides other research identifying gender as an indicator of significant difference in terms of DL both in Turkey (Çelik & Kılıçoğlu, 2022) and in the international context (Jin et al., 2020) with the same age group. When it comes to MVDE, Kovancı (2021) and Salman (2019) report that female secondary school students have a higher perception of it without being statistically significant, just like in this research.

When considering the school grade as a variable, we found no significant effect in terms of DL, while 5th and 6th grade students have a higher DL than 7th and 8th graders. Çelik and Kılıçoğlu (2022) and Metin (2022), on the other hand, report that secondary school students' DL

increases together with their grades, which might be attributed to the increasing exposure to the digital environment year by year together with curricula interventions on the topic. The contradictory result of this and the aforementioned research about the grade and DL relationship requires a deeper inquiry from a qualitative perspective. A similar situation is observed in terms of MVDE, as 5th and 6th graders have a higher perception than 7th and 8th graders, but this time it is meaningful against 8th graders. This result may not be surprising, as 5th and 6th graders have a higher level of DL, and DL is found to be a positive indicator of MVDE in this research.

Social media use, another variable whose effect has been questioned in the research, is found to have a meaningful effect on DL as those who use it daily have higher DL perception, which can be understandable as use of social media and DL are interrelated (Yıldız Durak & Seferoğlu, 2020). So, use of social media, if guided by teachers and families, can be beneficial to the DL perceptions and skills of young people and should be encouraged, considering the necessity of DL in the age of technology. On the other hand, social media use is not a source of significant difference in terms of MVDE, while those who do not use it have a slightly higher mean.

Online gaming, the addiction to which is identified as a medical disease by the World Health Organization (2020), is associated with higher DL (Appel, 2012; Aranda et al., 2023); however, the results of this research indicate that online gaming does not bring about a significant difference in either DL or MVDE. The contradiction might be caused by the amount of gaming time or kind of games preferred by participants, and it is needed to carry out deeper research to comprehend the situation better.

It is notable that the use of social media brings a significant difference in terms of DL perceptions, while online gaming does not. This might be caused by a very clear distinction between the primary aims of two variables, as the aim of social media use is mostly interaction and communication in the digital environment (Vorderer et al., 2017), which has been found to be a significant factor in DL. Online gaming, on the other hand, is primarily about enjoying time, competition, and satisfaction (Wu et al., 2016) while being accompanied by communication with others in the game to some extent. Another reason might be that online gaming does not address the DL structure provided by the scale used in this research.

Daily online time, which has drastically increased in the last few years, especially given the effects of the pandemic (Kemp, 2022), is not a significant indicator of the DL perception, as the findings of this research reveal. However, it would be expected that an increasing amount of online time might bring about a higher DL perception. This can be about activities carried out online that do not require a higher perception or skills of DL. Daily online time, on the other hand, has been found to be a statistically significant variable for MVDE, as those who are online more than 3 hours daily have a meaningfully lower MVDE than those online between 1 to 2 and

2 to 3 hours. This could be attributed to the negative effects of technology overuse on values (Ushakova et al., 2021). Students can reach information in an easier way, build relationships in a digital environment without much effort, and make and lose friends without caring a lot, which could corrode existing beliefs and value judgments since extensive use of digital tools could be claimed to lead to desensitization towards social norms and value judgments such as truth, privacy, honesty, et cetera. Then, as an avenue for further research, it would be interesting to investigate a potentially negative correlation between online time and perceptions of moral values in digital environments.

A critical result of this research indicates that there is a positive correlation between MVDE and DL perceptions and that perceptions of MVDE play a role in explaining DL perceptions. A strong moral foundation can lead to the use of digital tools in a more responsive and ethical manner, and the users aim to benefit from digital technologies at an ultimate level since they are aware that such tools promote learning and personal development and contribute to the development of critical thinking and problem-solving skills, which are crucial components of digital ability.

There are some limitations of the research. First, the population includes secondary school students, while the main variables, DL and MVDE, have no specific age group limitations, so the results can be generalized only for the given group. In that sense, future research might combine different age groups to examine the relationship between the variables. Secondly, DL and MVDE are complex issues, including many sub-structures that have been discussed in the literature part; however, this research focuses on the structures included in the data collection tools explained in the relevant part. Thirdly, both scales used to collect the research data are self-perception scales that might be misleading due to social desirability bias (Ross & Bibler Zaidi, 2019). It would be advised to evaluate DL and MVDE more directly, for example through personal applications and less structured self-report type data collection tools.

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