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Examination of elementary school students' digital literacy levels in terms of different variables

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ABSTRACT

The aim of this study is to examine the digital literacy levels of primary school students according to different variables. The survey model was used to investigate how technology, which has become one of the most important needs of today, affects the digital literacy of primary school students who have experienced distance education. The participants of the study consisted of 100 students studying in a city center located in the Black Sea region of Turkey. The data were obtained by using the personal information form developed by the researchers and the "Digital Literacy" scale developed by Pala and Başıbüyük (2010). In the analysis of the data, percentage, arithmetic mean, gender, independent sample t-test for the variables of availability of technological tools, one-way analysis of variance (ANOVA) was used for the variables of parental education level, place of residence, time spent with technology and family income level. As a result of the research, it was seen that the digital literacy level of the students was at an average level and that the digital literacy of the students showed significance according to the family income level and the availability of internet at home, while there was no significant difference according to variables such as gender, parental education level, and the availability of technological devices. Based on the data of the study, it is recommended to include related courses in the curriculum for the positive development of students' digital literacy.

Introduction

Today, accessing the information needed is no longer something that requires a long time and labor force as in the past. On the contrary, it has become possible to access information, to travel many kilometers away from where they are sitting, and to make languages they have never known understandable. The reason for this facilitation is the age of technology. It has become an inevitable necessity to utilize technology to access information and to have knowledge about technology (Özçelik & Yıldız, 2019).

Technological developments used in daily life have also been integrated into our education system. These developments have also changed the expectations of people. In the 21st century, the behaviors expected from individuals are researching, questioning, reaching conclusions by analyzing the results of their research, being literate and using technology correctly (Günüç et al.,

2013). These characteristics transform the skills expected not only from adults but also from children. This situation brings the concept of 21st century skills to the forefront and our education system is shaped accordingly. Because the new generation finds it difficult to concentrate on a lesson taught only at the blackboard and finds the environments inadequate. Children born in the early 2000s were born in a different time, and the characteristics of this new generation that distinguish them from their predecessors have emerged (Prensky, 2001). Today's students were born into many innovations such as video, cell phones, computers, online tools, tablets. As such, it is not possible to think of this generation as independent from technology and try to keep them away from it. As adults, it is our duty to ensure that children who are so intertwined with technology use it correctly. Studies show that children use technology in many different ways such as socializing, playing games, watching videos, visiting web pages, and sending e-mails (Vasile, 2012). It is inevitable that a concept that children are so involved with should be included in education.

Although technological developments bring important pluses to the education system, they also create minuses (Ünal, 2017). For this reason, technology should be used as a tool, not a goal, in our education system and should be positioned to support the process. It is thought that a technology planned in this way and adapted to educational environments will be beneficial for students. If we take steps to raise generations who can use technology correctly, this will also benefit our country. Today, it is not possible to remain indifferent to the concept of technology as it has entered educational methods. Many models such as flipped learning, Harezmî Education Model, STEM, hybrid learning also include the concept of digital literacy.

Today, literacy appears in different forms. Literacy is defined as the way of understanding all kinds of information through letters, numbers, symbols, shapes or signs (Belshaw, 2011; Arslan, 2019). It is referred to with meanings such as the process of receiving education, following innovations, and being able to read technology (Önal, 2010). For this reason, we encounter many types of literacy that are current. Media literacy, information literacy, e-literacy, visual literacy and digital literacy are concepts that have emerged in recent years (Kurudayıoğlu & Tüzel, 2010).

In order to examine the concept of digital literacy in depth, we need to be able to master the concept of digital. TDK (2011) defines the word digital as "the electronic display of digital data on a screen". Many tools used today are defined as digital tools. Many tools such as audio, image, video, animation, graphics, maps are defined as digital materials. In order to present these tools, many devices such as computers, tablets, phones, smart watches... have entered our lives. Being able to understand all the sound, animation, video, graphic technologies used in these tools shows our command of digital tools, which can be explained by the concept of digital literacy.

According to Martin (2008), the concept of digital literacy is classified as technology literacy, media literacy, ICT literacy, visual literacy and communication literacy. Technology literacy refers to understanding, analyzing and analyzing the developments in today's technologies (Kurt, Orhan, Yaman, Solak, & Türkan, 2001). Although technological literacy and digital literacy are confused concepts, they have minor differences. Digital literacy is a quality that covers all these sections. It may be correct to define people with digital competence who use information and communication technologies for various purposes as digital literate (Silik & Aydın, 2021). It is not enough to have digital tools to be digitally literate. Being able to use them for their intended purpose, learning innovations about their use, analyzing and producing solutions constitute the basis of digital literacy.

Communication literacy within the concept of digital literacy is the most widely used field today. Many social networks such as social media, WhatsApp, Facebook, Instagram, Twitter are used by the whole society, young and old, and follow the developments. However, limiting digital literacy

to these concepts causes a great deficiency. However, considering the conditions we live in, our social obligations, and the deficits in our education system, it would be more useful to express digital literacy with Özerbaş and Kuralbayeva's (2018) definition. According to Özerbaş and Kuralbayeva (2018), digital literacy is defined as the ability to access useful information from the internet, to collect information and to use this information effectively. Although digital literacy was first expressed narrowly in terms of using a technological tool, the concept was first used by Paul Gilster in 1997 (Koltay, 2011). Gilster (1997) defines digital literacy as the ability to understand and use computer-based information (Gilster, 1997; Karabacak & Sezgin, 2019).

Due to these technological developments, technology companies in the education sector develop many digital tools and applications. It is aimed to attract and encourage students' attention with added visuals, animations and sound effects (Kurudayıoğlu & Bal, 2014). Teachers who will support the development of students should also be advanced in this field and reach the awareness that they can use technology as a tool in their classrooms, not as a goal. In this sense, developing teachers shaping their lesson plans with digital applications will affect students' perspectives and expose them to many different uses of digital tools (European Commission, 2008). Digital literacy is not a concept to be taken and maintained in the form of a pill at once. Individuals who gain awareness on this issue develop their awareness and try to learn by researching any information they find missing.

The integration of the concept of digital literacy into the field of education is very common in our system where 21st century skills are at the forefront. Technology has become a necessity for education and there is a general education on its use. The widespread distribution of the "Movement for Increasing Opportunities and Improving Technology" (FATİH) project in our country to all schools can be seen as an indicator of this. The main goal to be achieved with this project is to improve the technological literacy of teachers and to help the students trained by teachers who improve in this field in terms of their lessons and technological literacy. The project continues to be disseminated throughout the country with the belief that bringing technological developments, which students are already predisposed to, into their educational lives will increase their motivation and learning rates (Ayvacı, Bakırcı, Başak, 2014).

When the literature on digital literacy is examined; studies examining the digital literacy of teachers and pre-service teachers (Aksoy, Karabay, & Akbay, 2021; Anisimova, 2020; Kozan & Özek, 2019; Üstündağ, Güneş, & Bahçıvan, 2017; Krumsvik, 2008; Pianfetti, 2001; Yontar, 2019); and studies examining students (Onursoy, 2018; Shopova, 2014; Nelson, Courier, & Joseph, 2011; Pala & Başıbüyük, 2020; Talan & Aktürk, 2021). In addition to the studies in which the study groups differed but digital literacy levels were determined, this issue has also found a place in the literature from different perspectives. While Karaoğlu (2022) tried to examine the concept of digital literacy in depth, there are also researchers who conducted studies on integrating the concept of digital literacy into the curriculum (Ataş & Gündüz, 2019; Duran & Özen, 2018; Hague & Payton, 2011; Ulusoy, 2016; Reddy, Sharma, & Chaudhary, 2020).

Based on the stated characteristics, the subject of the research was determined as the examination of primary school students' digital literacy skills in terms of various variables. In line with the determined problem, answers to the following sub-problems were sought.

1. What is the level of digital literacy of primary school students?
2. Do the digital literacy levels of primary school students differ according to gender?
3. Does the digital literacy of primary school students differ according to parental education level?
4. Does the digital literacy of primary school students differ according to where they live?
5. Does the technological equipment of primary school students affect their digital literacy?

Method

Research model

This study aims to examine the digital literacy levels of primary school students in terms of various variables. The research was designed in the general survey design used in quantitative research methods. The general survey design is explained as "a survey conducted on the whole universe or a group, sample or sample to be taken from it in order to reach a general conclusion about the universe in a universe consisting of many members (Büyüköztürk et al., 2018: 16).

Study group

The study group of the research consists of 100 students determined by convenience sampling method. "The sample selected among individuals who are related to the research and who are in the appropriate environment is called "convenience sampling" (Çalışkur, Demirhan 2013:59). When determining the sample, the margin of error was 5% and the confidence interval was 95%.

Frequency and percentage values including information about the demographic information of the students are presented in Table 1.

Table 1 Descriptive statistics related to the research sample

Variable	n	%
Gender		
Male	56	56
Female	44	44
Mother's Education Status		
Primary School	36	36
Middle School	32	32
High School	25	25
Undergraduate and Above	7	7
Father's Education Status		
Primary School	22	22
Middle School	32	32
High School	34	34
Undergraduate and Above	12	12
Family Income Level		
0-3000 (Turkish Liras)	19	19
3001-5000	27	27
5001-10000	33	33
10001-15000	15	15
15001 and above	6	6
Place of Residence		
Village	45	45
Township	8	8
City	47	47

As seen in Table 1, 57% of the students participating in the study were male (n=57) and 43% (n=43) were female. According to the results of the research on the families of the students participating in the study, students whose fathers graduated from primary school constitute 22% (n=22) of the participants, those who graduated from secondary school constitute 32% (n=32) of the participants, those who graduated from high school constitute 34% (n=34) of the participants,

and those who graduated from undergraduate and higher programs constitute 12% (n=12) of the participants. This research was also conducted on the level of mother's graduation. Students whose mothers graduated from primary school constitute 36% (n=36) of the participants, those who graduated from secondary school constitute 32% (n=32), those who graduated from high school constitute 25%, and those who graduated from undergraduate and graduate programs constitute 7% of the participants.

The answers given to the question posed to determine the income level of the participants were combined considering the scarcity of the answers given to the options in the ranges, and the ranges were calculated as follows. When the income level of the families of the participants is analyzed, 19% (n=19) of the families have an income level in the range of 0-3000 Turkish Liras. Those with income in the range of 3000-5000 Turkish Liras are listed as 27% (n=27). The percentages decrease as the income level increases to the upper limits. Families with incomes in the 50001-10000 range are 33% (n=33), and those with incomes in the 10001-15000 range are 15% (n=15). The smallest group of participants consisted of those with an income above 15000 Turkish liras (n=6).

The provincial center category, which was determined to measure the place of residence of the participants, was removed due to lack of data, and the percentages of the other sections were classified as village 45% (n=45), district 8% (n=8) and city 47% (n=47). The answers given by the participants to the fields related to the identified variables are explained in Table 2.

Table 2 The effect of the variable on the demographic characteristics of the participants

	n	%
Availability of Computer at Home		
Yes	29	29
No	71	71
Availability of Tablets at Home		
Yes	32	32
No	68	68
Availability of Smart Phone at Home		
Yes	84	84
No	16	16
Availability of Internet at Home		
Yes	52	52
No	48	48
Time Allocated to Technology in a Day		
0-1 Hour	54	54
1-2 Hour	36	36
2-3 Hours	5	5
3 Hours and above	5	5

When the answers given to the question about the technological devices in the participants' homes are analyzed, it is seen that most of the participants do not have computers in their homes (n=71). The rate of those who have computers in their homes is 29%. In the question regarding the presence of tablets, 68% of the participants answered no. It was concluded that only (n=32) of the participants had a tablet at home. In the question regarding the availability of a telephone, the data showed an increase in the rate of yes. Of the students participating in the study, 84% had a smartphone at home. While 52% of the participants have internet at home, 48% do not have internet at home.

In the question about the calculation of the digital literacy of the participants in the study, it is seen that 54% of the students spend less than 1 hour on the internet with tools such as smartphones, tablets and computers. The time spent with tools such as smartphones, tablets and computers in the range of 1-2 hours constitutes 36% of the participants. The distribution of students spending 2-3 hours and over 3 hours was expressed as 5% (n=5) and 5% (n=5).

Data collection tools

In this study, "Digital Literacy Scale" and personal information form were used to determine the digital literacy levels of students. The first part of the questionnaire includes the personal information form, and the second part includes the "Digital Literacy Scale" developed by Pala and Başıbüyük (2020).

Digital literacy scale

In this study, "Digital Literacy Scale (DLS)" developed by Pala and Başıbüyük (2020) was used. This scale was developed to determine the digital literacy levels of students aged 10-12 years. The scale consists of 21 items and 4 sub-dimensions. The sub-dimensions are categorized as "Computing, Communication, Security and Problem Solving". The scale has no reverse scored items and the total score can be obtained as well as the total sub-dimension score. The Cronbach's Alpha coefficient of the scale was found to be .877. Since the Cronbach's Alpha reliability coefficient of the scale was above .70, it was seen that the scale was at a sufficient level in terms of reliability (Büyüköztürk, 2008: 170-171).

Data collection process

For the research, the class students who were thought to represent the population and who constituted the sample were selected by convenience sampling method and the scales were applied. While applying the scales, the principle of voluntariness was taken into consideration, and it was tried to ensure that the scales were answered sincerely. There was no time limitation while applying the scales. Since it is the most important point that students answer the scale items correctly and sincerely, no time limit was set to overcome any uncertainties about the points to be hesitated. The scale was applied to 100 students and the results were analyzed.

Data analysis

The data obtained from the research were analyzed with SPSS statistical program. Percentage, arithmetic mean, t-test for the variables on the presence of digital tools and gender, and One-Way Analysis of Variance (ANOVA) test for age and place of residence variables were used to analyze the data. The kurtosis, skewness and normality values of the digital literacy scale are given in Table 3.

Table 3 Kurtosis, skewness and normality values of the digital literacy scale

Scale	Kurtosis	Skewness	Normality
Digital Literacy	-.04	-.47	.20

When Table 2 was examined, it was seen that the kurtosis skewness values for the digital literacy scale were between -1 and +1 and it was concluded that the data were normally distributed (Tabachnick & Fidell, 2013).

Findings

In this section, the data obtained as a result of examining the digital literacy levels of primary school students in terms of various variables and the findings obtained from the analysis of these data are presented.

The findings regarding the students' digital literacy levels are presented in Table 4.

Table 4 Students' digital literacy averages

	N	*Min.*	*Max.*	$\bar{x}$	*Sd*
Digital Literacy	100	1.43	4.90	3.13	1.39

As seen in Table 4, the mean of the students' (n=100) digital literacy levels is 3.13. Accordingly, it can be said that students' digital literacy levels are above average. In Table 5, when the difference in the mean digital literacy scores of the students according to their gender is analyzed, the t-test results are as follows.

Table 5 Digital literacy results by gender

Gender	$\bar{x}$	*S.S.*	*sd*	*p*
Male	56	0.70	100	.809
Female	44	0.74		

As seen in Table 5, as a result of the t-test for independent samples, it was seen that the t-test results of the students did not show a significant difference according to the gender variable.

Table 6 shows the results of the Anova test conducted to examine the differences in the participants' digital literacy score averages according to their mother's education level.

Table 6 Digital literacy results according to mother's education status

Education Status	$\bar{x}$	*S.S.*	*sd*	*p*
Primary School	36	.72	100	.154
Middle School	30	.59		
High School	26	.79		
Undergraduate and above	8	.75		

As seen in Table 6, it is observed that the educational status of the participants' mothers did not cause a significant difference in their digital addictions. Table 7 was conducted to examine the differences in the mean digital literacy scores of the participants' fathers' education status.

Table 7 Digital literacy results according to father's education status

Education Status	$\bar{x}$	*S.S.*	*Sd*	*p*
Primary School	23	.62	100	.933
Middle School	30	.69		
High School	35	.78		
Undergraduate and above	12	.80		

As seen in Table 7, there is no significant effect of father's education level on students' digital literacy. In Table 8, it is examined whether the family income variable has an effect on students' digital literacy.

Table 8 Results of the effect of family income on digital literacy

Income Status	$\bar{x}$	*S.S.*	*Sd*	*p*
0-3000 Turkish liras	19	.58		
3001-5000	27	.71	100	.037*
5001-10000	33	.81		
10001 and above	21	.66		

As seen in Table 8, students' digital literacy rates show a significant difference according to the family income variable. This difference causes a significant difference not according to any income level group but on average. Table 9 shows the results of the analysis on whether the students' digital literacy is affected according to the place of residence variable.

Table 9 Results of the effect of place of residence on digital literacy

Place of Residence	Mean	SD	df	t
Village	48	.64		
Township	9	.90	100	.296
City	43	.74		

It was observed that the place of residence variable, which is one of the demographic variables in the study, had no effect on students' digital literacy. In Table 10, t-test results are presented to examine the effect of having a computer at home on digital literacy.

Table 10 The effect of having a computer at home on digital literacy

Computer Availability	Mean	SD	df	t	p
Yes	29	.88	100	-.78	.545
No	71	.63			

As seen in Table 10, as a result of the t-test for independent samples, it is observed that students' having computers does not affect their digital literacy. Table 11 shows the results of the t-test conducted to examine the effect of having tablets on students' digital literacy.

Table 11 The effect of having a tablet at home on digital literacy

Tablet Availability	Mean	SD	df	t	p
Yes	33	.80	100	-.94	.376
No	67	.67			

As seen in Table 11, as a result of the t-test for independent samples, it is observed that having tablets does not affect students' digital literacy. Table 12 shows the results of the t-test conducted to examine the effect of having smartphones on students' digital literacy.

Table 12 The effect of having a smartphone at home on digital literacy

Smart Phone Status	Mean	SD	df	t	p
Yes	83	.74	100	-1.42	.158
No	17	.52			

As seen in Table 12, as a result of the t-test for independent samples, it is observed that having a smartphone at home does not affect students' digital literacy. Table 13 shows the results of the t-test conducted to examine the effect of having internet at home on students' digital literacy.

Table 13 The effect of having internet at home on digital literacy

Internet Availability	Mean	SD	df	t	p
Yes	51	.82	100	-.115	.002*
No	49	.59			

In Table 13, when the mean scores related to the effect of the variable of having internet in their homes on their digital literacy are examined, it is observed that having internet in their homes causes a significant difference in their digital literacy. Table 14 shows the Anova results regarding the time students spend with technological tools.

Table 14 The effect of time spent with technological tools on digital literacy

Time with Technological Tools	$\bar{x}$	*S.S.*	*sd*	*p*
0-1 hour	54	.62	100	.464
1-2 hours	35	.82		
2-3 hours	6	.88		
3 hours and above	5	.67		

When the results given in Table 14 are analyzed, it is observed that the time students spend with technological tools is not related to their digital literacy.

Discussion and conclusion

In this study, which aims to examine the digital literacy levels of primary school students in terms of various variables, it is seen that the digital literacy scores of the students are high. It can be stated that this situation is due to the fact that students are born into a digital world in terms of their age group and that these issues are frequently discussed around them. Considering that the students spent a large part of the first and second grades of their primary school life being educated to the extent that technological tools were sufficient, it may be evidence for the findings related to their high digital literacy. Similar findings were also found by researchers, although they worked with different age groups (Aksoy, Karabey, & Aksoy, 2021; Arslan, 2019; Çelik & Kılıçoğlu, 2022; Dönmez, 2019; Korkmaz, 2020; Ocak & Karakuş, 2019; Pala & Başıbüyük, 2020; Talan & Aktürk, 2021, Yıldırım, 2015).

When the results of the students according to the gender variable are examined, it is seen that the level of digital literacy is not affected by gender. Similar results (Aşıcı & Usluel, 2013; Koch, Müller, & Sieverding, 2008; Özmusul, 2008; Pala & Başıbüyük, 2020; Tuti, 2005). This may be due to the fact that the environments in which students use technology do not differ for male and female students. It can be concluded that boys and girls come to the primary school level with the same conditions and there is no discrimination. However, some studies have concluded that boys use the Internet more efficiently than girls and have higher digital literacy rates (Çetinkaya, 2008; Deryakulu, 2007; Tsai, Lin, & Tsai, 2001).

When the effect of the place where the students live on their digital literacy was examined, no significant difference was found. On the other hand, there are studies that have determined the opposite views of our research and that the digital literacy of students living in district and provincial centers where there is more interaction is higher (Kılıç & Yıldırım, 2018; Pala & Başıbüyük, 2020).

When the technological devices in students' homes were analyzed, it was observed that the presence of computers, tablets and phones in their homes did not affect students' digital literacy. This situation is similar to the findings of Vekiri (2010). In the research conducted, the opposite results are reached and the results that the digital literacy of students who have computers, tablets and smartphones in their homes is high come to the fore (Çetinkaya, 2008; Kuhlemeier & Hemker, 2007; Kurt, Çoklar, Kılıççer, & Yıldırım, 2008; Yıldırım, 2015).

In the answers given to the questions examining the duration of internet use and the presence of internet in their homes, it is seen that students are affected by the variable of having internet in

their homes and that digital literacy and the presence of internet in their homes cause a significant difference. There are also different studies in which this difference was found. Tsai, Lin, and Tsai (2001) concluded that students who have internet have higher technological competencies than those who do not, while Özerbaş and Kuralbayeva (2018) made a similar finding regarding pre-service teachers. Acar (2015) reached a similar finding regarding parents. As a result, it was observed that the easy accessibility of the internet had a significant relationship with students' digital literacy. When an analysis was made in terms of the time spent on the internet, it was observed that students' digital literacy was not affected by this situation.

It is thought that the reason for the opposite results found in most studies (Çetin, Çalışkan, & Menzi, 2012; Pala & Başıbüyük, 2020; Yıldırım, 2015) is the age groups of the students. Since primary school students' use of technological tools is under the control of their parents, it is thought that a significant relationship could not be detected.

As a result, considering that the research findings were collected from students in the fourth grade level of primary school and that they do not have a digital tool of their own due to their age, it can be concluded that students have high levels of digital literacy in terms of environmental factors such as television, social environment, school friends, but this is due to the school environment rather than the tools in their homes.

Recommendations

The following recommendations are given in the study.

- An education that will increase the digital literacy skills of students at school may be more efficient for younger age groups,
- Integrating outcomes and lessons related to digital literacy skills into the curriculum,
- Studying the subject with younger age groups using qualitative research models,
- Suggestions were made to expand the research with studies where the population was larger.

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