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Examination of Middle School Students' Digital Literacy Levels*

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ABSTRACT

The development of digital literacy equips students with the skills to effectively utilize technology and helps them become informed and responsible individuals in the digital world. Effective instruction in digital literacy empowers students with the necessary skills to navigate and utilize technology proficiently, thereby fostering their ability to engage critically and responsibly in the digital environment. The inaugural objective of this research is to assess the proficiency in digital literacy among middle school students. During epidemics and crises, when education is delivered digitally, it is important to assess students' levels of digital literacy. Within this framework, an effort has been undertaken to ascertain whether variables such as gender, the quantity of siblings, maternal education, and the frequency of internet connectivity exert any influence on the digital literacy aptitude of middle school students. The study adopts a quantitative research design, employing a descriptive survey model for data collection. The study population, comprising 268 middle school students in Kastamonu, was determined through an appropriate sampling technique. Subsequently, the gathered data underwent analysis via a quantitative data analysis program, and the results were subjected to interpretation. The findings reveal that the digital literacy levels of middle school students surpass the average across all dimensions. Moreover, there is a negative correlation between the number of siblings and digital literacy levels, indicating a decrease as the sibling count increases.

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1. Introduction

Education and instructional processes are evolving in tandem with the rapid changes in our world. As the world advances, the goals of education and instruction also diversify. In the evolving world, education and instruction play a crucial role in cultivating individuals with new skills. With the aim of nurturing individuals equipped with new skills in the developing world, education and instruction assume significant importance. The skills required in the 21st century are imparted to students through the medium of education. Education is the process of consciously instigating changes in an individual's life. While the concepts of education and instruction often convey good intentions, education is used in a more specific and planned instructional sense. A fundamental characteristic of education is its lifelong and ubiquitous nature. On the other hand, instruction is planned, systematic, and takes place in a

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specific location (Güven, 2015). In light of these changes, the impact of scientific and technological innovations on education has become inevitable.

The advent of new scientific and technological advancements has propelled education and learning to a more advanced level. Transitioning into an era where digital tools are extensively utilized alongside traditional resources, digital devices such as tablets, smartphones, and smart boards have gained increased significance in education. As digital tools such as tablets, smartphones, and smart boards become integral to the learning environment, the emphasis on digital literacy skills has grown. These skills are now crucial components of curricula, especially within Social Studies instruction. Social Studies educators, therefore, play a critical role in fostering digital literacy among students. They are tasked with not only imparting traditional knowledge but also ensuring students are proficient in utilizing digital resources effectively and responsibly. The field of social sciences is at the forefront of this educational transformation, highlighting the importance of adapting teaching methods to include digital competencies alongside conventional pedagogical strategies. By doing so, Social Studies educators help prepare students for a future where digital literacy is essential, ensuring they are well-equipped to navigate and contribute to a technologically advanced society.

Social studies aim to support an individual's societal existence by encompassing disciplines such as psychology, political science, anthropology, geography, sociology, history, economics, law, and philosophy. Furthermore, the social sciences, encompassing themes associated with citizenship, integrate these varied domains into a comprehensive framework. This is achieved through an examination of the interplay between individuals and their social and physical surroundings across historical, contemporary, and future contexts. Such an approach adheres to a holistic instructional paradigm. As per the curriculum delineated by the Ministry of National Education in 2005, the primary education curriculum, derived from the amalgamation of these disciplines, embraces a collaborative pedagogical strategy. This involves scrutinizing the individual's engagement with their social and physical milieu across historical, contemporary, and future contexts.

A student taking the Social Studies course develops the ability to analyse sociological events occurring in their surroundings from the perspectives of different disciplines (Faiz, 2016). This indicates that the Social Studies course guides students by drawing upon various branches of science to support the individual's societal existence. In today's digital era, where the process of accessing information occurs through digital platforms, the ability to use digital environments accurately and effectively has become a crucial skill, especially in the context of 21st-century requirements. The Social Studies course highlights the digital literacy skill included in the curriculum to impart this skill to students. It is believed that possessing fundamental literacy skills is a prerequisite for effectively using digital tools.

Literacy, as defined by Kellner (2010), pertains to the proficient capability to comprehend and employ communicative symbols imbued with significance within the societal context. This concept focuses on an individual's perception and understanding of life, events, and objects in the guidance of reading and writing (Aşıcı, 2009). In tandem with the expeditious advancement of technology, the conception of literacy has undergone notable evolution. In the contemporary world of the 21st century shaped around technology and media, many concepts have undergone changes, and this transformation has become evident in the field of literacy as well. In the past, it was possible to read or write printed and written content on paper. However, now, with the advancement of technology, the act of reading/writing has become more diverse. This phenomenon has elucidated rise to various forms of literacy, including digital literacy, technology literacy, computer literacy, and information literacy. Studies concentrating on the notion of digital literacy specifically investigate individuals' competencies in reading and writing within digital environments, encompassing devices such as mobile phones, computers, and televisions (Maden et al., 2018). Achieving digital literacy necessitates the utilization of skills such as problem-solving, decision-making, questioning, research proficiency, and critical thinking (Duran & Özen, 2018).

Digital literacy encompasses a skill set consisting of three fundamental dimensions: technical, cognitive and socio-emotional literacy. The technical dimension includes broad-ranging technical and operational skills, forming the foundation of digital literacy. The cognitive dimension encompasses advanced cognitive abilities, including but not limited to research, critical thinking, and evaluation. Meanwhile, the socio-emotional dimension encompasses behaviors such as using "self" language in face-to-face communication, maintaining the confidentiality of personal information, ensuring personal security and privacy, and being aware of potential risks (Ng, 2012). Particularly, events like the COVID-19 pandemic and earthquakes affecting the country have compelled students to continue their education through remote learning, frequently requiring them to use digital tools. This situation underscores the significance of students possessing the skill of using digital tools accurately and securely, i.e., digital literacy.

Digital literacy can empower students to effectively utilize digital tools and navigate digital environments safely, contributing to their success in the modern educational landscape especially in times of increased reliance on digital resources, as exemplified by the challenges posed by events like the COVID-19 pandemic and earthquakes.

Research on digital literacy has predominantly focused on prospective teachers. Dinlemez (2021) endeavoured to scrutinize the association between digital literacy and digital citizenship proficiency within Turkish prospective language teachers. Özoğlu (2019) sought to establish the correlation between digital literacy and the inclination toward lifelong learning among teacher candidates. In a separate study, Öçal (2017) conducted an investigation to gauge the perception of digital literacy levels among primary school teachers and parents. Kozan (2018) explored the sensitivity of computer teacher candidates to cyberbullying and their levels of digital literacy. Kilci (2019) aimed to bring forth perspectives and practices related to digital citizenship. Bozyel (2019) investigated the encounters of teacher candidates in digital literacy courses, specifically focusing on their reflections pertaining to daily life. Talan & Aktürk (2021) evaluated the information security insights and digital literacy status of 14-17-year-old students. In a study by Oğuz Haçat & Demir (2019), the most studied literacy types were identified as media literacy, mathematical literacy, science and technology literacy, and environmental literacy. However, it was determined that the rate of exploration of digital literacy was low.

Furthermore, social studies education and digital literacy are two complementary elements in modern education. Traditional social studies courses cover topics such as history, geography, and culture, while digital literacy encompasses individuals' ability to understand, use, and evaluate digital technologies. The integration of these two domains can provide students with a rich learning experience in both content and skills. Social studies classes offer in-depth knowledge about history, culture, and societal issues, while digital literacy empowers students to research and analyse these topics through online resources. This integration enables students to access information more effectively.

Social studies education aims to cultivate critical thinking skills in students. Conversely, digital literacy, as a component of media literacy, empowers students with the capacity to critically assess visual, written, and digital media. When combined, these skills enable students to better understand and evaluate current events. Social studies also guides students in understanding and appreciating cultural diversity. Digital literacy provides students with the opportunity to understand digital content from different cultures and engage with this diversity. As a result, students can gain a global perspective. Upon examining the findings, it is evident that digital literacy skills are generally underexplored. Therefore, focusing on digital literacy skills, especially during crises when education and teaching processes rely heavily on digital tools and resources, may be crucial. Evaluating the digital literacy levels of students constitutes a crucial initiative in implementing requisite measures and fostering a more efficacious digital learning milieu.

In the context of this study, which is directed towards discerning the digital literacy proficiency of middle school students, the research inquiry canters on investigating potential disparities in the digital literacy levels of middle school students, contingent upon various variables such as gender, number of

siblings, parental educational attainment, possession of computer and internet, and frequency of internet connection.

2. Method

2.1. Research Design

This research utilized a descriptive survey model with the objective of ascertaining the digital literacy levels among middle school students. The descriptive survey model represents an approach that seeks to explore a current or ongoing situation. The survey model aims to identify existing skills and, therefore, adopts a quantitative research method. This model focuses on organizing the necessary conditions for collecting, analyzing, and interpreting data relevant to the research purpose (Karasar, 2018). The descriptive survey model defines the situation that forms the focus of the research in the terms of the individuals or objects involved, describing the current situation to achieve the research goal. Such a model is commonly used to gain a general overview of a specific subject, understand the situation, and determine the existing conditions (Karasar, 2014). The selection of this model for the research signifies its appropriateness in facilitating a comprehensive comprehension of the digital literacy levels among middle school students and discerning their existing competencies.

2.2. Study Cohort

The study cohort comprises 268 middle school students enrolled in the fifth, sixth, and seventh grades, hailing from schools situated in the central, Seydiler, and Küre districts of Kastamonu province, Turkey. In light of the repercussions of the COVID-19 pandemic, the study group was chosen using a convenient sampling approach. This method is deemed cost-effective, enabling the researcher to select readily available groups, thereby conserving time, financial resources, and labor (Büyüköztürk et al., 2017). The data for the research was collected online through Google Forms. Demographic information of the study group is given in the table below.

Table 1. Demographic information of the study group

Demographic inf.		%	Demographic inf.		%
Districts	City Center	42%	Maternal	Elementary School	32%
	Küre	34%	Education Level	Middle school	29%
	Seydiler	24%		High School	19%
Gender	Male	48%		Associate Degree	16%
	Female	52%		Bachelor's Degree	4%
Grade Level	5th	39%	Paternal	Elementary School	14%
	6th	31%	Education Level	Middle school	27%
	7th	30%		High School	33%
Siblings	None	10%		Associate Degree	24%
	One	41%		Bachelor's Degree	2%
	Two	35%			
	Three	11%			
	Four and +	3%			

When examining the distribution of the study group by district, the highest participation was in the central district, with 42%. The next highest was Küre, with a participation rate of 34%. The district with the lowest participation was Seydiler, with a rate of 24%. Regarding the distribution by gender, 52% of the participants were female, while 48% were male. In terms of grade levels, 39% of the participants were in the 5th grade, 31% were in the 6th grade, and 30% were in the 7th grade. Considering the number of siblings, 10% of the participants had no siblings, 41% had one sibling, 35% had two siblings, 11% had three siblings, and 3% had four or more siblings. Analyzing the educational level of mothers, 32% of the participants' mothers had completed elementary education, 29% had completed middle education, 19% had completed high school, 16% had completed associate degree, and 4% had completed bachelor's degree. Regarding the educational level of fathers, 14% of the participants' fathers had

completed elementary education, 27% had completed middle education, 33% had completed high school, 24% had completed associate degree and 2% had bachelor's degree.

2.3. Data Collection Tool

In this study, the Digital Literacy Scale (DLS), developed by Pala (2019), served as the inaugural assessment instrument. The factor structure of this scale was established by employing the "Digital Skills-Personal Assessment Table" accessible on Europass. Subsequently, the factor analysis identified four distinct factors: "Information Processing," "Communication," "Security," and "Problem Solving." Upon evaluating the Cronbach's Alpha reliability coefficients for each factor, the results were determined to be .712 for the 'Information Processing' factor, .736 for the 'Communication' factor, .786 for the 'Security' factor, .751 for the 'Problem Solving' factor, and .877 for the overall scale. These coefficients affirm that both the scale and its sub-dimensions exhibit a commendable level of reliability (Pala & Başıbüyük, 2020).

In the course of this investigation, the Cronbach's Alpha coefficients for distinct factors of the Digital Literacy Scale, developed by Pala (2019) and applied for evaluating the digital literacy competencies of middle school students, are delineated as follows: .620 for the 'Information Processing' factor, .700 for the 'Communication' factor, .668 for the 'Security' factor, .768 for the 'Problem Solving' factor, and .867 for the comprehensive scale.

As elucidated in the descriptions, the Digital Literacy Scale encompasses 21 items distributed across four distinct dimensions. In this study, participants can get a maximum of 105 points and a minimum of 21 points. Employing a 5-point Likert scale, the respondents are prompted to provide ratings ranging from "always" to "never," with no negatively framed items present in the scale. In conjunction with the scale, participants were furnished with a personal information questionnaire featuring inquiries pertaining to diverse variables. Notable elements within the questionnaire encompass gender, number of siblings, grade level, parental education level, parental occupation, the availability of internet and computer at home, and the frequency of internet connection.

2.4. Data Analysis

In this study, quantitative data analysis software was employed to analyze numerical data. Normality tests were carried out to scrutinize the distribution of the quantitative data, utilizing the Kolmogorov-Smirnov and Shapiro-Wilk tests. The decision criterion for normality was established as follows: a p-value exceeding 0.05 implies a normal distribution, while a p-value below 0.05 indicates non-normal distribution. In instances where the sample size is below 50, the Shapiro-Wilk test is applied; conversely, if the sample size exceeds 50, the Kolmogorov-Smirnov test is utilized, as recommended by Büyüköztürk (2008). Elucidated that the sample size in this study surpasses 50, the Kolmogorov-Smirnov test was executed, revealing that the data adheres to a normal distribution (.200 > 0.05).

Kurtosis and skewness metrics falling within the range of -1 to +1 have been established as indicative of a normal distribution according to Çokluk et al. (2012). Subsequently, elucidated that the kurtosis and skewness values in the present analysis fall within this designated interval (-1 to +1), it is deduced that the distribution adheres to normality. Specifically, the computed skewness value is 0.027, and the kurtosis value is 0.139. These values collectively suggest that the data exhibits negligible departure from a normal distribution. Consequently, it is plausible to assert that the data does not significantly deviate from normality. Following the completion of the normality assessments, subsequent statistical analyses encompassed t-tests for independent groups, one-way ANOVA, as well as Tukey and LSD post hoc tests.

3. Findings

Within the scope of this research, an examination was conducted to assess the digital literacy proficiency of middle school students. Various variables were considered in this analysis, including gender, number of siblings, grade level, parents' educational attainment, ownership of computers and internet access, and the frequency of internet usage. The ensuing results are elucidated below in accordance with the delineated sub-problems. In the initial stage, the digital literacy levels of middle school students were examined, and these findings are shown in Table 2:

Table 2. Digital literacy levels of middle school students

Dimensions	*n*	*Lowest*	*Highest*	$\bar{x}$	*ss*
Information Processing	268	8,00	25,00	20,09	3,62
Communication	268	7,00	25,00	17,72	4,57
Security	268	11,00	30,00	25,53	5,32
Problem Solving	268	6,00	25,00	17,63	4,40

Due to the scale being a 5-point Likert scale, the lowest score for the 5-item dimensions is calculated as 5x1=5, the midpoint as 5x2.5=12.5, and the highest score as 5x5=25. According to Table 1, the average score for the information processing-focused dimension is 20.09, the communication dimension's average score is 17.72, and the problem-solving dimension's average score is 17.63. This indicates that the average scores for all dimensions are above the midpoint ($\bar{x}$: 17.63; $\bar{x}$: 20.09; $\bar{x}$: 17.72 > $\bar{x}$: 12.50). Additionally, for the 6-item dimensions, the lowest score is 6x1=6, the midpoint is 6x2.5=15, and the highest score is 6x5=30. According to the findings, the average score for the security dimension is 25.53, which also indicates that the average scores for all dimensions are above the midpoint ($\bar{x}$: 25.53 > $\bar{x}$: 15.00). Based on these assessments, it can be concluded from the findings in Table 2 that middle school students' digital literacy scores are above the midpoint in all dimensions.

The inaugural sub-problem of this research endeavors to investigate the variable of gender. Within this context, the research addresses the query: "Does the digital literacy proficiency of middle school students exhibit variations based on gender?"

Table 3. Independent simple t-test table showing dimensions and the sum of dimensions according to the gender of middle school students

Dimension	*Gender*	*n*	$\bar{x}$	*ss*	*sd*	*t*	*p*
Information	Male	128	19,46	3,91	,345	-2,78	,006
Processing	Female	140	20,67	3,23	,273		
	Total	268					
Communication	Male	128	17,78	4,73	,418	,223	,824
	Female	140	17,66	4,44	,375		
	Total	268					
Security	Male	128	25,31	6,56	,579	-,649	,517
	Female	140	25,73	25,73	,328		
	Total	268					
Problem-	Male	128	18,07	4,388	,387	1,56	,118
Solving	Female	140	17,22	4,398	,371		
	Total	268					
Total of Scale	Male	128	80,63	15,18	1,34	-,402	,688
	Female	140	81,30	12,25	1,03		
	Total	268					

As per the data presented in Table 3, no statistically significant differences based on gender are discerned in the dimensions of communication, security, and problem-solving (p=0.824; p=0.517; p=0.118). Nevertheless, a notable difference favoring female students is evident in the information processing dimension (p<0.006). From these findings, it is deduced that the gender variable exerts a

discernible influence, specifically impacting the level of digital literacy in the information processing dimension.

Shifting focus to another variable investigated in a sub-problem of the research, consideration is elucidated to the number of siblings. In this context, the inquiry revolves around the question: "Do the levels of digital literacy exhibit variations based on the number of siblings among middle school students?"

Table 4. Descriptive statistics showing dimensions and the sum of dimensions according to the number of siblings of middle school students

Dimension	*Number of Siblings*	*N*	$\bar{x}$	*Ss*
Information	0	27	20,77	4,09
Processing	1 sibling	109	20,46	3,84
	2 siblings	93	20,05	3,25
	3 siblings	30	18,73	2,97
	4 and more siblings	9	18,55	4,03
	Total	268	20,09	3,62
	0	27	19,18	4,44
Communication	1 sibling	109	18,26	4,79
	2 siblings	93	17,19	4,44
	3 siblings	30	16,00	3,94
	4 and more siblings	9	18,00	3,87
	Total	268	17,72	4,57
Security	0	27	26,14	3,78
	1 sibling	109	26,11	6,53
	2 siblings	93	25,38	4,16
	3 siblings	30	23,76	4,78
	4 and more siblings	9	24,00	4,58
	Total	268	25,53	5,32
Problem-Solving	0	27	17,96	5,17
	1 sibling	109	18,21	4,59
	2 siblings	93	17,11	4,25
	3 siblings	30	16,13	3,26
	4 and more siblings	9	19,88	2,71
	Total	268	17,63	4,40
Total of Scale	0	27	84,07	14,63
	1 sibling	109	83,06	14,65
	2 siblings	93	79,75	12,49
	3 siblings	30	74,63	11,26
	4 and more siblings	9	80,44	12,74
	Total	268	80,98	13,71

Upon examination of Table 4, in the analysis conducted on the dimensions of information processing, communication, and security, as well as the total score, it was found that the highest arithmetic mean belongs to students without siblings ($\bar{x}$=20.77; $\bar{x}$=19.18; $\bar{x}$=26.14; $\bar{x}$=84.07). However, in the problem-solving dimension, the highest arithmetic mean was determined to belong to students with siblings ($\bar{x}$=18.21). Based on these findings, it can be stated that there is differentiation in students' levels of digital literacy based on the variable of the number of siblings. A one-way analysis of variance was conducted to examine the variation in scores obtained by students based on the variable of the number of siblings. The analysis results are presented in Table 5.

Table 5. One-way ANOVA results showing dimensions and the sum of dimensions according to the number of siblings of middle school students.

Dimensions		*Sum of Squares*	*df*	*Mean of Squares*	*F*	*p*	*Difference*
Information Processing	Between Group	104,853	4	26,213	2,031	,090	
	Within Group	3394,624	263	12,907			
	Total	3499,478	267				
Communication	Between Group	205,693	4	51,423	2,511	,042	0 sibling-2 siblings
	Within Group	5385,875	263	20,479			0 sibling-3 siblings
	Total	5591,567	267				1 sibling- 3 siblings
Security	Between Group	164,410	4	41,102	1,457	,216	
	Within Group	7418,288	263	28,206			
	Total	7582,698	267				
Problem Solving	Between Group	123,399	2	61,700	3,232	,041	1 sibling- 3 siblings
	Within Group	5059,030	265	19,091			
	Total	5182,429	267				
Total of Scale	Between Group	2083,037	4	520,759	2,847	,025	1 sibling-3 siblings
	Within Group	48110,903	263	182,931			
	Total	50193,940	267				

According to Table 5, a significant difference based on the number of siblings was found in students' communication, problem-solving, and total scores ($F=2.031$, $p<0.05$; $F=1.457$, $p<0.05$). However, no significant difference was identified in information processing and security scores ($F=2.031$, $p<0.05$; $F=1.457$, $p<0.05$). The research results indicate a significant difference in students' levels of digital literacy in communication, problem-solving, and total scores based on the number of siblings. This suggests that students' digital literacy skills may vary depending on the variable of the number of siblings. Tukey and LSD tests were conducted to determine this variation. Differences were observed in total, communication, and problem-solving dimensions. Looking at the total score, a significant difference was found between students with 1 sibling and 3 siblings, favoring 1 sibling. In the communication dimension, significant differences were observed in favor of 0 siblings between 0 siblings and 2 or 3 siblings, and in favor of 1 sibling between 1 sibling and 3 siblings. The research results indicate that those without siblings have a higher level of digital literacy than those with 2 or 3 siblings, and those with 1 sibling have a better digital literacy level than those with 3 siblings. In the problem-solving dimension, a significant difference in favor of 1 sibling was found between students with 1 sibling and 3 siblings.

In the context of another sub-problem investigated within the research, one of the examined variables pertains to computer ownership. Within this framework, the central inquiry revolves around the question, "Do the digital literacy levels of middle school students vary based on their ownership of computers?"

Table 6. Independent samples t-test for digital literacy scores based on middle school students' computer ownership status

Dimension	*Computer*	*n*	$\bar{x}$	*ss*	*sd*	*t*	*p*
Information	Yes	236	20,23	3,58	,233	1,67	,095
Processing	No	32	19,09	3,78	,669		
	Total	268					
Communication	Yes	236	17,82	4,56	,297	,953	,341
	No	32	17,00	4,65	,823		
	Total	268					
Security	Yes	236	25,70	5,33	,347	1,45	,147
	No	32	24,25	5,19	,918		
	Total	268					
Problem-Solving	Yes	236	24,25	4,35	,283	,991	,323
	No	32	16,90	4,78	,846		
	Total	268					
Total of Scale	Yes	236	81,49	13,52	,880	1,64	,101
	No	32	77,25	14,73	2,60		
	Total	268					

Upon examination of Table 6, no significant difference was identified in terms of computer ownership status across the dimensions of information processing, communication, security, and problem-solving (p=0.095; p=0.341; p=0.147; p=0.323). According to these findings, it can be observed that computer ownership status does not have a significant impact on digital literacy levels. These results indicate that being a computer owner is not a significant factor in determining digital literacy levels.

In another sub-problem investigated in the research, the variable under scrutiny is ownership of the internet. Within this framework, the focus is directed towards the question, "Do the digital literacy levels of middle school students vary based on their ownership of the internet?"

Table 7. Independent samples t-test for digital literacy scores based on middle school students' ownership of the internet

Dimension	*Internet*	*n*	$\bar{x}$	*ss*	*sd*	*t*	*p*
Information	Yes	241	20,21	3,64	,234	1,66	,097
Processing	No	27	19,00	3,25	,627		
	Total	268					
Communication	Yes	241	17,81	4,60	,296	,955	,340
	No	27	16,92	4,33	,833		
	Total	268					
Security	Yes	241	25,58	5,42	,349	,510	,611
	No	27	25,03	4,41	,849		
	Total	268					
Problem-Solving	Yes	241	17,68	4,39	,282	,645	,519
	No	27	17,11	4,58	,882		
	Total	268					
Total of Scale	Yes	241	81,31	13,78	,888	1,16	,245
	No	27	78,07	12,88	2,47		
	Total	268					

Upon examination of Table 7, no significant difference was identified in terms of ownership of the internet across the dimensions of information processing, communication, security, and problem-solving (p=0.097; p=0.340; p=0.611; p=0.519). These results indicate that ownership of the internet does

not alter digital literacy levels. These findings suggest that access to the internet is not a significant factor in determining digital literacy levels.

Another variable examined in a sub-problem of the research is the grade level. Within this framework, the focus is directed towards the question, "Do the digital literacy levels of middle school students vary based on their grade level?"

Table 8. Descriptive statistics showing digital literacy levels of middle school students by grade level

Dimension	*Grade Level*	*N*	$\bar{x}$	*ss*
Information Processing	5	105	19,90	3,70
	6	82	19,97	3,74
	7	81	20,46	3,38
	Total	268	20,09	3,62
Communication	5	105	17,58	4,75
	6	82	17,37	4,16
	7	81	18,25	4,74
	Total	268	17,72	4,57
Security	5	105	25,40	4,10
	6	82	24,26	4,50
	7	81	26,97	6,96
	Total	268	25,53	5,32
Problem Solving	5	105	18,11	4,31
	6	82	16,60	4,15
	7	81	18,03	4,64
	Total	268	17,63	4,40
Total	5	105	81,00	13,41
	6	82	78,23	13,41
	7	81	83,77	14,23
	Total	268	80,98	13,71

According to Table 8, it has been determined that, in terms of information processing, communication, and security dimensions, as well as the total score, the highest arithmetic means belong to the 7th grade ($\bar{x}$=20.46; $\bar{x}$=18.25; $\bar{x}$=26.97; $\bar{x}$=83.77). In the problem-solving dimension, however, the highest arithmetic mean is attributed to the 5th grade ($\bar{x}$=18.11). Consequently, it is determined that the grade level influences students' digital literacy levels. To examine the variation of these scores according to the grade level variable, a one-way analysis of variance (ANOVA) was conducted. The analysis results are presented in Table 9.

Upon examining Table 9, a significant difference has been identified in terms of students' security, problem-solving, and total scores based on grade level ($F=0.620$, $p<0.05$; $F=0.839$, $p<0.05$). According to these results, it is determined that students' digital literacy levels vary according to their grade level. To determine the source of the observed difference, Tukey and LSD tests were conducted. Differences in security, problem-solving, and total scores were observed based on grade level. According to the results of Tukey and LSD tests, a significant difference was found in favor of the 7th grade between the 6th and 7th grades in the security and total dimensions. In the problem-solving dimension, a significant difference was found in favor of the 5th grade between the 5th and 6th grades, and in favor of the 7th grade between the 7th and 6th grades. This indicates that, in the problem-solving dimension, the 5th and 7th grades are better than the 6th grade. These results suggest that students' digital literacy levels may vary depending on their grade level.

Table 9. One-way ANOVA results showing digital literacy levels of middle school students by grade level

Dimensions		*Sum of Squares*	*df*	*Mean of Squares*	*F*	*p*	*Difference*
Information Processing	Between Group	16,306	2	8,153	,620	,539	
	Within Group	3483,172	265	13,144			
	Total	3499,478	267				
Communication	Between Group	35,169	2	17,585	,839	,433	
	Within Group	5556,398	265	20,968			
	Total	5591,567	267				
Security	Between Group	301,259	2	150,630	5,482	,005	7.grade-6.grade
	Within Group	7281,439	265	27,477			
	Total	7582,698	267				
Problem Solving	Between Group	123,399	2	61,700	3,232	,041	5.grade-6.grade
	Within Group	5059,030	265	19,091			
	Total	5182,429	267				
Total	Between Group	1236,797	2	618,398	3,347	,037	7.grade-6.grade
	Within Group	48957,144	265	184,744			
	Total	50193,940	267				

In another sub-problem examined in the research, the variable under scrutiny is maternal education. Within this framework, the focus is directed towards the question, "Do the digital literacy levels of middle school students vary based on their mother's education?"

Table 10. Descriptive statistics showing digital literacy levels of middle school students by maternal education

Dimension	*Maternal Education*	*N*	$\bar{x}$	*Ss*
Information Processing	Elementary School	85	20,05	3,17
	Middle school	79	19,29	4,12
	High School	50	20,04	3,60
	Associate Degree	43	21,90	3,05
	Bachelor's Degree	10	19,20	3,32
	Total	267	20,09	3,62
Communication	Elementary School	85	16,68	4,30
	Middle school	79	17,62	4,63
	High School	50	17,72	4,52
	Associate Degree	43	19,86	4,81
	Bachelor's Degree	10	18,10	3,07
	Total	267	17,71	4,58
Security	Elementary School	85	24,48	4,42
	Middle school	79	25,10	4,55
	High School	50	26,06	3,17

	Associate Degree	43	28,00	8,86
	Bachelor's Degree	10	24,60	3,89
	Total	267	25,53	5,33
Problem-Solving	Elementary School	85	16,84	4,05
	Middle school	79	17,45	4,63
	High School	50	17,06	4,03
	Associate Degree	43	19,76	4,50
	Bachelor's Degree	10	18,60	4,03
	Total	267	17,60	4,39
Total of Scale	Elementary School	85	78,07	11,71
	Middle school	79	79,46	14,36
	High School	50	80,88	12,53
	Associate Degree	43	89,53	15,00
	Bachelor's Degree	10	80,50	11,87
	Total	267	80,94	13,72

According to Table 10, it has been determined that, in terms of information processing, communication, security, problem-solving dimensions, and the total score, the highest arithmetic means belong to students whose mothers are Bachelor's Degree graduates ($\bar{x}$=21.90; $\bar{x}$=19.86; $\bar{x}$=28.76; $\bar{x}$=89.53). To examine the results of the variation in these scores based on the maternal education variable, a one-way analysis of variance (ANOVA) was conducted. The analysis results are presented in Table 11.

Table 11. One-way ANOVA results showing digital literacy levels of middle school students by maternal education

Dimension		*Sum of Squares*	*df*	*Mean of Square*	*F*	*p*	*Difference*
Information Processing	Between Group	200,502	4	50,125	3,982	,004	Associate Degree - Elementary School
	Within Group	3298,158	262	12,588			Associate Degree - High School
	Total	3498,659	266				
Communication	Between Group	290,759	4	72,690	3,594	,007	Associate Degree - Elementary School
	Within Group	5299,174	262	20,226			
	Total	5589,933	266				
Security	Between Group	392,846	4	98,211	3,579	,007	Associate Degree- Elementary School
	Within Group	7189,633	262	27,441			Associate Degree - Middle school
	Total	7582,479	266				
Problem-Solving	Between Group	276,416	4	69,104	3,732	,006	Associate Degree -

							Elementary School
	Within Group	4851,501	262	18,517			Associate Degree Middle school
	Total	5127,918	266				Associate Degree -High
Total of Scale	Between Group	4049,541	4	1012,385	5,761	,000	Associate Degree - Elementary School
	Within Group	46043,725	262	175,739			Associate Degree - Middle school
	Total	50093,266	266				Associate Degree – High School

According to Table 11, a significant difference has been identified among students' scores in information processing, communication, security, problem-solving dimensions, and the total score based on maternal education ($F=3.982$, $p<0.05$; $F=3.594$, $p<0.05$; $F=3.579$, $p<0.05$; $F=3.732$, $p<0.05$; $F=5.761$, $p<0.05$). According to these results, it is determined that students' digital literacy levels vary based on their mother's education. Tukey test results indicate significant differences in favor of associate degree in the information processing dimension between high school, bachelor's degree, and elementary school; in favor of associate degree in the communication dimension between elementary school and bachelor's degree; in favor of associate degree in the security dimension between bachelor's degree, middle school, and elementary school; in favor of bachelor's degree education in the problem-solving dimension between bachelor's degree, high school, middle school, and elementary school; and in favor of associate degree in the total score between high school, bachelor's degree, middle school, and elementary school. These results suggest that students' digital literacy levels may vary based on their mothers' education.

In the investigation of another sub-problem of the research, one of the examined variables is paternal education. Within this framework, the inquiry is centered on the question, "Do the levels of digital literacy among middle school students vary according to paternal education?

Table 12. Descriptive statistics showing digital literacy levels of middle school students by paternal education

Dimensions	*Paternal Education*	*N*	$\bar{x}$	*SS*
Information Processing	Elementary School	37	19,51	3,38
	Middle school	71	19,36	3,88
	High School	85	20,80	3,26
	Associate Degree	62	20,82	3,61
	Bachelor's Degree	6	18,83	2,99
	Total	261	20,18	3,58
Communication	Elementary School	37	16,97	4,33
	Middle school	71	16,61	4,72
	High School	85	18,62	4,05
	Associate Degree	62	18,64	4,99
	Bachelor's Degree	6	14,33	5,04
	Total	261	17,75	4,62
Security	Elementary School	37	23,81	4,30

	Middle school	71	24,11	4,93
	High School	85	26,56	2,72
	Associate Degree	62	27,16	7,88
	Bachelor's Degree	6	22,83	5,41
	Total	261	25,56	5,36
Problem Solving	Elementary School	37	15,78	4,45
	Middle school	71	16,88	4,52
	High School	85	18,38	4,07
	Associate Degree	62	18,56	4,21
	Bachelor's Degree	6	17,00	6,32
	Total	261	17,62	4,42
Total of Scale	Elementary School	37	76,08	11,80
	Middle school	71	76,98	14,25
	High School	85	84,37	11,22
	Associate Degree	62	85,19	15,45
	Bachelor's Degree	6	73,00	10,25
	Total	261	81,12	13,78

According to Table 12, it has been determined that the highest arithmetic means in terms of information processing, communication, security, problem-solving dimensions, and total scores belong to students whose fathers are bachelor's degree ($\bar{x}$=20.82; $\bar{x}$=18.64; $\bar{x}$=27.16; $\bar{x}$=18.56; $\bar{x}$=85.19). To examine the differentiation of scores obtained by students based on paternal education, a one-way analysis of variance (ANOVA) was conducted. The analysis results are presented in Table 13.

Table 13. One-way ANOVA results showing digital literacy levels of middle school students by paternal education

Dimensions		*Sum of Squares*	*df*	*Mean of Squares*	*F*	*p*	*Difference*
Information Processing,	Between Group	132,597	4	33,149	2,644	,034	High School-Middle school
	Within Group	3209,204	256	12,536			Associate Degree - Middle school
	Total	3341,801	260				
Communication	Between Group	297,627	4	74,407	3,616	,007	High School-Middle school
	Within Group	5267,185	256	20,575			
	Total	5564,812	260				
Security	Between Group	551,318	4	137,830	5,089	,001	High School-Middle school
	Within Group	6932,889	256	27,082			Associate Degree - Middle school
	Total	7484,207	260				
Problem-Solving	Between Group	270,649	4	67,662	3,590	,007	High School-Elementary School
	Within Group	4824,799	256	18,847			Associate Degree - Elementary School
	Total	5095,448	260				
Total of Scale	Between Group	4478,704	4	1119,676	6,381	,000	High School-Elementary School
	Within Group	44921,373	256	175,474			High School-Middle school

Total	49400,077	260	Associate Degree - Elementary School Associate Degree - Middle school

According to Table 13, a significant difference has been identified among students in terms of information processing, communication, security, problem-solving, and total scores based on paternal education ($F=2.644$, $p<0.05$; $F=3.616$, $p<0.05$; $F=5.089$, $p<0.05$; $F=3.590$, $p<0.05$; $F=6.331$, $p<0.05$). These results indicate that students' levels of digital literacy vary according to paternal education. According to the Tukey and LSD test results, significant differences were observed in the communication dimension between high school and middle school in favor of high school; in the information processing dimension between high school and middle school in favor of high school, and between bachelor's degree and middle school in favor of bachelor's degree; in the security dimension between high school and middle school in favor of high school; in the problem-solving dimension between high school and elementary school in favor of high school, and between bachelor's degree and elementary school in favor of bachelor's degree; in the total score between bachelor's degree, elementary school, middle school, and high school in favor of bachelor's degree and between high school, middle school, and elementary school in favor of high school. These findings indicate that as paternal education level may have a positive effect on.

In another sub-problem of the research, one of the examined variables is the frequency of internet connection. In this context, the focus is on the question, "Does the level of digital literacy among middle school students vary according to the frequency of internet connection?"

Table 14. Descriptive statistics showing dimensions and the total of dimensions according to the frequency of middle school students' internet connectivity

Dimensions	*Internet Connectivity*	*N*	$\bar{x}$	*ss*
Information Processing,	Never			4,20
	Once a month	2	19,50	2,12
	Once a week	13	19,00	3,39
	2-3 per week	65	19,24	2,94
	Daily	183	20,62	3,68
	Total	268	20,09	3,62
Communication	Never	5	14,80	6,37
	Once a month	2	18,50	4,94
	Once a week	13	14,76	5,47
	2-3 per week	65	16,07	4,61
	Daily	183	18,59	4,19
	Total	268	17,72	4,57
Security	Never	5	17,60	5,36
	Once a month	2	26,00	4,24
	Once a week	13	22,07	4,82
	2-3 per week	65	24,26	4,30
	Daily	183	26,44	5,37
	Total	268	25,53	5,32
Problem Solving	Never	5	14,20	5,26
	Once a month	2	19,00	,00
	Once a week	13	16,76	3,89
	2-3 per week	65	16,36	4,28
	Daily	183	18,21	4,36
	Total	268	17,63	4,40
Total of Scale	Never	5	61,40	19,42

Once a month	2	83,00	7,07
Once a week	13	72,61	14,25
2-3 per week	65	75,95	11,70
Daily	183	83,87	13,13
Total	268	80,98	13,71

According to Table 14, the highest arithmetic means in the dimensions of information processing, communication, security, and total scores are attributed to daily internet users ($\bar{x}$=20.62; $\bar{x}$=18.59; $\bar{x}$=26.44; $\bar{x}$=83.87). However, in the problem-solving dimension, students who connect to the internet once a month obtained the highest arithmetic mean ($\bar{x}$=19). To understand how these scores differ based on the frequency of students' internet connectivity, one-way analysis of variance was conducted, and the analysis results are presented in Table 15.

Table 15. One-way ANOVA results showing dimensions and the total of dimensions according to the frequency of middle school students' internet connectivity

Dimensions		*Sum of Squares*	*df*	*Mean of Squares*	*F*	*p*	*Difference*
Information Processing	Between Group	255,384	4	63,846	5,176	,000	always - never
	Within Group	3244,094	263	12,335			
	Total	3499,478	267				
Communication	Between Group	471,082	4	117,770	6,049	,000	daily - once a week
	Within Group	5120,485	263	19,470			
	Total	5591,567	267				
Security	Between Group	726,873	4	181,718	6,971	,000	daily - once a week
	Within Group	6855,824	263	26,068			
	Total	7582,698	267				
Problem-Solving	Between Group	238,926	4	59,732	3,178	,014	daily - 2-3 times a week
	Within Group	4943,503	263	18,797			
	Total	5182,429	267				
Total of Scale	Between Group	6015,447	4	1503,862	8,953	,000	daily -never
	Within Group	44178,494	263	167,979			daily - once a week
	Total	50193,940	267				daily - 2-3 times a week

According to Table 15, a significant difference has been observed in the scores of students in the dimensions of information processing, communication, security, problem-solving, and total scores based on the frequency of internet connectivity ($F=5.176$, $p<0.05$; $F=6.049$, $p<0.05$; $F=6.971$, $p<0.05$; $F=3.118$, $p<0.05$; $F=8.953$, $p<0.05$). These results indicate that the frequency of internet connectivity influences the level of digital literacy. In the Tukey test results, a significant difference was found in favor of those who always connect to the internet compared to those who never connect to the internet in the information processing dimension. In the communication dimension, a significant difference was observed in favor of those who connect to the internet daily compared to those who connect once a

week. In the security dimension, a significant difference was identified in favor of those who connect to the internet daily compared to those who connect once a week. In the problem-solving dimension, a significant difference was found in favor of those who connect to the internet daily compared to those who connect 2-3 times a week. Regarding the total score, a significant difference was found in favor of those who connect to the internet daily compared to those who never, once a week, and 2-3 times a week. In conclusion, the research has shown that as the frequency of internet connectivity increases, the level of digital literacy also increases.

4. Discussion and Conclusion

This study undertakes an examination of the digital literacy levels among middle school students, specifically delving into the domains of information processing, communication, security, and problem-solving. The assessment of digital literacy levels among middle school students is conducted by considering various independent variables, including gender, grade level, parental education status, ownership of computers, possession of internet access, and the frequency of internet connectivity.

Upon scrutinizing the digital literacy levels of the participants, it was noted that commendable scores were achieved across the dimensions of information processing, communication, security, and problem-solving. In summation, it can be deduced that the students manifest a high degree of digital literacy. This outcome aligns with the research conducted by Kozan in 2018, which also identified a heightened level of digital literacy among prospective teachers. Further exploration within the participant cohort revealed that 68% engage with the internet on a daily basis, while 24% access the internet 2-3 times a week. Additionally, a discernible relationship was observed, indicating that an augmentation in the frequency of internet usage corresponds with an increase in digital literacy levels. This observation substantiates a similar finding reported by Dinlemez (2021). List (2019) concluded that the majority of preservice teachers hold a belief in digital literacy and that their digital literacy skills are at a "good" level. Quaicoe & Pat (2020), in their study examining the educational environment of schools and the use of digital technology by teachers in Ghana from the perspective of primary and secondary school teachers' digital literacy, found that most teachers possess an above-average level of digital literacy. These collective results not only underscore a generally positive state of digital literacy among the students but also underscore the influence of internet usage habits on this proficiency.

Upon examining students' digital literacy levels with respect to gender, no significant differences were discerned in the dimensions of communication, security, and problem-solving. This outcome aligns with the conclusions drawn by Arslan in 2019, suggesting a parity in digital literacy levels across genders. However, a salient observation in this study is the presence of a disparity favoring female students in the information processing dimension of students' digital literacy levels. This implies the potential existence of noteworthy distinctions in certain sub-dimensions of digital literacy based on gender. Maxwell and Maxwell (2014) emphasized that male and female university students exhibit different learning styles when it comes to using computers, suggesting that education should be tailored according to these gender-based differences. However, some studies, such as Deloitte (2018), have indicated that men have an advantage over women in terms of technology and computer use. In the study conducted by Çam (2012), it was found that male students exhibited higher levels of digital addiction, while the study by Arslan, Kırık, Karaman & Çetinkaya (2015) identified that female students had higher levels of digital addiction. In some families, girls may be encouraged to engage with technology at an earlier age. This can lead to girls developing digital skills earlier.

In the assessment of students' digital literacy levels with regard to computer ownership, no discernible differences were identified across the dimensions of information processing, communication, security, problem-solving, and total scores. This observation conflict with the findings reported in Arslan's 2019 study, emphasizing the influential role of computer ownership in shaping digital literacy levels. Moreover, Kozan's 2018 research corroborates this result, establishing a parallel outcome by affirming that digital literacy levels exhibit an upward trajectory with increased computer usage experience. This collectively suggests that both computer ownership and usage experience may

exert a positive influence on students' digital literacy levels. We can give a few reasons for owning a computer but not being digitally literate. Owning a computer and using it regularly and effectively are two different things. Merely owning a computer may not help develop digital literacy unless it is used correctly and consciously. Owning a computer may not provide adequate internet access or access to the right resources. This can negatively impact the development of digital literacy skills. Parents' failure to provide adequate guidance and supervision on how children use computers can lead to low levels of digital literacy skills. In some societies, owning a computer may be associated not only with financial means but also with cultural and social factors. This can explain differences in digital literacy.

Upon scrutinizing students' digital literacy levels contingent upon internet ownership, no discernible differences emerged across the dimensions of information processing, communication, security, problem-solving, and total scores. In general, studies have concluded that access to the internet at home positively influences students' digital literacy. Such as Öçal's 2017, Pala (2019), Özerbaş & Kuralbayeva (2018), but digital literacy is also related to offline literacy skills. If someone hasn't developed basic offline literacy skills such as language, reading, and writing, having access to the internet may make it difficult for them to develop digital literacy skills. The ownership of a computer does not necessarily impact one's digital literacy skills, as computer usage is merely a tool for developing digital literacy. However, not owning a computer does not imply an inability to develop digital literacy skills. What matters is having the opportunity to understand, use, and interact with digital technologies. These opportunities can be provided not only through computer ownership, but also through access to shared computers, computers in libraries, or mobile devices. Therefore, digital literacy skills depend not only on access to technological tools, but also on the ability to effectively utilize these tools. However, parents with low socio-economic status may not always possess the educational experiences and resources necessary to encourage their children's learning, potentially failing to provide the instructional environments required for children to develop self-efficacy (Hatlevik et al., 2018). Chiao & Chui (2018) emphasized that students with high socio-economic status generally have better access to and equipment for information technology, which significantly impacts their digital skills. Ritzhaupt et al. (2013) found that students from higher socio-economic backgrounds are more proficient in information technology literacy skills compared to those from lower socio-economic backgrounds.

Upon analyzing students' digital literacy levels based on grade level, a significant difference emerges in the domains of security, problem-solving, and overall scores. This finding aligns with the outcomes elucidated in Bağçecik's 2021 study, reinforcing the assertion that digital literacy levels exhibit variation according to grade level. The research outcomes elucidate that the digital literacy levels of 7th-grade students surpass those of their 6th-grade counterparts. Kozan (2018) stated in his study with pre-service teachers that the level of digital literacy of pre-service teachers varies according to the class levels they are studying in, and that as the class level increases, the level of digital literacy also increases. However, Kara (2021) stated in his study that the class levels of pre-service teachers do not affect their digital literacy levels. Similarly, Özerbaş & Kuralbayeva (2018) observed in their study that there was only a significant difference between the class levels and digital literacy levels of pre-service teachers in the sub-dimension of contextual use. Nevertheless, no significant difference is discerned in information processing and communication scores. And also, the research conducted by Yıldız et al. (2012) on secondary school students revealed that there was no significant difference between students' levels of digital literacy and their grade levels. In Arslan's (2020) study, no significant differences were observed by grade level, whereas Çam (2012) found that students in the 1st grade had higher levels of addiction. This scenario implies that specific dimensions of digital literacy may exhibit variance contingent upon grade level, while such distinctions may not be evident in other dimensions.

Upon investigating students' digital literacy levels based on the number of siblings, a notable difference is observed in communication, problem-solving, and overall scores. The research findings indicate that students without siblings and those with only one sibling exhibit higher digital literacy levels in comparison to those with two or more siblings. This outcome underscores a discernible trend where a reduction in the number of siblings corresponds with an elevation in students' digital literacy

levels. Notably, in Üstündağ's 2021 study, variations in children's digital literacy levels were identified concerning age and grade level, though the impact of the number of siblings was not considered. Hence, the current research sheds light on the importance of investigating the influence of the number of siblings on digital literacy levels. In his study, Pala (2019) indicated that the number of siblings is an important variable affecting students' digital literacy skills, stating that as the number of siblings increases, the levels of digital literacy decrease. Having more siblings can provide more opportunities for learning from each other and sharing information to enhance digital literacy skills. Older siblings, in particular, can teach younger siblings how to use digital technologies. Healthy competition among siblings can encourage the development of digital literacy skills. Siblings who see one another improving their digital skills may imitate or compete with each other, thereby enhancing their own skills. When multiple siblings use the same device, agreements about sharing the device and limited access times can promote the healthy and balanced use of digital technologies. Strong relationships among siblings can create a positive environment for digital literacy. They can support each other in using digital technologies correctly and safely.

In the examination of students' digital literacy levels based on maternal education, a noteworthy difference is evident across information processing, communication, security, problem-solving, and overall scores. As per the research results, students with mothers holding bachelor's degrees exhibit higher digital literacy levels in comparison to those whose mothers have completed elementary, middle school, or high school education. This finding aligns with the conclusion drawn from Öçal's 2017 study, wherein educational attainment was identified as a influential variable in determining digital literacy levels. Broadly, an ascending trend is observed: as the mother's education level increases, so does the digital literacy proficiency of students. Consequently, targeted interventions aimed at enhancing digital literacy levels should be specifically tailored for students whose mothers have completed elementary and middle school education. In the evaluation of students' digital literacy levels based on paternal education, a notable difference is discerned across information processing, communication, security, problem-solving, and overall scores. According to the research findings, students with fathers who are bachelor's degree and high school graduates demonstrate higher digital literacy levels in comparison to those whose fathers have completed elementary or middle school education. This outcome reinforces the conclusion derived from Öçal's 2017 study, which underscored educational attainment as a significant variable influencing digital literacy levels. In general, an upward trajectory is observed: as the father's education level increases, so does the digital literacy proficiency of students. Consequently, targeted interventions directed towards students with fathers who have completed elementary and middle school education are anticipated to be efficacious in enhancing digital literacy levels. According to the studies conducted by Acar (2015), Öçal (2017), and Pala (2019), it has been determined that the education level of parents has an impact on the level of digital literacy. Pala & Başıbüyük (2020) suggested that as education and digital life increasingly influence each other, it can be assumed that as the education level of parents increases, mothers may receive more education about digital technologies, and as a result, parents with higher education levels are expected to have children with higher levels of digital literacy. Parents' lack of sufficient knowledge about digital technologies and the internet can make it difficult for them to provide accurate guidance to their children. The lack of adequate access to technology in some families can hinder children's development of digital skills. Additionally, differences in values and priorities among families can lead to inconsistent guidance regarding digital literacy. Parents' failure to exhibit digitally healthy behaviors can lead their children to exhibit similar behaviors. The continuous development of digital technologies can make it difficult for parents to keep up with these changes.

In the scrutiny of students' digital literacy levels based on the frequency of internet connection, a noteworthy difference is discerned across information processing, communication, security, problem-solving, and overall scores. This finding aligns with the results of Dinlemez's 2021 research, which similarly concluded that the frequency of internet use exerts a positive influence on digital literacy levels. Also in Cetin's 2016 study on preservice teachers, it was noted that as the frequency of internet use among preservice teachers increased, their level of digital literacy also showed a corresponding

improvement. This observation indicates a significant relationship between digital literacy and the frequency of internet use. In the study by Teyfur et al. (2017), no significant differences were found based on the time spent daily on the internet and social media. Conversely, the study by Akbaş-Coşar & Gedik (2021) concluded that participants who spent more time daily on the internet and social media had significantly higher levels of digital addiction. According to the research outcomes, students who engage with the internet on a daily basis exhibit higher digital literacy levels in comparison to those who never connect, connect once a week, or connect 2-3 days a week. These findings suggest that initiatives aimed at augmenting students' frequency of internet connection may concurrently contribute to the enhancement of their digital literacy levels. Someone who frequently uses the internet can access a variety of sources, which can lead to encountering a wide range of information and enhancing skills in evaluating information

The expansion of the number of siblings is shown to impede students' access to digital tools, thereby adversely impacting digital literacy. Consequently, targeted interventions for individuals with a substantial number of siblings are deemed critical for the enhancement of digital literacy. The advent of the COVID-19 pandemic has necessitated a shift towards remote education utilizing digital tools. Consequently, proactive measures addressing learning disparities among individuals with numerous siblings can significantly contribute to the elevation of digital literacy. The research findings underscore the variability in students' digital literacy levels contingent upon the frequency of internet connectivity. Notably, students who engage with the internet more frequently demonstrate an observable increase in their digital literacy levels. In contrast, those who either never connect or connect infrequently, such as once a week, exhibit a disadvantage in terms of digital literacy. Consequently, initiatives tailored towards students with limited internet connectivity may prove effective in enhancing digital literacy. Moreover, maternal education level emerges as a significant factor influencing digital literacy levels. Students with mothers who are bachelor's degree graduates exhibit higher digital literacy levels compared to those whose mothers have completed primary, middle, or high school education. Similarly, paternal education level also exerts an influence on digital literacy levels, with students whose fathers are bachelor's degree or high school graduates demonstrating superior digital literacy proficiency compared to those with fathers who completed primary or middle school education. Thus, measures targeting students with parents possessing only primary or middle school education have the potential to positively impact digital literacy levels. In addition we can We can add the following regarding the variables of family education level and number of siblings. May it be because of the share of internet resources within the household with siblings. Parents may afford to buy 1 mobile phone with internet access. Or a tablet computer with internet access.

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