



Investigating the Relationship Between Teachers' Digital Technology Competencies and Their Digital Literacy Levels

Öğretmenlerin Dijital Teknoloji Yeterlikleri ve Dijital Okuryazarlık Düzeyleri Arasındaki İlişkinin İncelenmesi

Osman ÖZDEMİR¹

Keywords

1. Digital Competence
2. Digital Literacy
3. Teacher's Technology Skills
4. Correlation Analysis
5. Education Technology Competencies

Anahtar Kelimeler

1. Dijital Yeterlilik
2. Dijital Okuryazarlık
3. Öğretmenlerin Teknoloji Becerileri
4. Korelasyon Analizi
5. Eğitim Teknolojisi Yeterlilikleri

Received/Başvuru Tarihi
19.09.2024

Accepted / Kabul Tarihi
25.07.2025

Abstract

Purpose: Understanding the interaction between digital technology competence and digital literacy is important for improving educational outcomes in the digital age. The purpose of this study is to examine the relationship between teachers' digital technology competencies and digital literacy levels. In addition, the study aims to investigate whether these variables differ significantly based on gender and the education level at which teachers work, and whether digital competence significantly predicts digital literacy.

Design/Methodology/Approach: Correlation research model was used in the study and 354 teachers selected from different regions of Turkey by purposive sampling method constituted the sample group. The research data were collected using the 'Teacher Digital Competence Scale' to determine the digital competence levels of teachers and the 'Digital Literacy Scale' to determine their digital literacy levels. Descriptive statistics and parametric tests were used to analyze the data.

Findings: The findings of the study revealed that teachers' digital competence and digital literacy levels were high. While there was a significant difference in terms of digital literacy according to gender variable, no significant difference was observed in terms of digital competence. ANOVA results revealed that there were no significant differences in terms of digital cognitive and technical literacy sub-dimensions and overall digital literacy level according to the education level of the teachers; however, high school teachers had higher digital competence scores compared to primary school teachers. Correlation analysis showed that there is a strong and positive relationship between digital literacy and digital competence. Simple linear regression analysis showed that digital literacy significantly predicted digital competence and explained 45% of its variance.

Highlights: As a result of this study, it is recommended that targeted professional development programs focusing on enhancing digital competence and literacy be implemented for teachers, particularly at the primary school level. These programmes should be implemented especially in regions and education levels where digital technology and digital literacy skills are lower. In order to reduce the digital literacy gap between genders, gender-sensitive digital skills development workshops should be organised for teachers and this gap should be prevented from leading to inequalities in digital education. In the light of the finding that digital literacy significantly predicts digital competence, it is important to make digital literacy training compulsory for all teachers.

Öz

Çalışmanın amacı: Dijital teknoloji yeterliliği ve dijital okuryazarlık arasındaki etkileşimi anlamak, dijital çağda eğitim çıktılarına iyileştirmek açısından önemlidir. Bu çalışmanın amacı, öğretmenlerin dijital teknoloji yeterlilikleri ile dijital okuryazarlık düzeyleri arasındaki ilişkiyi incelemektir. Ayrıca, bu değişkenlerin cinsiyete ve öğretmenlerin çalıştıkları eğitim düzeyine göre anlamlı bir farklılık gösterip göstermediği ve dijital yeterliliğin dijital okuryazarlığı anlamlı bir şekilde yordayıp yordamadığı araştırılmaktadır.

Materyal ve Yöntem: Araştırmada korelasyon araştırma modeli kullanılmış ve Türkiye'nin farklı bölgelerinden amaçlı örneklem yöntemiyle seçilen 354 öğretmen örneklem grubunu oluşturmuştur. Araştırma verileri, öğretmenlerin dijital yeterlilik düzeylerini belirlemek için "Öğretmen Dijital Yeterlilik Ölçeği" ve dijital okuryazarlık düzeylerini belirlemek için "Dijital Okuryazarlık Ölçeği" kullanılarak toplanmıştır. Verilerin analizinde betimsel istatistikler ve parametrik testler kullanılmıştır.

Bulgular: Araştırma bulguları öğretmenlerin dijital yeterlilik ve dijital okuryazarlık düzeylerinin yüksek olduğunu ortaya koymuştur. Cinsiyet değişkenine göre dijital okuryazarlık açısından anlamlı bir fark bulunurken, dijital yeterlilik açısından anlamlı farklılık gözlenmemiştir. ANOVA sonuçları, öğretmenlerin görev yaptıkları eğitim seviyelerine göre dijital bilişsel ve teknik okuryazarlık alt boyutlarında ve genel dijital okuryazarlık düzeyi açısından anlamlı farklar olmadığını, ancak, lise öğretmenlerinin ilköğretim öğretmenlerine kıyasla daha yüksek dijital yeterlilik puanlarına sahip olduğunu ortaya koymuştur. Korelasyon analizi, dijital okuryazarlık ile dijital yeterlilik arasında güçlü ve pozitif bir ilişki olduğunu göstermiştir. Basit doğrusal regresyon analizi ise dijital okuryazarlığın dijital yeterliliği anlamlı şekilde öngördüğünü ve varyansının %45'ini açıkladığını göstermiştir.

Önemli Vurgular: Bu çalışmanın bir sonucu olarak, özellikle ilköğretim düzeyindeki öğretmenler için dijital yetkinlik ve okuryazarlığı artırmaya odaklanan hedefli mesleki gelişim programlarının uygulanması önerilmektedir. Bu programlar, özellikle dijital teknoloji ve dijital okuryazarlık becerilerinin daha düşük olduğu bölgelerde ve eğitim kademelerinde uygulanmalıdır. Cinsiyetler arası dijital okuryazarlık farkını azaltmak için ise öğretmenlere yönelik cinsiyete duyarlı dijital beceri geliştirme atölyeleri düzenlenmeli, bu farkın dijital eğitimde eşitsizliklere yol açmasının önüne geçilmelidir. Dijital okuryazarlığın dijital yeterliliği anlamlı şekilde öngördüğü bulgusu ışığında, dijital okuryazarlık eğitiminin tüm öğretmenler için zorunlu hale getirilmesi önem arz etmektedir.

¹ Corresponded Author, Selcuk University, School of Foreign Languages, Konya, TÜRKİYE; <https://orcid.org/0000-0002-4536-4049>

INTRODUCTION

The integration of technology into education has fundamentally altered teaching practices, requiring educators to develop new skills beyond traditional competencies (Herro et al., 2021; Tondeur et al., 2017). Modern education now demands proficiency in digital tools and the ability to integrate these tools effectively into classroom environments (Mishra & Koehler, 2006). The Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the importance of teachers' ability to combine content knowledge, pedagogy, and technology to enhance student learning (Koehler & Mishra, 2008). Teachers are not only expected to master the subjects they teach but also to skillfully use digital technologies to engage students and improve instructional outcomes (Ocak & Karafil, 2021; Snyder, 2014).

Teachers' technological competence in the teaching-learning process spans a broad spectrum, encompassing traditional tools like pen and paper as well as modern digital resources such as the Internet, digital video, interactive whiteboards, and various software programs (Ventayen, 2019). It is crucial for educators not only to master the subjects they teach but also to achieve instructional objectives effectively through technological means. The integration of technology into teaching practices is influenced by several factors, including teachers' professional self-efficacy, age, educational background, and perceptions of technology. Studies have shown that teachers' pedagogical digital competence is significantly influenced by factors such as professional development, access to digital tools, and institutional support (Guillén-Gámez et al., 2021). Research indicates that instructors' adeptness with technology significantly impacts their ability to enhance learning, plan lessons, and facilitate classroom interactions (Foulger et al., 2017; Zhu et al., 2013). Therefore, understanding and leveraging technological tools are essential for educators to foster engaging and effective learning environments.

With its continuously evolving and active structure, the world of technology necessitates acquiring new communication skills and using media and technological tools responsibly and effectively to keep pace with its speed. In this context, recent advancements in digital technology have introduced the concept of digital literacy (Kurt et al., 2013). In today's increasingly digital educational environments, it is becoming imperative for teachers to have sufficient digital competence to integrate technology into their teaching practices. Teachers' digital competence encompasses a range of abilities enabling them to proficiently utilize diverse technologies to enhance the educational process (Chadegani et al., 2013). Central to achieving this competence is the concept of digital literacy, which encompasses the foundational skills necessary for educators to effectively implement technology in their teaching practices (Orakova et al., 2024; Zhang, 2023).

Digital literacy, as articulated by Hicks et al. (2019), denotes the proficiency in utilizing digital technologies to access, evaluate, and generate information. This competency encompasses a broad spectrum of abilities, encompassing the adept use of digital tools for communication, problem-solving, and critical thinking (Digital Literacy, 2023). Essentially, digital literacy extends beyond mere technical proficiency with digital devices; it entails the cognitive capacity to comprehend and critically analyze digital content, coupled with the creative aptitude to effectively produce and share digital information. Bawden (2008) further elaborates on digital literacy as encompassing the awareness, attitudes, and competencies necessary for individuals to employ digital technologies both effectively and responsibly. This comprehensive definition underscores the significance of possessing not only technical skills but also a conscientious approach towards the use of digital tools (Tokaç Kan, 2020b).

Fundamentally, digital literacy can be distilled into two essential components: information literacy and digital communication skills. Information literacy revolves around comprehending how information is stored, disseminated, and effectively grasping digital texts. On the other hand, digital communication involves the creation of coherent text and content using digital tools, along with engaging in interactions on digital platforms. Moreover, digital literacy entails not just the capability to utilize digital resources but also the adeptness in critically evaluating information sourced from diverse multimedia platforms (Karagözoğlu & Gezer, 2022; Lestari et al., 2020).

Digital literacy encompasses the comprehensive ability to effectively utilize information and communication technologies across various digital platforms, employing both cognitive and practical skills. The advent of digital technologies has vastly expanded communication possibilities, enabling individuals to actively engage with current environmental trends and remain informed (Bai et al., 2022). This multifaceted literacy entails skills such as locating, evaluating, analyzing, and synthesizing digital information, as well as communicating, collaborating, and creating content using digital tools. In today's society, which places a premium on information, digital literacy is no longer merely beneficial but essential for individuals to prosper and achieve success (Fraillon et al., 2019). Individuals lacking strong digital literacy skills may encounter challenges in independent learning. Digital literacy also encompasses students' abilities to access, manage, and utilize information via technological devices, effectively fostering independence in learning. Teachers leverage their proficiency in current information technology tools and experiences—such as email, Google Classroom, and Google Meet—to cultivate digital citizenship among students. They integrate these digital media and technology components into classroom activities to promote interactive and engaging learning environments (Tohara, 2021). Digital literacy skills empower individuals by providing access to a diverse array of information sources and perspectives. This exposure stimulates critical thinking by prompting individuals to evaluate and compare multiple sources, recognize biases, and identify trustworthy information (Bawden, 2008; Tokaç Kan, 2020c). Thus, digital literacy not only equips individuals with practical skills but also nurtures a mindset essential for navigating today's information-rich landscape effectively.

From an educational standpoint, digital literacy stands as a vital skill set for teachers in the 21st century, profoundly impacting their efficiency and capabilities (Falloon, 2020). By integrating digital literacy into their practice, teachers can streamline everyday

tasks like grading, attendance management, and lesson planning, thereby dedicating more time to actual teaching and learning activities (Tokaç Kan, 2020b). This efficiency boost is crucial in maximizing instructional time and effectiveness. Moreover, digital literacy empowers teachers to collaborate seamlessly with colleagues and students across different geographical locations and time zones. This ability not only fosters a sense of community among educators but also enhances opportunities for shared learning experiences and professional development (Indeed, 2022). Additionally, digital literacy facilitates quick and convenient access to a vast array of educational resources. Teachers can easily tap into online repositories containing educational videos, podcasts, e-books, and other multimedia materials. These resources enrich classroom instruction by offering diverse content that caters to various learning styles and instructional needs (Korisztek, 2022). Thus, digital literacy not only optimizes teaching practices but also expands educators' pedagogical toolkit, enabling them to deliver engaging and comprehensive educational experiences to their students.

The role of teachers in driving the digital transformation of education is indisputably crucial (Bridwell-Mitchell, 2015; Lockton & Fargason, 2019). As today's students are widely considered digital natives proficient in using digital tools, it becomes imperative for educators, akin to parents, to possess digital literacy themselves. Karabulut (2015) discusses the classifications of digital natives, immigrants, and hybrids, highlighting the impact of these categories on educational practices. This competence equips teachers to effectively educate and guide their students in navigating the digital landscape. Educators who aim to cultivate digital literacy among their students must first attain a certain level of digital literacy (Doğan & Birişçi, 2022). Being digitally literate in the 21st century entails understanding the profound impact of digital and social media on our lives, as well as developing strategies to mitigate potential negative effects and promoting critical thinking skills. It also requires educators to embrace an open-minded approach to integrating educational tools offered by the digital age (Voogt et al., 2013). Research increasingly demonstrates that digital learning is significantly enhanced when it is supported by a well-defined pedagogical framework for teachers (Tamim et al., 2014). This framework not only aids in effectively integrating digital tools into teaching practices but also ensures that technology enhances learning outcomes by aligning with educational objectives and fostering meaningful engagement. Thus, fostering digital literacy among educators is pivotal not only for their professional growth but also for empowering them to deliver effective digital education experiences that meet the needs of today's learners.

Digital literacy supports teachers' ongoing professional development and enhances educational quality. This proficiency not only instills confidence but also strengthens their ability to leverage technological tools effectively, thereby optimizing teaching methodologies (Hamakali & Josua, 2023; Pérez-Escoda et al., 2019). Digital literacy is pivotal in enabling educators to teach and learn effectively within digital environments (Kılınç, 2023). Research has shown that teachers' digital literacy levels are strongly associated with their tendencies toward lifelong learning, highlighting the importance of digital literacy in ongoing professional development (Gökbulut, 2021). As teachers' digital literacy levels increase, so does their competence in the field of education. Recent research underscores the significant impact of effectively utilizing teachers' digital literacy on enhancing the teaching and learning processes within schools (Doğan & Birişçi, 2022; Kuru, 2019). Teachers and students alike benefit from heightened digital literacy, enabling them to use digital technology proficiently and expansively, which positively influences remote education outcomes, thereby enhancing instructional effectiveness (Li & Yu, 2022; Rapanta et al., 2020). Consequently, it is imperative for teachers to possess digital literacy skills to provide students with diverse and enriching learning experiences through the effective utilization of digital resources and tools. Enhancing these skills not only strengthens teachers' capacity to deliver high-quality education but also bolsters their career progression and professional development, rendering them more competitive and adaptable in their roles.

Aligned with the belief that education equips individuals for lifelong success, it is essential to adopt an educational framework that not only prepares individuals to adapt to but also excel amidst the rapid transformations and advancements of our time (Tüzel & Tok, 2013). A cornerstone of this preparation is the systematic and gradual integration of digital literacy skills starting from the foundational levels of education. The concept of digital literacy has emerged as a pivotal element in contemporary educational discussions worldwide, reflecting societies' growing integration of new technologies into everyday life. Consequently, there is a compelling necessity to meticulously embed digital literacy within core curricula and educational frameworks, particularly within primary and secondary education (Altun, 2019). This deliberate incorporation ensures that learners not only gain proficiency in responsibly utilizing digital tools and media but also cultivate critical thinking and problem-solving abilities crucial for thriving in a digitally driven environment. Moreover, in Türkiye, as well as globally, the discourse on education is evolving to underscore the integration of emerging technologies and the development of digital literacy skills among educators and students alike (Karabacak & Sezgin, 2019). Essentially, fostering digital literacy from an early educational stage is not solely about acquiring technical skills; it also aims to instill a mindset of adaptability, critical inquiry, and ethical responsibility in the face of technological progress. Therefore, educational policies and practices must continually adapt to ensure that individuals are equipped with the essential competencies needed to succeed in an increasingly digital and interconnected global society (Butler et al., 2024; European Commission, 2021; Tokaç Kan, 2020a; Tokaç Kan, 2024).

Significance of the Study

While there is growing emphasis on enhancing teachers' digital competences and literacy levels, the majority of current research has concentrated primarily on these aspects (Astuti et al., 2021; Fidan & Yeleğen, 2022; Köksal & Canlı, 2024; Yılmaz-Ergül & Taşar, 2023) and their digital literacy levels (Çam & Kırıyıcı, 2017; Korkmaz & Akçay, 2024; Ocak et al., 2022; Saripudin et al., 2021; Yontar, 2019). When considered in the context of Türkiye, to the best knowledge of the researcher, no previous study has

specifically investigated how teachers' digital technology competencies relate to their levels of digital literacy. Therefore, aiming to fill this gap in the existing literature, the main objective of this study is to explore the correlation between teachers' digital technology competencies and their levels of digital literacy in Türkiye. The limited number of studies in the Turkish context in which these two variables are addressed together increases the originality of the study and its potential to fill the gap in the literature. This study is also significant as it addresses the growing need for educators to develop digital literacy and technological competencies. In the modern educational landscape, teachers who are proficient in digital technologies can enhance their teaching methodologies, foster critical thinking, and facilitate interactive learning experiences. By understanding the relationship between digital technology competencies and digital literacy levels, this research provides insights into how educators can be better equipped to meet the demands of contemporary education. By examining the relationship between teachers' digital competencies and digital literacy levels, this study is expected to make a significant contribution to better understand the theoretical link between these two concepts. In this context the purpose of this study is to examine the relationship between teachers' digital technology competencies and digital literacy levels. In addition, the study aims to investigate whether these variables differ significantly based on gender and the education level at which teachers work, and whether digital competence significantly predicts digital literacy. This study addresses the following sub-problems:

1. "What is the digital technology competency and digital literacy levels of the teachers?"
2. "Do the digital technology competency and digital literacy levels of the teachers differ significantly according to gender and education level variables?"
3. "What is the predictive role of digital technology competency on teachers' digital literacy levels?"

In light of the research questions presented, this study aims to contribute to the growing literature by investigating the relationship between teachers' digital technology competences and their digital literacy levels. Understanding this interaction may be important for improving teaching practices in digitally orientated educational environments. By examining how factors such as gender and educational level influence these competencies, this research aims to provide valuable insights for educators, policy makers and institutions seeking to improve digital literacy among teachers. In this way, the study offers a more comprehensive understanding of the relationship between digital skills and personal or institutional characteristics. In addition, it is thought that the findings obtained from the research can be a guide for restructuring teacher education programs with digital content and planning in-service trainings. Furthermore, the findings are expected to strengthen targeted professional development initiatives that promote both digital competence and literacy, thus contributing to ensuring that teachers are adequately equipped to meet the changing demands of modern education. In conclusion, this study contributes to the ongoing discourse on educational technology by emphasizing the importance of developing both digital literacy and competence in teachers to create more effective and engaging learning environments.

METHOD/MATERIALS

This study utilized a correlational research model to investigate the relationship between teachers' digital technology competency and their levels of digital literacy. Correlational studies are designed to discern and analyze the nature of relationships between two or more variables (Miles & Shevlin, 2000). There are two primary types of correlational research: predictive and exploratory (Mertens, 2014). This study adopted a predictive correlation research approach. Predictive correlation research aims to ascertain the degree to which the variability in dependent variables can be explained by the variables under investigation (Mertens, 2014). Accordingly, this study investigated how digital technology competency predicts teachers' digital literacy levels. Additionally, this study aims to investigate whether digital technology competencies and digital literacy levels differ significantly based on teachers' gender and the level of education at which they work. It also examines whether digital competence significantly predicts digital literacy.

Sample of the Study

The sample of the study included 354 teachers working in different provinces of Türkiye selected by convenient sampling. Convenient sampling offers advantages such as easy access, time efficiency, and cost-effectiveness (Cohen, Manion, & Morrison, 2018). The descriptive data of the teachers involved in the study are shown in Table 1.

Table 1: Descriptive Data of the Teachers Included in the Sample

Variables	N	%
Gender		
<i>Male</i>	105	29.6
<i>Female</i>	249	70.3
Year of Work Experience		
<i>1-5 years</i>	41	11.5
<i>6-10 years</i>	60	16.9
<i>11-15 years</i>	70	19.7
<i>16-20 years</i>	57	16.1
<i>21-25 years</i>	85	24
<i>26 years and above</i>	40	11.2

Education Level		
Graduate	259	73.2
Master's Degree	89	25.1
Doctoral Degree	6	1.7
Education Level Teacher Works		
Preschool	14	3.9
Primary School	72	20.3
Middle School	89	25.1
High School	179	50.5
Following Technological Developments		
Yes	256	72.3
Partially	88	24.9
No	7	2
Receiving Digital Literacy Training		
Yes	95	26.8
No	259	73.2
Total	354	100

As seen in Table 1, 29.6% of the teachers were male (105 individuals) and 70.3% were female (249 individuals). Regarding work experience, 11.5% had 1-5 years of experience (41 individuals), 16.9% had 6-10 years (60 individuals), 19.7% had 11-15 years (70 individuals), 16.1% had 16-20 years (57 individuals), 24% had 21-25 years (85 individuals), and 11.2% had over 26 years of experience (40 individuals). In terms of education level, 73.2% held a graduate degree (259 individuals), 25.1% had a master's degree (89 individuals), and 1.7% had a doctoral degree (6 individuals). The education levels at which these teachers worked varied, with 3.9% in preschool (14 individuals), 20.3% in primary school (72 individuals), 25.1% in middle school (89 individuals), and 50.5% in high school (179 individuals). When asked about following technological developments, 72.3% responded affirmatively (256 individuals), 24.9% responded partially (88 individuals), and 2% responded negatively (7 individuals). Regarding digital literacy training, 26.8% had received training (95 individuals), while 73.2% had not (259 individuals).

Data Collection Tools

In the study, the "Teachers' Digital Competence Scale" and "Digital Literacy Scale" were used.

Teachers' Digital Competence Scale

The "Teachers' Digital Competence Scale" developed by Ergül and Taşar (2023) was used to assess the digital competency levels of teachers within the research scope. This scale, employing a 5-point Likert-type format, consists of 19 items measuring a single factor. Responses range from "Never" (1) to "Always" (5). According to Ergül and Taşar (2023), the scale demonstrated high internal consistency with a Cronbach's Alpha coefficient of .94. In the current study, the internal consistency coefficient of the scale was calculated as .92. This indicates a high level of reliability for the scale, falling within the recommended range of .80 to 1.00 for Cronbach's Alpha reliability coefficients (Alpar, 2013).

Digital Literacy Scale

The "Digital Literacy Scale" developed by Paşalı (2023) was used to evaluate the digital literacy levels of teachers. This scale, using a five-point Likert-type format, comprises 12 items categorized into two factors. Responses range from "Strongly Disagree" (1) to "Totally Agree" (5). This scale consists of two sub-dimensions: "cognitive domain" and "technical domain". The cognitive domain covers individuals' ability to understand, analyze and evaluate information in the digital environment and to use digital content critically. This dimension measures the ability to think critically and make sense of digital information. The technical domain includes individuals' ability to use digital tools and technologies effectively. This dimension measures practical knowledge and skills in the use of digital technologies. Both dimensions aim to comprehensively assess teachers' digital literacy levels. The Cronbach's Alpha internal consistency coefficient value of the scale was calculated as .88 for the "cognitive domain" sub-dimension and as .83 for the "technical domain" (Paşalı, 2023). In the current study, the Cronbach's Alpha internal consistency coefficient value of the scale was calculated as .88 for the cognitive domain sub-dimension and as .79 for the technical domain sub-dimension. Additionally, it was obtained as .91 for the total mean score sub-dimension, which indicated a high level of reliability (Alpar, 2013).

Data Collection Process

The data collection period for this study spanned from May 16, 2024, to June 19, 2024. A scale form was created using Google Forms, and a corresponding link was generated and disseminated to teachers through various social media platforms. Teachers

who expressed interest in participating were invited to complete the form. The entire data collection process was conducted over the course of approximately one month.

Data Analysis

In this study, descriptive statistics such as arithmetic mean, standard deviation, minimum, and maximum were utilized to assess the levels of teachers' digital technology competency and digital literacy. The items on the scales were rated on a range of 1 to 5 points. To categorize the teachers' competency and literacy levels, a formula was applied based on the score interval: $\text{Score Interval} = (\text{Highest score} - \text{Lowest score}) / 5$ (Guvendi & Serin, 2019; Kaplanoğlu, 2014). For instance, with scores ranging from 1 to 5, the score interval was calculated as $(5-1) / 5 = 0.8$. Accordingly, the mean scores for digital technology competency and digital literacy were categorized into five levels as follows: scores ranging from 1 to 1.79 were classified as very low, 1.80 to 2.59 as low, 2.60 to 3.39 as moderate, 3.40 to 4.19 as high, and 4.20 to 5.00 as very high (Kozikoğlu & Özcanlı, 2020). This categorization method provided a structured approach to interpret and analyze the data effectively.

Before proceeding with data analysis to address the study's sub-problems, data distribution was examined. Skewness and kurtosis values were calculated to assess the shape of the distribution, and Shapiro-Wilk and Kolmogorov-Smirnov tests were conducted to test for normality. According to Tabachnick and Fidell (2013), data with skewness and kurtosis values falling within the range of -1.5 to +1.5 are considered approximately normally distributed. Additionally, if the significance level (p-value) in the Shapiro-Wilk and Kolmogorov-Smirnov tests exceeds .05, the data is typically considered to follow a normal distribution. In the study, both the skewness and kurtosis values were within the acceptable range, and the p-values from the Shapiro-Wilk and Kolmogorov-Smirnov tests were greater than .05. Therefore, based on these findings, it was determined that the data followed a normal distribution. As a result, parametric statistical tests were deemed appropriate for analyzing the data.

The independent sample t-test was employed to assess whether there were significant differences in teachers' digital technology competency and digital literacy levels based on gender. Additionally, one way ANOVA test was conducted to determine whether the digital technology competency and digital literacy levels of the teachers differ significantly according to education level they work variable. Furthermore, Pearson correlation analysis was conducted to explore the relationship between teachers' digital technology competency and their digital literacy levels. According to Çokluk, Şekercioğlu and Büyüköztürk (2012), the interpretation of the Pearson correlation coefficient suggests that values between .00 and .29 indicate a low correlation, .30 to .69 indicate a moderate correlation, and .70 to 1.00 indicate a high correlation. The analysis revealed a statistically significant relationship between teachers' digital technology competency and their digital literacy levels. Consequently, simple linear regression analysis was subsequently employed to determine to what extent teachers' digital technology competency could predict their digital literacy levels. This regression analysis aimed to quantify the predictive power of digital technology competency in relation to digital literacy levels among teachers.

FINDINGS

Table 2 provides the descriptive statistics results for the scales used in the study, offering a detailed overview of the participants' digital technology competency and digital literacy levels.

Table 2: Descriptive data of the scales

Variable	Sub-dimensions	n	Min	Max	$\bar{X}$	Ss	Level
Digital Competence		354	1.32	5.00	3.48	.68	High
Digital Literacy	Cognitive Domain	354	1.57	5.00	3.68	.62	High
	Technical Domain	354	1.00	5.00	3.74	.64	High
	Total Mean Score	354	1.33	5.00	3.70	.59	High

As can be seen in Table 2, the mean score for teachers' digital competence is 3.48 (SD = 0.68), indicating a generally high level of competency. Similarly, the total mean score for digital literacy is 3.70 (SD = 0.59), with both the cognitive and technical domains of digital literacy showing high mean values of 3.68 (SD = 0.62) and 3.74 (SD = 0.64), respectively. These findings suggest that teachers, on average, demonstrate high proficiency in both their digital technology competencies and literacy skills.

The findings from the analysis comparing the digital technology competency and digital literacy levels of teachers across gender are presented in Table 3.

Table 3: Digital technology competency and digital literacy levels of teachers by gender variable

Variable	Gender	N	$\bar{X}$	S	sd	t	p
Digital Competence	Male	104	4.57	.62	351	-1.602	.110
	Female	249	4.44	.70			
Digital Literacy	Male	104	3.91	.52	224.664	-4.502	.000
	Female	249	3.62	.61			

When Table 3 is examined, it is seen that the digital competence levels of male teachers ($\bar{X}=4.57$) are higher than those of female teachers ($\bar{X}=4.44$), although the difference is not statistically significant ($t=-1.602$, $p=.11$). On the other hand, the digital literacy levels of male teachers ($\bar{X}=3.91$) are significantly higher than those of female teachers ($\bar{X}=3.62$), with a statistically significant difference ($t=-4.502$, $p=0.00$). These findings suggest that there is no notable gender difference in digital competence, but there is a significant gender difference in digital literacy, with male teachers demonstrating higher levels compared to their female counterparts. The significant gender difference in digital literacy, contrasted with the non-significant difference in digital competence, highlights a nuanced distinction in the way male and female teachers engage with and utilize digital technologies.

Table 4 presents the results of the ANOVA analysis, which examines whether there are significant differences in teachers' digital technology competency and digital literacy levels across various educational levels (Pre-School, Primary School, Middle School, and High School).

Table 4: Descriptive and ANOVA results for digital literacy and competence levels by school level where teachers work

Scales and Dimensions	Education Level Teachers Work	<i>n</i>	$\bar{X}$	<i>SD</i>	<i>DF</i>	Mean Squares	<i>F</i>	<i>p</i>
Digital Cognitive Domain	Pre-School	14	3.79	.73	3	.428	1.081	.357
	Primary School	72	3.78	.62	350	.396		
	Middle School	89	3.65	.66	353			
	High School	179	3.64	.60				
	Total	354	3.68	.62				
Digital Technical Domain	Pre-School	14	3.91	.57	3	.302	.723	.539
	Primary School	72	3.80	.67	350	.418		
	Middle School	89	3.75	.69	353			
	High School	179	3.70	.61				
	Total	354	3.74	.64				
Digital Literacy Total Mean Score	Pre-School	14	3.84	.64	3	.344	.960	.412
	Primary School	72	3.79	.60	350	.358		
	Middle School	89	3.69	.64	353			
	High School	179	3.67	.56				
	Total	354	3.70	.59				
Digital Competence Total Mean Score	Pre-School	14	3.65	.73	3	1.951	4.245	.006
	Primary School	72	3.68	.64	350	.460		
	Middle School	89	3.52	.63	353			
	High School	179	3.36	.70				
	Total	354	3.48	.68				

Based on the provided ANOVA results in Table 4, no statistically significant differences were obtained in the digital cognitive domain, digital technical domain, and digital literacy total mean score sub-dimensions across education levels (Pre-School, Primary School, Middle School, High School) ($p > .05$). This suggests that teachers' digital literacy, both in cognitive and technical aspects, remains consistent regardless of the school level in which they work.

However, a statistically significant difference was observed in the Digital Competence Total Mean Score across different educational levels ($F = 4.245$, $p = .006$). This indicates that the level of digital competence varies significantly depending on the educational setting. According to the Tukey post hoc analysis, high school teachers demonstrated significantly higher digital competence scores compared to primary school teachers. This finding implies that high school teachers, possibly due to the increased demand for technology integration in secondary education, are more proficient in utilizing digital tools compared to their primary school counterparts.

The relationship between teachers' digital technology competency and digital literacy levels is shown in Table 5.

Table 5: Correlation analysis results

Digital Literacy	Digital Competence		
	Pearson Correlation	Sig. (2-tailed)	<i>n</i>
Total Mean Score	.675**	.000	354

** Correlation is significant at the 0.01 level (2-tailed); ** $p < 0.01$, * $p < 0.05$

The results presented in Table 5 indicate a statistically significant and strong positive relationship between teachers' digital literacy and digital competence levels, as demonstrated by a Pearson correlation coefficient of $r = .675$, with a significance value of $p < 0.01$. This suggests that as teachers' digital literacy increases, their digital competence also tends to rise in a proportional manner. The strength of this correlation implies that digital literacy plays a crucial role in enhancing teachers' overall digital competence. Moreover, the significance of the correlation at the 0.01 level highlights the robustness of this relationship,

reinforcing the idea that digital literacy is an essential factor in fostering digital competence among educators. Further insights into how digital literacy predicts teachers' digital competence are explored in Table 6.

Table 6: Simple linear regression analysis between variables

	<i>B</i>	<i>SHB</i>	<i>β</i>	<i>t</i>	<i>p</i>
Constant	1.072	.155	-	6.903	.000
1– Digital Competence	.588	.034	.675	17.171	.000

$n=354$, $R=.675$, $R^2=.456$, $p<.01$

The results from Table 6 demonstrate that digital literacy is a significant predictor of digital competence among teachers. The β coefficient of 0.675 suggests a strong positive relationship, indicating that an increase in digital literacy is associated with a corresponding increase in digital competence. The R^2 value of 0.456 implies that approximately 45.6% of the variance in teachers' digital competence can be explained by their digital literacy levels, highlighting the substantial influence of digital literacy on their digital competence. The t -value of 17.171 and the p -value of .000 further confirm that this relationship is statistically significant, underscoring the robustness of the predictive model. These findings suggest that initiatives aimed at improving teachers' digital literacy could play a key role in enhancing their digital competence, thus supporting more effective integration of digital technologies in educational practices.

DISCUSSION

In the study investigating the correlation between teachers' digital competence and their levels of digital literacy, initial assessments were conducted to gauge both aspects among educators. The results revealed that teachers exhibited high levels of both digital competence and digital literacy. This shows a strong ability to use digital technologies effectively. These findings align with prior research indicating that teacher candidates also display a significant level of media literacy (Karaman & Karataş, 2009), supporting the role of media literacy in fostering overall digital competence. The high level of digital competence found in this study may be due to several factors. First, the increased use of digital technologies in education has pushed teachers to improve their digital skills (Gillen & Barton, 2010). Second, the COVID-19 pandemic, which forced a rapid shift to online learning, likely boosted educators' digital competencies (Dhawan, 2020). Lastly, professional development programs focused on digital literacy have played a significant role in enhancing these skills (Ertmer & Ottenbreit-Leftwich, 2010).

Comparatively, the findings from this study align with and diverge from existing literature that underscores the criticality of digital literacy among educators. Gümüş and Kukul (2023) determined that teachers generally exhibited an intermediate level of digital competence. Similarly, Dias-Trindade and Moreira (2020) observed comparable results, highlighting lower proficiency in pedagogical competencies and student-related factors, but stronger capabilities in professional competences. In contrast, Napal Fraile et al. (2018) identified notably low levels of digital competence among pre-service teachers, particularly in areas such as content production and problem-solving. Further studies yield varied outcomes. Çebi and Reisoglu (2020) reported intermediate levels of digital competences in pre-service teachers, with specific weaknesses noted in content development, digital media use, and technical problem-solving, yet strengths observed in information literacy, communication, cooperation, and security. Esteve Mon et al. (2020) found that pre-service teachers rated their competences highly in multimedia, communication, and collaboration skills. Conversely, Rokenes and Krumsik (2016) identified significant deficiencies in content development skills among pre-service teachers. Overall, these findings suggest a spectrum of digital skills among teachers, ranging from low to intermediate levels. Factors contributing to these variations may include the adequacy of in-service training programs, as noted by Çebi and Reisoglu (2020) and Ceylan and Gundogdu (2017).

In a study conducted by Aksoy et al. (2021), aimed at assessing the digital literacy levels of primary school teachers, it was revealed that these teachers demonstrated high levels of digital literacy. Similarly, a study conducted by Bingöl (2022) during the distance education period also found that teachers maintained elevated levels of digital literacy. These findings collectively suggest that teachers exhibit proficiency not only in comprehending digital content but also in utilizing diverse digital tools and platforms effectively. Such competence is pivotal in ensuring effective teaching practices in the contemporary digital era.

The digital competence among teachers does not show significant differences based on gender, indicating that both male and female teachers feel relatively confident and capable in their use of digital tools and technologies. The absence of significant differences in digital competence based on gender indicates that both male and female teachers feel relatively confident and capable in using digital tools and technologies. This parity may reflect the widespread integration of technology in educational settings, which requires all teachers to develop a certain level of proficiency regardless of gender. Gümüş and Kukul (2023) found that while there were no significant differences in digital competences between male and female teachers, male teachers tended to score slightly higher on average. Similarly, Kayhan (2022) discovered that male teachers used educational technology more frequently compared to their female counterparts. Studies have shown that male pre-service teachers generally possess higher levels of digital competence compared to their female counterparts (Guillén-Gámez et al., 2021). On the other hand, Çebi and Reisoglu (2020) identified significant differences favoring male pre-service teachers in areas such as information and data literacy, digital content production, security, and problem-solving skills. Keskin and Yazar (2015) also observed that male teachers exhibited greater competencies in computer use, digital media utilization, and data acquisition. Esteve-Mon et al. (2020) further noted that male teachers showed higher competence levels in technical problem-solving and programming skills. Additionally, studies by Guillén-Gámez et al. (2021) revealed that male pre-service teachers generally possessed higher levels of digital competence compared to their female counterparts. These mixed findings suggest that gender differences in digital competence may vary

depending on the context and environment. Factors such as access to technology, the nature of professional development opportunities, and the specific educational settings might influence these results. Therefore, the observed variations in digital competence by gender could be attributed to different contextual factors rather than a universal trend.

The significant difference in digital literacy scores between male and female teachers highlights a notable area of concern. The higher scores observed among male teachers suggest that they may possess greater proficiency in tasks related to understanding, evaluating, and applying digital information. This difference could stem from varying factors such as prior training, exposure to digital technologies, or differing levels of confidence in utilizing these tools. Korkmaz and Akçay (2024) concluded that younger and male teachers generally exhibit higher levels of digital literacy. Çam and Kırııcı (2017) explored digital literacy among prospective teachers by gender, finding that male prospective teachers tend to demonstrate higher levels of visual and computer literacy compared to their female counterparts. Previous research indicates that many teachers often lack sufficient digital literacy skills (Sun et al., 2016). However, recent evidence suggests improvement in educators' proficiency, particularly in data literacy (Kippers et al., 2018). Specifically, studies consistently show that male teachers typically display higher levels of digital literacy and technological competencies compared to females. Lin et al. (2013) found that male pre-service teachers generally exhibit stronger technological competencies than their female counterparts, a finding supported by other research highlighting persistent gender differences in technology usage and related skills (Colley & Comber, 2003; Drabowicz, 2014). According to Van Grootel et al. (2018) and colleagues, these disparities in technology adoption between genders may be attributed to societal gender stereotypes that traditionally associate males with autonomy and technology-related fields, while females are often linked with nurturing and pedagogical domains. Moreover, research indicates that males may perceive themselves as more capable and comfortable with computers, potentially providing them with an advantage in online educational settings (Ashong & Commander, 2012). In summary, the analysis highlights significant differences in digital literacy based on gender and access to technology. Male prospective teachers, as well as those with continuous computer and internet access, generally show higher levels of various facets of digital literacy. These findings underscore the importance of ensuring equal access to digital resources and opportunities for both male and female prospective teachers to bridge the digital literacy gap and enhance overall proficiency in the digital domain.

Findings revealed that teachers teaching at the high school level demonstrated significantly higher levels of digital competence compared to those teaching at the primary school level. This suggests that educators in high school settings generally possess greater digital competence, encompassing a broader range of digital skills and abilities, than their counterparts in primary school settings. This finding is crucial as it highlights disparities in digital competence across educational stages, underscoring the potential need for targeted professional development initiatives and support systems aimed at enhancing digital skills among teachers, particularly those in primary school settings. Strengthening digital competence across all educational levels is essential for equipping teachers with the necessary skills to effectively integrate technology into teaching practices and enhance educational outcomes in today's digital age. Gümüş and Kukul (2023) found that the digital competences of the teachers working in high schools were lower than those of secondary school teachers. Arslan (2019) asserts that elementary and middle school teachers have a high level of digital literacy. Ayaz (2016) suggests that this difference in lifelong learning inclinations might explain why high school teachers are less engaged in developing digital competencies. Their diminished enthusiasm for continuous learning likely affects their willingness to explore and integrate new digital tools and technologies in their teaching practices. This contrast with middle school teachers, who generally exhibit higher lifelong learning tendencies and thus display more curiosity and motivation to enhance their digital skills.

The correlation analysis revealed a strong and statistically significant positive relationship between teachers' digital literacy and digital competence. This indicates that as teachers' proficiency in digital literacy increases, their competence in utilizing digital technologies also tends to increase, and vice versa. The correlation coefficient suggests a strong relationship between these two variables, underscoring the importance of digital literacy as a foundational skill that supports enhanced digital competence among educators. Similarly, Pehlevan and Ünal (2024) found a strong correlation between digital literacy and technological, pedagogical and content knowledge (TPACK) levels of pre-service teachers. Moreover, a noteworthy positive correlation was found between the Technical dimension of digital literacy and TPACK. Altun (2017) also identified a significantly strong relationship between TPACK and digital literacy. The findings of simple linear regression analysis further confirm the predictive role of digital literacy in determining teachers' digital competence levels. Orakova et al. (2024) found that teachers' digital literacy significantly predicted their pedagogical and technological competencies. These findings underscore the critical importance of fostering digital literacy skills among teachers as a means to enhance their digital competence. Initiatives aimed at improving digital literacy can potentially lead to more effective integration of technology in educational practices, ultimately benefiting student learning outcomes in today's increasingly digital-centric educational environment.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it is evident that teachers exhibit high levels of both digital competence and digital literacy. Gender variable does not significantly influence teachers' digital competence levels, indicating similar proficiency between male and female teachers in utilizing digital tools and technologies. However, male teachers tend to exhibit higher average scores in specific digital competencies. Moreover, the study reveals disparities in digital competence across educational levels teachers

work, with high school teachers demonstrating significantly higher digital competence compared to primary school teachers. The predictive role of digital literacy in determining digital competence levels highlights the critical importance of integrating comprehensive digital literacy training into educational practices. The findings emphasize the critical importance of integrating digital literacy training into professional development programs to empower teachers in navigating and leveraging digital tools in educational settings. In conclusion, fostering digital literacy skills among teachers through targeted professional development initiatives is essential for effective integration of technology into teaching practices. Addressing gender disparities in digital competencies and ensuring equitable access to digital resources are pivotal steps towards enhancing overall educational outcomes in today's digital-centric environment. By improving these skills, teachers will be better equipped to integrate technology effectively in educational settings, ultimately improving student outcomes.

FUTURE IMPLICATIONS

Future studies could benefit from larger and more diverse samples to generalize findings across different regions or educational settings. This would enhance the robustness and applicability of the results. While this study focused on variables such as gender, education level teacher work, future research could investigate other factors such as subject specialization, socio-economic background, or specific digital tools used by teachers. The study's findings suggest variability in digital competence across different educational settings. Future research could focus on specific educational levels (e.g., primary vs. secondary) or regional differences to identify targeted needs and tailor professional development programs accordingly. More research is needed on the impact of specific digital tools and technologies used by teachers. This could help in understanding how different tools influence digital competence and guide the selection and integration of these tools in educational settings. Supplementing quantitative findings with qualitative research, such as interviews and case studies, could offer deeper insights into teachers' experiences, challenges, and perspectives on digital literacy and competence. Findings from this study can inform policy decisions related to teacher training programs and curriculum development, ensuring they align with the evolving demands of digital education.

Declaration of Conflicting Interests

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

Funding

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

Statements of publication ethics

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

Ethics Committee Approval Information

In the study, volunteering was taken as a basis, and all individuals who participated were required to read and sign a consent form prior to taking part. Participants were fully informed about the research's aim and the confidentiality of any information they provided. Moreover, the researchers obtained scale permission for the use of scales. Ethical approval for this study was obtained from the Scientific Research Ethics Committee of Selcuk University, School of Foreign Languages, with the decision number 2024/04, dated 07 May 2024.

REFERENCES

- Altun, N. (2019). *Temel eğitim programları ve ders kitaplarının dijital okuryazarlık bağlamında incelenmesi* [Unpublished master's thesis]. Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.
- Arslan, E. (2019). *Ortaokul öğretmenlerinin ve öğrencilerinin eğitim bilişim ağı (EBA) platformu hakkındaki görüşleri: Hatay ili örneği* [Master's thesis]. Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana.
- Ashong, C. Y., & Commander, N. E. (2012). Ethnicity, gender, and perceptions of online learning in higher education. *MERLOT Journal of Online Learning and Teaching*, 8(2). Retrieved from https://jolt.merlot.org/vol8no2/ashong_0612.htm
- Astuti, M., Arifin, Z., Mutohahari, F., & Nurtanto, M. (2021). Competency of digital technology: the maturity levels of teachers and students in vocational education in Indonesia. *Journal of Education Technology*, 5(2), 254-262. <https://doi.org/10.23887/jet.v5i3.35108>
- Bai, J., Zhang, H., Chen, Q., Cheng, X., & Zhou, Y. (2022). Technical supports and emotional design in digital picture books for children: a review. *Procedia Computer Science*, 201, 174-180. <https://doi.org/10.1016/j.procs.2022.03.025>
- Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 17-32). Peter Lang Publishing: UK.
- Bingöl, H. (2022). *Uzaktan eğitim sürecinde öğretmenlerin dijital okuryazarlık düzeyleri ile mesleki motivasyonlarının incelenmesi* [Master's Thesis]. Zonguldak Bülent Ecevit Üniversitesi, Sosyal Bilimler Enstitüsü, Zonguldak.
- Bridwell-Mitchell, E. N. (2015). Theorizing teacher agency and reform: How institutionalized instructional practices change and persist. *Sociology of Education*, 88(2), 140-159. <https://doi.org/10.1177/0038040715575559>

- Butler, D., Leahy, M., Charania, A., Gedara, P. M., Keane, T., Laferrière, T., Nakamura, K., Ueda, H., Bocconi, S., & ... (2024). Aligning digital educational policies with the new realities of schooling. *Technology, Knowledge and Learning*, 29, 1831–1849. <https://doi.org/10.1007/s10758-024-09776-9>
- Ceylan, V. & Gündoğdu, K. (2017). E-content development skills of teachers: an in-service training experience. *Journal of Education and Humanities: Theory and Practice*, 8(15), 48-74
- Chadegani, A. A., Salehi, H., Yunus, M. M., Farhadi, H., Fooladi, M., Farhadi, M., & Ebrahim, N. A. (2013). A comparison between two main academic literature collections: Web of Science and Scopus databases. *Asian Soc Sci*, 9(18), 1-26. <https://doi.org/10.48550/arXiv.1305.0377>
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.
- Colley, A., & Comber, C. (2003). Age and gender differences in computer use and attitudes among secondary school students: what has changed?. *Educational research*, 45(2), 155-165. <https://doi.org/10.1080/0013188032000103235>
- Çam, E., & Kırıyıcı, M. (2017). Perceptions of prospective teachers on digital literacy. *Malaysian Online Journal of Educational Technology*, (4), 29-44. Retrieved from https://drive.google.com/file/d/1UubzdfQ6xK7sZ6x_6au00dmDajf7POOQ/view
- Çebi, A., & Reisoğlu, İ. (2020). Digital competence: A study from the perspective of pre-service teachers in Turkey. *Journal of New Approaches in Educational Research (NAER Journal)*, 9(2), 294-308. Retrieved from <https://www.learntechlib.org/p/217619/>.
- Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2012). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları (2. basım)/ Multivariate statistics for social sciences: SPSS and LISREL applications (2nd ed.)*. Pegem Akademi.
- Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 Crisis. *Journal of Educational Technology Systems*, 49(1), 5-22. <https://doi.org/10.1177/0047239520934018>
- Dias-Trindade, S. & Moreira, J. A. (2020). Assessment of high school teachers on their digital competences. *MAGIS, Revista Internacional de Investigación en Educación*, 13(1), 1-21
- Digital Literacy. (2023, September 12). Retrieved from <https://uis.unesco.org/en/glossary-term/digital-literacy>
- Doğan, C., & Birişçi, S. (2022). Covid-19 süreciyle birlikte öğretmenlerin dijital okuryazarlık düzeylerinin incelenmesi. *Ege Eğitim Teknolojileri Dergisi*, 6(1), 53-76. Retrieved from <https://dergipark.org.tr/en/pub/eetd/issue/70271/1152403>
- Drabowicz, T. (2014). Gender and digital usage inequality among adolescents: A comparative study of 39 countries. *Computers & Education*, 74, 98-111. <https://doi.org/10.1016/j.compedu.2014.01.016>
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255-284. <https://doi.org/10.1080/15391523.2010.10782551>
- Esteve-Mon, F., Llopis, M. & Adell-Segura, J. (2020). Digital competence and computational thinking of student teachers. *International Journal of Emerging Technologies in Learning (IJET)*, 15(2), 29-41. Retrieved from <https://www.learntechlib.org/p/217159/>.
- European Commission. (2021). *Digital education initiatives: Digital education action plan (2021–2027)*. In European Education Area. Retrieved from <https://education.ec.europa.eu/eu/focus-topics/digital-education/about-digital-education>
- Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational technology research and development*, 68(5), 2449-2472. <https://doi.org/10.1007/s11423-020-09767-4>
- Guillén-Gámez, F. D., Mayorga-Fernández, M. J., Bravo-Agapito, J., & Escribano-Ortiz, D. (2021). Analysis of teachers' pedagogical digital competence: Identification of factors predicting their acquisition. *Technology, Knowledge and Learning*, 26(3), 481-498. <https://doi.org/10.1007/s10758-019-09432-7>
- Fidan, M., & Yeleğen, H. C. (2022). Öğretmenlerin dijital yeterliklerinin çeşitli değişkenler açısından incelenmesi ve dijital yeterlik gereksinimleri. *Ege Eğitim Dergisi*, 23(2), 150-170. <https://doi.org/10.12984/eggefd.1075367>
- Foulger, T. S., Graziano, K. J., Schmidt-Crawford, D., & Slykhuis, D. A. (2017). Teacher educator technology competencies. *Journal Of Technology And Teacher Education*, 25(4), 413-448. Retrieved July 13, 2024 from <https://www.learntechlib.org/primary/p/181966/>.
- Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2019). *Preparing for life in a digital world: IEA international computer and information literacy study 2018 international report*. Amsterdam: International Association for the Evaluation of Educational Achievement (IEA). <https://www.iea.nl/publications/study-reports/preparing-life-digital-world>
- Gillen, J., & Barton, D. (2010). *Digital literacies: A research briefing by the Technology Enhanced Learning Phase of the Teaching and Learning Research Programme (TLRP)*. JISC. <http://www.tlrp.org/docs/DigitalLiteracies.pdf>
- Gökbulut, B. (2021). Öğretmenlerin dijital okuryazarlık düzeyleri ile hayat boyu öğrenme eğilimlerinin incelenmesi. *Yükseköğretim ve Bilim Dergisi*, 11(3), 469- 479. <https://doi.org/10.5961/higheredusci.896998>.
- Gümüş, M. M., & Kukul, V. (2023). Examination of digital competences of teachers according to different variables. *Journal of Teacher Education and Lifelong Learning*, 5(1), 111-129. <https://doi.org/10.51535/tell.1231192>
- Hamakali, H. P. S., & Josua, L. M. (2023). Engendering technology-assisted pedagogy for effective instructional strategy in the University of Namibia language centre. *Research in Educational Policy and Management*, 5(1), 18-32. <https://doi.org/10.46303/repam.2023.3>
- Herro, D., Visser, R., & Qian, M. (2021). Teacher educators' perspectives and practices towards the Technology Education Technology Competencies (TETCs). *Technology, Pedagogy and Education*, 30(5), 623-641. <https://doi.org/10.1080/1475939X.2021.1970620>.
- Hicks, T. W., Baleja, K., & Zhang, M. (2019). Digital literacy. *Oxford Bibliographies*. <https://doi.org/10.1093/obo/9780199756841-0239>
- Indeed. (2022). 5 reasons digital literacy is important for educators. *Indeed*. Retrieved July 1, 2024, from <https://www.indeed.com/career-advice/career-development/digital-literacy>
- Karabacak, Z. İ. & Sezgin, A. A. (2019). Türkiye’de Dijital dönüşüm ve dijital okuryazarlık. *Türk İdare Dergisi*, 91(488), 319-343.

- Karabulut, B. (2015). Bilgi toplumu çağında dijital yerliler, göçmenler ve melezler. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 21, 11-23. Retrieved from <https://dergipark.org.tr/en/pub/pausbed/issue/34743/384200>
- Karagözoğlu, N., & Gezer, U. (2022). An investigation of the relationship between digital literacy levels of social studies teacher candidates and their attitudes towards distance education. *Educational Policy Analysis and Strategic Research*, 17(1), 218-235. Retrieved from <https://eric.ed.gov/?id=EJ1334602>
- Karaman, M. K. & Karataş, A. (2009). Öğretmen adaylarının medya okuryazarlık düzeyleri. *İlköğretim Online*, 8(3), 798-808. Retrieved from <https://dergipark.org.tr/en/pub/ilkonline/issue/8597/106997>
- Kayhan, O. (2022). Understanding teachers' classroom management anxiety: the role of educational technology usage in classrooms. *Journal of Teacher Education and Lifelong Learning*, 4(2), 51-64. <https://doi.org/10.51535/tell.1148725>
- Kılınç, S. (2023). Embracing the future of distance science education: Opportunities and challenges of ChatGPT integration. *Asian Journal of Distance Education*, 18(1), 205- 237. <https://doi.org/10.5281/zenodo.7857396>.
- Kippers, W. B., Poortman, C. L., Schildkamp, K., & Visscher, A. J. (2018). Data literacy: What do educators learn and struggle with during a data use intervention?. *Studies in Educational Evaluation*, 56, 21-31. <https://doi.org/10.1016/j.stueduc.2017.11.001>
- Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3-29). Mahwah, NJ: Lawrence Erlbaum Associates.
- Korisztek, R. (2022). Teachers' digital literacy when teaching online. *World of Better Learning*. Cambridge University Press. Retrieved September 12, 2023, from <https://www.cambridge.org/elt/blog/2021/07/13/teachers-digital-literacy-teaching-online/>
- Korkmaz, M., & Akçay, A. O. (2024). Determining digital literacy levels of primary school teachers. *Journal of Learning and Teaching in Digital Age*, 9(1), 1-16. <https://doi.org/10.53850/joltida.1175453>
- Köksal, D. & Canlı, S. (2024). Öğretmenlerin dijital yeterliliklerinin incelenmesi [Examination of Teachers' Digital Competencies]. *Bilim, Eğitim, Sanat ve Teknoloji Dergisi (BEST Dergi) [Science, Education, Art and Technology Journal (SEAT Journal)]*, 8(1), 1-21.
- Kuru, E. (2019). Sosyal bilgiler öğretmen adaylarının dijital okuryazarlık kavramına ilişkin görüşleri. *Turkish Studies*, 14(3), 1629-1648.
- Kurt, A. A., Dönmez, F. İ., Ersoy, M., Dindar, M., Mısırlı, Ö. & Akçay, T. (2013). Teknoloji ışığında okuryazarlıklar. *Eğitim Teknolojileri Araştırmaları Dergisi*, 4(2), 1-24.
- Lestari, H., Siskandar, R., & Rahmawati, I. (2020). Digital literacy skills of teachers in elementary school in the revolution 4.0. *International Conference on Elementary Education*, 2(1), 302-311. Retrieved from <http://proceedings2.upi.edu/index.php/icee/article/view/631>
- Li, M., & Yu, Z. (2022). Teachers' satisfaction, role, and digital literacy during the covid-19 pandemic. *Sustainability*, 14, 1121, 1-19. <https://doi.org/10.3390/su14031121>
- Lin, T. C., Tsai, C. C., Chai, C. S., & Lee, M. H. (2013). Identifying science teachers' perceptions of technological pedagogical and content knowledge (TPACK). *Journal of Science Education and Technology*, 22, 325-336. <https://doi.org/10.1007/s10956-012-9396-6>
- Lockton, M., & Fargason, S. (2019). Disrupting the status quo: How teachers grapple with reforms that compete with long-standing educational views. *Journal of Educational Change*, 20(4), 469-494. <https://doi.org/10.1007/s10833-019-09351-5>
- Mertens, D. M. (2014). Ethical use of qualitative data and findings. In U. Flick (Ed.), *The Sage handbook of qualitative data analysis* (pp. 510–523). Sage.
- Millî Eğitim Bakanlığı (MEB). (2020). *Dijital okuryazarlık öğretmen kılavuzu*. Ankara.
- Miles, J., & Shevlin, M. (2000). *Applying regression and correlation: A guide for students and researchers*. Sage Publications.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Napal Fraile, M., Penalva-Velez, A. & MendiorozLacambra, A. M. (2018). Development of digital competence in secondary education teachers' training. *Education Sciences*, 8(3), 104. <https://doi.org/10.3390/educsci8030104>
- Ocak, G., Çengelci, S., & Yurtseven, R. (2022). Öğretmenlerin dijital okuryazarlık beceri düzeyleri ile yaşam boyu öğrenme eğilimleri arasındaki ilişkinin incelenmesi (Afyonkarahisar Örneği). *Uluslararası Sosyal Bilimler Eğitimi Dergisi*, 8(1), 123-155. <https://doi.org/10.47615/issej.1103143>
- Ocak, G. & Karafil, B. (2021). Teachers' perceptions of their technological competence in learning and teaching process. *Malaysian Online Journal of Educational Technology*, 9(4), 14-30. <http://dx.doi.org/10.52380/mojet.2021.9.4.221>
- Orakova, A., Nametkulova, F., Issayeva, G., Mukhambetzhanova, S., Galimzhanova, M., & Rezuanova, G. (2024). The relationships between pedagogical and technological competence and digital literacy level of teachers. *Journal of Curriculum Studies Research*, 6(1), 1-21. <https://doi.org/10.46303/jcsr.2024.2>
- Pehlevan, İ., & Ünal, B. Investigating the relationship between digital literacy and TPACK levels of pre-service english teachers. *Journal of Language Education and Research*, 10(1), 87-111. <https://doi.org/10.31464/jlere.1432879>
- Pérez-Escoda, A., García-Ruiz, R., & Aguaded, I. (2019). Dimensions of digital literacy based on five models of development / Dimensiones de la alfabetización digital a partir de cinco modelos de desarrollo. *Culture and Education*, 31(2), 232-266. <https://doi.org/10.1080/11356405.2019.1603274>
- Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, 2, 923–945. <https://doi.org/10.1007/s42438-020-00155-y>
- Rokenes, F. M. & Krumsvik, R. J. (2016). Prepared to teach ESL with ICT? A study of digital competence in Norwegian teacher education. *Computers & Education*, 97, 1-20. <https://doi.org/10.1016/j.compedu.2016.02.014>

- Saripudin, S., Budiyanto, I. B., Listiana, R. E. N. I., & Ana, A. (2021). Digital literacy skills of vocational school teachers. *Journal of Engineering Science and Technology*, 16(1), 666-680. Retrieved from https://jestec.taylors.edu.my/Vol%2016%20issue%201%20February%202021/16_1_46.pdf
- Snyder, M. (2014). *Technology integration for educators: The why and the how* [Master's Thesis]. Eastern Michigan University.
- Sun, J., Przybylski, R., & Johnson, B. J. (2016). A review of research on teachers' use of student data: From the perspective of school leadership. *Educational Assessment, Evaluation and Accountability*, 28, 5-33. <https://doi.org/10.1007/s11092-016-9238-9>
- Tamim, R. M., Borokhovski, E., Bernard, R. M., Schmid, R. F., Abrami, P. C., & Sokolovskaya, A. (2014). *Technology use in teacher training programs: Lessons learned from a systematic review*. Paper presented at the AERA 2014 annual meeting in Philadelphia, PA.
- Tezci, E. (2011). Factors that influence pre-service teachers' ICT usage in education. *European Journal of Teacher Education*, 34(4), 483-499. <https://doi.org/10.1080/02619768.2011.587116>
- Tohara, A. J. T. (2021). "Exploring digital literacy strategies for students with special educational needs in the digital age". *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(9), 3345-3358. <https://doi.org/10.17762/turcomat.v12i9.5741>
- Tokaç Kan, A. (2024). Exploring the impact of SCOPA creation on language learners' reading and reflective thinking skills in a concept-based reading curriculum. *International Journal of Contemporary Educational Research*, 11(1), 64-85.
- Tokaç Kan, A. (2020a). *Designing a concept-based reading curriculum for language learners*. Çizgi Yayınevi.
- Tokaç Kan, A. (2020b). *Computer-assisted vocabulary instruction*. Çizgi Yayınevi.
- Tokaç Kan, A. (2020c). Reading material evaluation in EAP: An example of a dialogic approach. In T. Akşit (Ed.), *The future of teaching English for academic purposes: Standards, provision, and practices* (pp. 121-132). Cambridge Scholars Publishing.
- Tondeur, J., Pareja Roblin, N., van Braak, J., Voogt, J., & Prestridge, S. (2017). Preparing beginning teachers for technology integration in education: Ready for take-off?. *Technology, Pedagogy and Education*, 26(2), 157-177. <https://doi.org/10.1080/1475939X.2016.1193556>
- Tüzel, S. & Tok, M. (2013). Öğretmen adaylarının dijital yazma deneyimlerinin incelenmesi. *Tarih Okulu Dergisi*, 6(15), 577-596. <https://doi.org/10.14225/Joh292>
- Van Grootel, S., Van Laar, C., Meeussen, L., Schmader, T., & Sczesny, S. (2018). Uncovering pluralistic ignorance to change men's communal self-descriptions, attitudes, and behavioral intentions. *Frontiers in psychology*, 9, 1344. <https://doi.org/10.3389/fpsyg.2018.01344>
- Ventayen, R. J. M. (2019). Educator's competencies on the application of technological tools in teaching. *International Journal of Scientific & Technology Research*, 8(11). Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3491717
- Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the digital networked world of the 21st century. *Journal of Computer Assisted Learning*, 29(5), 403-413. <https://doi.org/10.1111/jcal.12029>
- Wang, Q., & Woo, H. L. (2007). Systematic planning for ICT integration in topic learning. *Journal of Educational Technology & Society*, 10(1), 148-156. Retrieved from <https://www.jstor.org/stable/10.2307/jeductechsoci.10.1.148>
- Yılmaz-Ergül, D., & Taşar, M. F. (2023). Development and validation of the teachers' Digital Competence Scale (TDiCoS). *Journal of Learning and Teaching in Digital Age*, 8(1), 148-160. <https://doi.org/10.53850/joltida.1204358>
- Yontar, A. (2019). Öğretmen adaylarının dijital okuryazarlık düzeyleri. *Ana Dili Eğitimi Dergisi*, 7(4), 815-824. <https://doi.org/10.16916/aded.593579>
- Zhang J. (2023). EFL teachers' digital literacy: the role of contextual factors in their literacy development. *Frontiers in psychology*, 14, 1153339. <https://doi.org/10.3389/fpsyg.2023.1153339>
- Zhu, C., Wang, D., Cai, Y., & Engels, N. (2013). What core competencies are related to teachers' innovative teaching? *Asia-Pacific Journal of Teacher Education*, 41(1), 9-27. <https://doi.org/10.1080/1359866X.2012.753984>.