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Gender Differences in Digital Literacy: An Analysis[1]

Dijital Okuryazarlıkta Cinsiyet Farklılıkları: Bir Analiz

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Abstract. Objective: This study investigates gender differences in various dimensions of digital literacy, including ethical responsibility, general knowledge and functional skills, daily usage, professional production, privacy and security, and social dimensions. Method: We employed a quantitative approach. We used independent samples t-tests to analyze survey data collected from 255 participants, divided into male (m =96) and female (f = 159) groups. The survey included questions across multiple digital literacy dimensions, and the data were assessed for differences in means between genders. Results: The analysis revealed significant gender differences in several dimensions. Specifically, males scored higher in general knowledge and functional skills, as well as in professional production and privacy and security aspects. Females demonstrated higher scores in ethical responsibility and daily usage dimensions. However, no significant differences were observed in the social dimension of digital literacy. Conclusion: The study highlights notable gender-based variations in digital literacy, suggesting that males and females engage differently with digital tools and platforms. with digital tools and platforms differently. These findings have implications for targeted digital literacy programs and educational interventions designed to address specific needs and improve overall digital competency across genders.
Keywords: Digital literacy, Gender differences, Quantitative analysis, Digital skills, Ethical responsibility, Privacy and security, Educational interventions.

Öz. Amaç: Bu çalışma, etik sorumluluk, genel bilgi ve işlevsel beceriler, günlük kullanım, profesyonel üretim, gizlilik ve güvenlik ve sosyal boyutlar dahil olmak üzere dijital okuryazarlığın çeşitli boyutlarındaki cinsiyet farklılıklarını araştırmaktadır. Yöntem: Erkek (m =96) ve kadın (f = 159) gruplarına ayrılan 255 katılımcıdan toplanan anket verilerini analiz etmek için bağımsız örneklem t-testlerini kullanarak nicel bir yaklaşım kullanılmıştır. Ankette birden fazla dijital okuryazarlık boyutuna ilişkin sorular yer almış ve veriler cinsiyetler arasındaki ortalama farklılıkları açısından değerlendirilmiştir. Sonuçlar: Analiz, çeşitli boyutlarda önemli cinsiyet farklılıkları ortaya koymuştur. Özellikle, erkekler genel bilgi ve işlevsel becerilerin yanı sıra profesyonel üretim ile gizlilik ve güvenlik konularında daha yüksek puanlar almıştır. Kadınlar ise etik sorumluluk ve günlük kullanım boyutlarında daha yüksek puanlar almıştır. Ancak, dijital okuryazarlığın sosyal boyutunda anlamlı bir farklılık gözlenmemiştir. Sonuç: Çalışma, dijital okuryazarlıkta cinsiyete dayalı önemli farklılıkları vurgulamakta, erkeklerin ve kadınların dijital araçlar ve platformlarla farklı şekilde etkileşime girdiğini göstermektedir. Bu bulgular, belirli ihtiyaçları karşılamak ve cinsiyetler arasında genel dijital yetkinliği geliştirmek için tasarlanmış hedefli dijital okuryazarlık programları ve eğitim müdahaleleri için çıkarımlara sahiptir.
Anahtar kelimeler: Dijital okuryazarlık, Cinsiyet farkları, Nicel analiz, Dijital beceriler, Etik sorumluluk, Gizlilik ve güvenlik, Eğitim müdahaleleri.

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Genişletilmiş Özet

Giriş. Dijital okuryazarlık, bireylerin dijital teknolojileri etkin bir şekilde kullanma, anlama, eleştirel değerlendirme ve bu teknolojilerle üretebilme yeteneği olarak tanımlanabilir. Bu kavram, dijital araçları kullanma becerisini vurgular. Kavram aynı zamanda dijital dünyada karşılaşılan bilgileri doğru bir şekilde değerlendirebilme, güvenlik ve gizlilik konularında farkındalık sahibi olma, dijital içerikler yaratabilme ve bunları etkili bir şekilde paylaşabilme gibi becerileri de kapsar. Dijital okuryazarlık, günümüzün dijital çağında kişisel, akademik ve profesyonel yaşamın önemli bir parçası haline gelmiştir.

Dijital okuryazarlığın kökenleri, bilgisayarların ve dijital teknolojilerin yaygınlaşmaya başladığı 20. yüzyılın ikinci yarısına dayanmaktadır. Ancak, kavramın kendisi daha önce ortaya çıkan "bilgisayar okuryazarlığı" terimiyle yakından ilişkilidir. 1980'ler ve 1990'larda, bilgisayar okuryazarlığı, temel bilgisayar becerilerini öğrenmeyi ifade ediyordu. Bu dönemde, bilgisayarları kullanabilme yeteneği, özellikle iş dünyasında ve eğitim alanında önemli bir beceri olarak kabul edilmeye başlandı. 1990'ların sonlarından itibaren, internetin ve dijital medyanın yaygınlaşmasıyla birlikte, dijital okuryazarlık kavramı daha geniş bir anlam kazandı. Bilgisayar okuryazarlığı, sadece bilgisayarları kullanabilme becerisiyle sınırlı kalmadı; aynı zamanda internete erişim, çevrimiçi bilgileri bulma ve değerlendirme, sosyal medya kullanımı, dijital içerik üretimi ve dijital güvenlik gibi çok çeşitli yetkinlikleri içermeye başladı.

2000'li yıllarda dijital okuryazarlık, eğitim sistemlerinde ve iş dünyasında daha fazla önem kazandı. Eğitimciler, dijital okuryazarlığın öğrencilere kazandırılması gereken temel bir beceri olduğunu fark etti ve bu alandaki müfredatlar geliştirildi. Aynı şekilde, iş dünyasında da dijital okuryazarlık, çalışanlardan beklenen temel yetkinlikler arasında yerini aldı.

Günümüzde dijital okuryazarlık, sadece bir araç kullanma becerisi olarak değil, dijital dünyada etkili bir şekilde var olabilmenin anahtarı olarak görülmektedir. Bu, dijital teknolojilerin sürekli evrim geçirmesiyle birlikte, dijital okuryazarlığın da dinamik ve sürekli gelişen bir kavram olduğunu göstermektedir. Dijital dünyada güvenli ve bilinçli bir şekilde hareket edebilmek, dijital içerikler üretebilmek ve bu içerikleri eleştirel bir gözle değerlendirebilmek, dijital okuryazarlığın temel unsurları arasında yer almaktadır.

Amaç. Bu çalışmanın amacı, dijital okuryazarlığın çeşitli boyutlarında cinsiyet farklarını incelemektir. Hem kişisel hem de profesyonel alanlarda dijital platformlara olan bağımlılığın giderek artmasıyla, farklı cinsiyetlerin bu teknolojilerle nasıl etkileşime geçtiğini ve bunları nasıl kullandığını anlamak kritik hale gelmiştir. Bu araştırma, dijital okuryazarlığın etik sorumluluk, genel bilgi ve işlevsel beceriler, günlük kullanım, profesyonel üretim, gizlilik ve güvenlik ile sosyal boyutlar gibi çeşitli yönlerini özel olarak incelemektedir.

Yöntem. Bu çalışma, kadın ve erkek katılımcılar arasındaki dijital okuryazarlık seviyelerindeki farkları incelemek için nicel bir araştırma tasarımını benimsemektedir. Çalışmada, 96 erkek ve 159 kadın olmak üzere toplam 255 katılımcıdan veri toplamak amacıyla yapılandırılmış bir anket kullanılmıştır. Anket, dijital okuryazarlığın birden fazla boyutunu ölçmek için tasarlanmıştır. Veriler, bağımsız örneklemler için t-testi kullanılarak analiz edilmiştir. Bu yöntem, erkek ve kadın katılımcılar arasında her bir boyutta ortalama puanlar açısından anlamlı farkların olup olmadığını belirlemek için etkili bir istatistiksel yöntem olarak seçilmiştir.

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Sonuç: Çalışma, dijital okuryazarlıkta cinsiyete dayalı önemli farklılıkları vurgulamakta, erkeklerin ve kadınların dijital araçlar ve platformlarla farklı şekilde etkileşime girdiğini göstermektedir. Bu bulgular, belirli ihtiyaçları karşılamak ve cinsiyetler arasında genel dijital yetkinliği geliştirmek için tasarlanmış hedefli dijital okuryazarlık programları ve eğitim müdahaleleri için çıkarımlara sahiptir.

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Introduction

In today's increasingly digital world, literacy in digital technologies has become essential for personal and professional success. Digital literacy encompasses a range of skills and competencies, including the ability to use technology effectively, understand its ethical implications, and engage with digital content critically. As technology becomes more embedded in daily life, understanding the variations in digital literacy between different demographic groups is crucial to develop equitable educational strategies and policies. Gender differences in digital literacy have received significant attention in recent years, revealing disparities in how men and women interact with, perceive, and utilize digital tools. These differences can have profound implications for various aspects of life, from educational attainment and career opportunities to social interactions and privacy concerns. Despite growing awareness of these issues, comprehensive analyses examining gender disparities across multiple dimensions of digital literacy remain limited.

Van Deursen and Van Dijk (2019) found that women generally excel in using digital tools for communication and social purposes, while men often demonstrate greater confidence in the technical aspects of technology. Complementing this, Gnambs (2024) examined gender differences in information and communication technology (ICT) literacy during adolescence. His study revealed that while gender differences in ICT literacy were negligible at age 15, small differences favoring boys emerged by age 18. Interestingly, boys showed higher ICT confidence at age 15, but this disparity did not grow over time. These findings highlight gender dynamics in digital competencies and confidence.

This study aims to fill this gap by analyzing gender differences in digital literacy across several domains. Specifically, we examine how gender influences perceptions and competencies related to ethical responsibilities, general knowledge and functional skills, daily technology usage, professional production, privacy, and social interactions. By employing various statistical methods, including independent samples t-tests, this research explores whether and how these differences manifest, and discusses their potential implications. Understanding these gender differences is important for identifying existing gaps and informing the development of targeted interventions and educational programs. By highlighting where and how men and women differ in their digital literacy skills and perceptions, this study seeks to contribute valuable insights that can help bridge the digital divide and promote more inclusive technological advancement.

Literature review

Digital literacy is defined as the ability to effectively and critically navigate, evaluate, and create information using a range of digital technologies. This includes technical skills such as using software and hardware, as well as higher-order skills like assessing the credibility of online sources and understanding the ethical dimensions of digital interactions (Bawden, 2008; Eshet-Alkalai, 2004). Gilster (1997) originally defined digital literacy as:

> …the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. Digital literacy extends this definition by encompassing the cognitive processes involved in interpreting what is seen on the computer screen while using networked media (Tamborg, et al. 2018).

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This definition highlights the functional aspect of handling diverse digital content and the cognitive engagement required to make sense of information in a networked environment.

According to Bayrakcı and Narmanlıoğlu (2021, p. 6), essential aspects of digital competence encompass ethics and responsibility, general knowledge and functional skills, daily use, advanced production, privacy and security, and the social dimension. Ethics and responsibility pertain to recognizing and adhering to ethical conduct in digital contexts. General knowledge and functional skills involve acquiring the basic abilities needed to utilize digital tools and technologies. Daily use refers to the application of digital skills in routine personal and professional activities. Advanced production covers the creation and development of digital content and solutions. Privacy and security focus on safeguarding personal information and practicing safe online behaviors. The social dimension involves interacting and collaborating with others in digital environments. This detailed framework underscores the different components of digital literacy, highlighting the significance of ethical behavior, foundational skills, practical use, content creation, security, and social engagement in the digital world. They observed that teachers can more effectively equip themselves and their students to succeed in the digital era by mastering and enhancing these competencies.

Research on digital literacy has consistently highlighted gender differences, revealing nuanced disparities in how men and women engage with technology and perceive its use. Exploring key studies provides insight into these gender differences across various aspects of digital literacy. A recent study by Fraillon (2024) in the International Computer and Information Literacy Study (ICILS) 2023 provides further evidence on gender differences in digital literacy. This large-scale assessment of eighth-graders across 34 countries found that girls significantly outperformed boys in computer and information literacy.

Following this, Zin et al. (2000) investigated gender differences in computer literacy among undergraduate students at Universiti Kebangsaan Malaysia (UKM). Their study found that male students generally had more computer experience and used technology more frequently. Males also assessed their computer skills more positively, were slightly more likely to own a computer, and showed greater confidence in controlling computer systems. They demonstrated superior programming skills and better computer repair and maintenance abilities than females.

Hohlfeld, Ritzhaupt, and Barron (2013) conducted a study focusing on gender differences in Information and Communication Technology (ICT) literacy among eighth-grade students in Florida public schools. Their research used two validated measures and found significant differences in favor of females. Females scored higher in perceived ICT skills, frequency of computer use, and attitudes toward computers. Additionally, female students performed better on a performance-based assessment, challenging earlier studies that suggested males generally had better ICT skills and attitudes. However, when adjusting for additional predictors using multilevel modeling, gender differences were no longer significant.

Adeoye (2023) examined how various teacher characteristics, including gender, affect digital literacy and the adoption of innovations in teaching. The study revealed that male secondary school

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teachers were more prevalent in teaching STEAM subjects and were likelier to own laptops and possess advanced digital skills than female teachers. The study identified some factors such as lack of school support, limited time, and inadequate internet access as major barriers affecting digital skill use in teaching. Adeoye recommended that schools enhance facilities and support for teaching STEAM based on best practices.

Campos and Scherer (2024) argued that digital gender gaps manifest in several critical areas of ICT engagement. Hargittai and Shafer (2006) also noted that men often have more advanced technical skills and more frequent technology use, while women excel in specific areas such as information retrieval and online communication, indicating a more nuanced understanding of digital competencies.

Grande-de-Prado, Cañón, García-Martín, and Cantón (2020) explored gender differences in students' digital competence and found that men were more likely to view themselves as competent in using ICTs, with better information management and online collaboration skills. Further research conducted by Gebhardt et al., (2019) and Siddiq and Scherer (2019) also documented gender disparities in digital knowledge and skills.

In summary, the review of the related literature highlights the complex nature of gender differences in digital literacy. Some studies suggest that men tend to possess higher levels of technical skills. However, some other studies indicate that women may excel in specific areas such as information retrieval and online communication. These differences can be given to various factors, for example, societal expectations, educational opportunities, and access to technology.

Methodology

This study aims to explore gender differences in digital literacy across various dimensions, including ethical responsibilities, general knowledge, and functional skills, daily technology usage, professional production, privacy, and social interactions. This research employed a quantitative research design. The quantitative research design collects and analyses numerical data to identify patterns, relationships, and trends (Creswell, 2003).

Participants

The study sample comprised 255 participants, with a breakdown of 96 males and 159 females. Participants were selected from a larger pool of individuals engaged in a digital literacy assessment. The sample size was deemed sufficient for conducting meaningful statistical analyses and ensuring representativeness within the constraints of the study. The study group consisted of 255 pre-service English teachers studying at a Turkish university during the 2023-2024 academic year. A probability sampling method was employed, which ensures that every member of the population has an equal chance of being selected. Specifically, simple random sampling, a type of probability sampling, was used. In this method, the researcher randomly selects a subset of participants from the population, giving each member an equal opportunity to be chosen. This approach is particularly suitable for quantitative research.

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Data collection

The "Digital Literacy Scale" developed by Bayrakcı and Narmanlıoğlu (2021) was used to determine the digital literacy levels of pre-service teachers. This scale consists of 29 items and is structured around six dimensions: Ethics and Responsibility, General Knowledge and Functional Skills, Daily Use, Advanced Production, Privacy and Security, and Social Dimension. A 5-point Likert-type rating was employed, ranging from Strongly Disagree (1) to Strongly Agree (5). There are no reverse-scored items in the scale. The highest possible score on the scale is 145, and the lowest is 29. The reliability of the scale was measured using Cronbach's Alpha, which is a common measure of internal consistency, yielding a Cronbach's Alpha coefficient of 0.898.

Data analysis

The study analyzed the collected data using SPSS software version 25.0. The data collection involved administering digital literacy tests to the students. The results of the digital literacy tests were then descriptively and inferentially analyzed. Descriptive analysis was performed to summarize the data, while inferential statistical analysis was conducted using independent samples t-tests. Independent samples t-tests compare the means of two independent groups. In this study, the independent samples t-test was used to determine significant differences in digital literacy levels based on gender. The results will contribute to understanding gender-based disparities. Participants completed the questionnaire in a controlled environment. Data were then coded and entered into statistical software for analysis. Each dimension of digital literacy was analyzed separately to determine specific patterns and differences between genders.

Ethical considerations

The study adhered to ethical standards by obtaining informed consent from all participants. They were assured of the confidentiality of their responses and their right to withdraw from the study at any time without penalty. Ethical approval was obtained from the relevant institutional review board prior to data collection (E-10042736-659-814023).

Limitations

While the study provides valuable insights into gender differences in digital literacy, several limitations should be noted: The current study's findings are specific to pre-service English teachers at a Turkish university. Therefore, the generalizability of these results to other disciplines or professions, particularly those with different cultural and educational contexts, should be interpreted with caution. The study used a self-report scale titled the "Digital Literacy Scale" Reliance on self-reported measures may introduce response biases. The study captures data at a single point in time, limiting the ability to infer causal relationships.

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Results and Discussion

The results of this research will reveal the digital literacy of male and female students in English teacher education. The table presents group statistics for various dimensions of digital literacy, categorized by gender. The following summary highlights the mean scores, standard deviations, and standard errors for each dimension for both males (M) and females (F):

Table 1
Group Statistics for Digital Literacy Dimensions by Gender

Dimension	Gender	N	Mean	Std. Deviation	Std. Error Mean
Ethics and Responsibility	M	92	4.5699	.41148	.04290
	F	158	4.4864	.48184	.03833
General Knowledge and	M	92	4.3388	.78736	.08209
Functional Skills	F	151	3.2450	.87110	.07089
Daily Use	M	95	4.4561	.58609	.06013
	F	155	4.4151	.62631	.05031
Advanced Production	M	95	2.0579	1.23956	.12718
	F	153	1.9052	1.01429	.08200
Privacy and Security	M	96	4.7005	.43167	.04406
	F	154	4.5455	.89271	.07194
Social Dimension	M	96	3.5677	.93716	.09565
	F	154	3.4383	.90130	.07263

Table 1 *presents* group statistics for digital literacy dimensions by gender. *Ethics and Responsibility* involves understanding and practicing ethical behavior in digital environments. As seen in Table 1, males have a mean score of 4.5699 (Standard Deviation = 0.41148, Standard Error = 0.04290), while females have a mean score of 4.4864 (Standard Deviation = 0.48184, Standard Error = 0.03833). This suggests that both genders exhibit high levels of understanding and practice of ethical behavior in digital environments, with males showing a slightly higher mean score and slightly more consistent responses.

General Knowledge and Functional Skills refer to possessing the fundamental skills required to operate digital tools and technologies. Males score higher on average, with a mean of 4.3388 (Standard Deviation = 0.78736, Standard Error = 0.08209), compared to females, who have a mean score of 3.2450 (Standard Deviation = 0.87110, Standard Error = 0.07089). This indicates that males generally have greater proficiency in fundamental digital skills, whereas females show more variability in their scores, reflecting a broader range of skill levels.

Daily Use entails applying digital skills in everyday life for both personal and professional tasks. Males report a mean score of 4.4561 (Standard Deviation = 0.58609, Standard Error = 0.06013), while females have a mean score of 4.4151 (Standard Deviation = 0.62631, Standard Error = 0.05031). This demonstrates that both genders frequently apply digital skills in their daily lives, with males scoring slightly higher but with similar levels of consistency in their responses.

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Advanced Production encompasses creating and producing digital content and solutions. Males have a mean score of 2.0579 (Standard Deviation = 1.23956, Standard Error = 0.12718), compared to females with a mean score of 1.9052 (Standard Deviation = 1.01429, Standard Error = 0.08200). This indicates that while both genders engage less in creating and producing digital content, males score slightly higher, suggesting marginally greater involvement or confidence in this area. However, both groups show considerable variability.

Privacy and security focuses on protecting personal information and ensuring safe practices online. Males score a mean of 4.7005 (Standard Deviation = 0.43167, Standard Error = 0.04406), while females score a mean of 4.5455 (Standard Deviation = 0.89271, Standard Error = 0.07194). This reflects strong practices in privacy and security among both genders, with males demonstrating slightly higher scores and more consistent practices compared to females.

Social dimension includes engaging and collaborating with others in digital spaces. Males have a mean score of 3.5677 (Standard Deviation = 0.93716, Standard Error = 0.09565), whereas females have a mean score of 3.4383 (Standard Deviation = 0.90130, Standard Error = 0.07263). This shows that both genders engage moderately in digital social interactions, with males showing a slightly higher mean score and similar variability in engagement.

The data suggest that while males generally score higher in some areas, both genders demonstrate substantial digital literacy across various dimensions. The findings highlight areas where both genders perform well and identify specific dimensions, such as advanced production, where further development and support may be beneficial.

Table 2.
Independent Samples t-test Results

		F	Sig	t	df	Sig. (2-tail)	Mean Difference	Std. Error	95% Confidence Inte.	
									L	U
Ethics and Responsibility	Equal variances	1.50	0.22	1.39	248.00	0.17	0.08	0.06	-0.03	0.20
	Equal variances not			1.45	214.91	0.15	0.08	0.06	-0.03	0.20
General Knowledge	Equal variances	1.62	0.21	9.84	241.00	0.00	1.09	0.11	0.87	1.31
	Equal variances not			10.08	207.37	0.00	1.09	0.11	0.88	1.31
Daily use	Equal variances	0.21	0.64	0.52	248.00	0.61	0.04	0.08	-0.12	0.20
	Equal variances not			0.52	209.11	0.60	0.04	0.08	-0.11	0.20
Advanced Production	Equal variances	3.21	0.07	1.06	246.00	0.29	0.15	0.14	-0.13	0.44
	Equal variances not			1.01	170.21	0.31	0.15	0.15	-0.15	0.45
Privacy and Security	Equal variances	5.38	0.02	1.59	248.00	0.11	0.16	0.10	-0.04	0.35
	Equal variances not			1.84	235.86	0.07	0.16	0.08	-0.01	0.32

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Social Dimension	Equal variances	0.14	0.71	1.09	248.00	0.28	0.13	0.12	-0.11	0.36
	Equal variances not			1.08	195.73	0.28	0.13	0.12	-0.11	0.37

The independent samples t-tests were conducted to examine gender differences across various dimensions of digital literacy. The results are summarized below:

As presented in Table 2 *Ethics and Responsibility* Levene's test for equality of variances indicated that the variances were equal (F = 1.502, p = 0.222). The t-test for equality of means revealed no significant difference between males (Mean = 4.5699) and females (Mean = 4.4864), with t (248) = 1.391, p = 0.165. The mean difference of 0.08344 (95% Confidence Interval: -0.03468 to 0.20155) suggests that while males scored slightly higher, this difference is not statistically significant. The absence of a significant difference between males and females suggests that both genders equally understand and practice ethical behavior in digital environments. Despite males scoring slightly higher, this difference is not substantial, indicating similar levels of ethical awareness across genders.

General Knowledge and Functional Skills, Levene's test for equality of variances showed equal variances (F = 1.617, p = 0.205). The t-test indicated a significant difference between males (Mean = 4.3388) and females (Mean = 3.2450), with t (241) = 9.840, p < 0.001. The mean difference of 1.09374 (95% Confidence Interval: 0.87477 to 1.31270) highlights that males have significantly higher proficiency in general knowledge and functional skills compared to females. A significant difference favoring males in general knowledge and functional skills highlights a gender disparity in fundamental digital competencies. Males consistently report higher proficiency, which suggests that targeted training or support for females might be beneficial in bridging this gap. These results are consistent with Campos and Scherer's recent study (2023) where a gender gap existed in favour of male students in technology. Likewise, the study by Hargittai and Shafer (2006) examined the relationship between actual and perceived online skills, focusing on the role of gender the findings showed similar results to the current study's. That is, while men and women demonstrated identical levels of actual online ability, women consistently reported lower self-perceived skills as the current study underscored. Prado et al.'s study (2020) demonstrated similar results to the current study's findings in which male students tended to perceive themselves as more digitally competent than female students, particularly in areas such as information management, online collaboration, and problem-solving with devices. Conversely, female students reported greater familiarity with social media, image and text processing, and graphic design. As in the current study, regarding the analytic aspects of digital literacy, female students displayed more competence compared to their male counterparts. However, the results of the current study do not appear to be consistent with the results of Fraillon's (2024) study regarding computer and information literacy, where female students were found to outperform their male counterparts. The same discrepancy was seen in the study of Zin (2000) in favour of the male and female subjects in the Malaysian context. The results may reflect unequal access to computers and opportunities for computer use between male and female students. This could stem from societal factors, family dynamics, or educational disparities that shape early exposure to technology.

Hohfield et al.'s study (2013) revealed a complex relationship between gender and technology competence. Initially, descriptive statistics and t-tests indicated that female students outperformed males in all areas of ICT literacy. However, when multilevel models were employed, the results became

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more nuanced. While females still demonstrated significantly higher perceived ICT skills, the gender difference in demonstrated skills varied depending on the specific skill being assessed. For instance, females consistently outperformed males in most areas, but no significant gender difference was observed in graphics, presentation, and video editing skills. Similarly, in the current study, male students performed better in general knowledge and functional skills of digital literacy, as well as in areas related to professional production and privacy and security displayed higher knowledge and females scored higher in ethical responsibility and daily usage dimensions. However, there were no significant differences found in the social dimension of digital literacy. These findings highlight the importance of considering multiple perspectives and analytical approaches when investigating gender differences in technology literacy.

Daily Use, the variances were equal according to Levene's test ($F = 0.214$, $p = 0.644$). The t-test results showed no significant difference between males (Mean = 4.4561) and females (Mean = 4.4151), with $t(248) = 0.516$, $p = 0.606$. The mean difference of 0.04109 (95% Confidence Interval: -0.11581 to 0.19799) indicates that daily digital usage is similar for both genders. The lack of significant difference in daily digital usage between genders reflects similar engagement levels in applying digital skills to everyday tasks. Both genders use digital tools with comparable frequency, suggesting that digital habits are similarly integrated into daily life regardless of gender.

Advanced Production, Levene's test suggested equal variances ($F = 3.209$, $p = 0.074$). The t-test revealed no significant difference between males (Mean = 2.0579) and females (Mean = 1.9052), with $t(246) = 1.057$, $p = 0.292$. The mean difference of 0.15267 (95% Confidence Interval: -0.13184 to 0.43717) shows that both genders have similar levels of involvement in advanced digital production. The insignificant difference in advanced production indicates that both genders have similar involvement in creating and producing digital content. Despite some variability, neither gender exhibits a pronounced advantage in this area.

Privacy and Security, Levene's test indicated unequal variances ($F = 5.381$, $p = 0.021$). The t-test showed no significant difference between males (Mean = 4.7005) and females (Mean = 4.5455), with $t(248) = 1.589$, $p = 0.113$. The mean difference of 0.15507 (95% Confidence Interval: -0.03712 to 0.34725) suggests that both genders demonstrate comparable practices in privacy and security, with males showing slightly higher scores. Although males scored slightly higher in privacy and security practices, the difference is not statistically significant. This suggests that both genders maintain comparable levels of awareness and practices regarding the protection of personal information online.

Social Dimension, Levene's test showed equal variances ($F = 0.136$, $p = 0.712$). The t-test indicated no significant difference between males (Mean = 3.5677) and females (Mean = 3.4383), with $t(248) = 1.087$, $p = 0.278$. The mean difference of 0.12940 (95% Confidence Interval: -0.10501 to 0.36380) suggests that engagement in digital social interactions is similar across genders. The absence of significant differences in digital social engagement shows that both males and females are similarly involved in online interactions. This indicates that social engagement in digital spaces is consistent across genders.

In contrast to the results of the current study, the meta-analysis (Siddiqa & Scherer, 2019) which examined gender differences in students' ICT literacy, indicated a small, but statistically

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significant, positive effect in favour of female subjects (g = +0.135). This suggests that, on average, female individuals demonstrate slightly higher ICT literacy levels compared to males. This overall effect remained consistent across various moderators, including publication status, sample type, and ICT literacy dimensions. However, it is important to note the small effect size, indicating that while statistically significant, the practical difference between genders may be limited. Unlike the results of the current study, in Adeoye's study (2023) while gender does not directly impact digital literacy skills, access to technology (e.g., laptops) might play a mediating role. However, given the multiple perspectives regarding digital literacy, it is inevitable to confront diverse findings. These discrepancies underscore the complexity of this issue, highlighting the influence of attitudes, socio-economic context, and specific skill types on the gender gap. Similarly, This research aimed to assess pre-service teachers' ICT competence beliefs. The results showed that the pre-service teachers had beliefs at a good level regarding their ICT competence beliefs. A few gender differences were found between participants' mean scores on six dimensions. No gender differences were found for many items. A study conducted by Sergeeva et al. (2024) aimed to assess pre-service teachers' ICT competence beliefs. The results of the study found out that the pre-service teachers had beliefs at a good level regarding their ICT competence beliefs. A few gender differences were found between participants' mean scores on six dimensions. No gender differences were found for many items.

In summary, while there are specific areas where gender differences are evident, such as general knowledge and functional skills, most dimensions of digital literacy show comparable levels of proficiency and engagement between males and females. These findings underscore the need for tailored interventions to address specific gaps, particularly in fundamental digital skills, while acknowledging that overall digital engagement practices are similar across genders.

Conclusion and Further Research

This study comprehensively analyses gender differences in digital literacy, highlighting notable variations across several dimensions. The findings indicate that while there are some significant differences, particularly in general knowledge and functional skills, other aspects of digital literacy, such as daily usage and social engagement, show no significant gender-based disparities. While males generally demonstrate proficiency levels in certain technical aspects of digital literacy, both genders show similar levels of digital engagement and ethical awareness. This suggests that digital literacy programs should address specific skills gaps identified among females, particularly in fundamental digital knowledge and functional skills, while recognizing that general digital engagement practices are similarly robust across genders.

To build on these findings, future research should consider some avenues. Firstly, as stated above, the findings of this study are specific to pre-service English teachers at a Turkish university. Future research should explore the generalizability of these findings by including a larger sample size with more diverse sample of participants from various disciplines and cultural backgrounds. Secondly, longitudinal studies examining the evolution of digital literacy skills over time for both genders could offer valuable insights into how technological advancements influence skill development differently between males and females. Thirdly, incorporating qualitative research, such as interviews or focus groups, can delve into the underlying reasons behind observed differences in digital literacy. This

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approach could enhance our understanding of attitudes, experiences, and barriers faced by different genders, thereby informing more tailored and effective interventions. Moreover, exploring a broader range of democratic factors including age, educational background, and socioeconomic status would be beneficial. Examining these variables alongside gender could provide a more comprehensive understanding of how different factors interact to shape digital literacy skills. It would also be beneficial to explore the effects of social media use on the development of digital literacy skills. Studies on the effects of social media use on the development of digital literacy could provide valuable insights into how social media platforms shape individuals' abilities to navigate and create content in the digital age. By addressing these areas, future research can contribute to a more nuanced understanding of digital literacy and support the development of more effective and equitable digital education strategies.

In conclusion, this study provides valuable insights into the digital literacy practices of pre-service English teachers at a Turkish university. The study contributes to the growing body of research on technology integration in language education. The study also highlights the need for further research to explore the complex relationship between cultural, and individual factors that shape digital literacy development among pre-service English teachers.

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