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Review Article

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Digital Skills in the 21st Century: Understanding the Impact of Digital Literacy on Nurses

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Abstract

The aim of this research is to draw attention to the importance of digital literacy in nursing services. Technological advances have driven global development in an unprecedented manner over the last two decades, leading to significant growth in access and connectivity for billions of people worldwide. Approximately 2.5 billion people own smartphones, and four billion people use social media. Digital literacy now requires not only the ability to use technology on a social level, but also the capacity to analyze and integrate digital information. The increasing demand from the labor market for individuals to be digitally literate has spurred targeted interventions and innovations aimed at equipping the future workforce with necessary digital skills. However, despite these efforts, the digital skills gap remains a global challenge. A digitally enabled profession ensures citizens receive the highest quality healthcare. Health-related infrastructures are rapidly digitalizing, leading to significant improvements in healthcare quality. Digital literacy is crucial for accessing and interpreting data, analyzing medical images, and using technology to enhance patient care. Assessing digital literacy levels within healthcare is an issue that should not be overlooked, as technology plays an increasingly important role in both clinical work and research. It is noted that the digital literacy levels of nursing students vary globally, and there is limited research on the factors that influence these levels. Therefore, academics should prioritize this concept and invest in further research and educational initiatives to improve digital literacy.

Key Words

Digital literacy • Management • Nursing

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Introduction

Technological advances have driven global development in an unprecedented manner over the past two decades, leading to significant growth in access and connectivity for billions of people (ITU, 2020). Worldwide, 2.5 billion people own smartphones, and four billion people use social media (Taylor, 2019; Smart Insights, 2024). A study conducted in Japan found that despite 100% smartphone and personal computer ownership among university students, these devices are not being used to their full potential (Cote & Milliner, 2016). Digital literacy requires not only the ability to use technology at a social level, but also the capacity to analyze and integrate digital information (Margaryan, 2011). Buckingham (2015) argues that “digital literacy is not a simple concept, and the ability to use computers and digital tools at a basic level is not sufficient to achieve digital literacy.” Although digital technologies, particularly social media, are now ubiquitous, linking their ubiquity to effective usage remains a challenge (Cohen & Hewitt, 2019). It has been emphasized that exposure to digital technologies does not automatically equate to digital literacy (Reid et al., 2023).

Digital literacy was defined by Paul Gilster in 1997 as “the ability to understand and use information in a variety of formats from a wide range of sources when presented through computers” (Gilster, 1997). The World Health Organization’s “eHealth Strategy and Action Plan 2012-2017” emphasizes digital literacy as a key element in ensuring quality care, promoting health, and preventing disease, as it guarantees better access to education and information in an equitable manner (Alonso Galbán, 2019). Widespread internet access, and in particular, the availability of smartphones and other mobile devices since around 2009, have significantly contributed to the digitalization of health (Taj et al., 2019). The concept of digital literacy is becoming increasingly prevalent in the 21st century. Growing demands from the labor market for digitally literate individuals have prompted targeted interventions and innovations to equip the future workforce with digital skills. However, despite these efforts, the digital skills gap remains a global challenge (Reddy, 2023).

Adoption of digital tools and technologies in healthcare has not been widespread in many countries, including Australia, Europe, and the US (Honeyman, 2020; Islam, 2019; Health, 2021; Lomazzi, 2014). Poor digital health literacy has been identified as the most common barrier to the implementation of digital health services (Health, 2021). While interdisciplinary capabilities in digital innovation are being actively developed in other professions, nursing education has largely remained at the exploratory stage in cultivating expertise in digital technology (Cheng, 2024). A digitally enabled profession ensures citizens receive the highest quality of healthcare. The UK Department for Business, Innovation and Skills, along with the Department for Culture, Media and Sport, asserts that maximizing the benefits of digital tools in patient care will improve not only patient outcomes but also staff experiences, thereby “achieving better outcomes for patients” according to 2016 data (Booth et al., 2021). In 2016, the Royal College of Nursing (RCN) Congress emphasized that nurses should become ‘e-nurses’ who can effectively utilize technology to benefit patients (RCN, 2018). According to Pravikoff (2006), digital literacy is as crucial as evidence-based practice, and the development and maintenance of digital literacy is a lifelong professional responsibility (Stombaugh et al., 2013; Pravikoff, 2006). Assessing digital literacy levels within healthcare is an issue that should not be overlooked, as digital literacy and technologies are playing an increasingly vital role in clinical practice and research (Aydımlar & Mavi, 2024).

The Concept of Digital Literacy

The term digital literacy was first defined by Paul Gilster in 1997 (Gilster, 1997). In 2011, the American Library Association (ALA) further refined the definition, describing it as "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (Techataweewan, 2018). Digital literacy encompasses the management of information, digital skills, ethical awareness, and the effective and efficient use of technology for learning. It involves not only knowledge and technical skills but also the attitudes towards using digital technology and devices—such as smartphones, tablets, laptops, and PCs—intelligently for collaboration, communication, support, and expression (Polizzi, 2020; Tejedor, 2020).

In the Cambridge Dictionary (2004), literacy is defined as the ability to read and write. Digital literacy, however, is a concept that has gained prominence in the digital age. The Joint Information Systems Committee (JISC, 2014) defines it as the acquisition of foundational digital skills that enable individuals to live, learn, and work in a digital society. The committee emphasizes the importance of practical digital competencies and behaviors developed through digital literacy skills. Similarly, the American Library Association (ALAIR, 2011) describes digital literacy as the capacity to use technology to access information.

The London School of Economics offers another perspective, defining digital literacy as the opportunity for individuals to engage with digital platforms and interact within them. This definition introduces a social dimension to digital literacy, outlining it as a set of skills that involves using digital devices, communication tools, and networks to access, manage, and evaluate information (Nascimbeni & Vosloo, 2019). The Digital Literacy Across the Curriculum handbook by British Futurelab (Hague & Payton, 2010) describes it as having access to a wide range of practices and cultural resources that one can apply to digital tools.

A similarly expansive definition is provided by the European Information Society (Martin, 2005), which describes digital literacy as the awareness, attitude, and ability of individuals to use digital tools and facilities appropriately. This includes the ability to identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources, create new knowledge, produce media expressions, and communicate with others. Both definitions highlight the importance of creating meaning and communicating effectively with digital tools, with the latter definition placing additional emphasis on the processes of searching, evaluating, and synthesizing information from digital sources. The Organization for Economic Cooperation and Development (OECD, 2018) predicts that as society progresses, the importance of digital literacy will continue to grow, as future conditions will be markedly different from those of today.

Digital Literacy in Türkiye

The use of information technologies in Türkiye has been steadily increasing. According to data from Turkstat (2023), internet access and usage rates in Turkey have risen significantly over the past decade. Specifically, household internet access has increased from 47% to 95.5%, while individual internet usage has grown from 47% to 87.1% in 2023 (Figure 1).

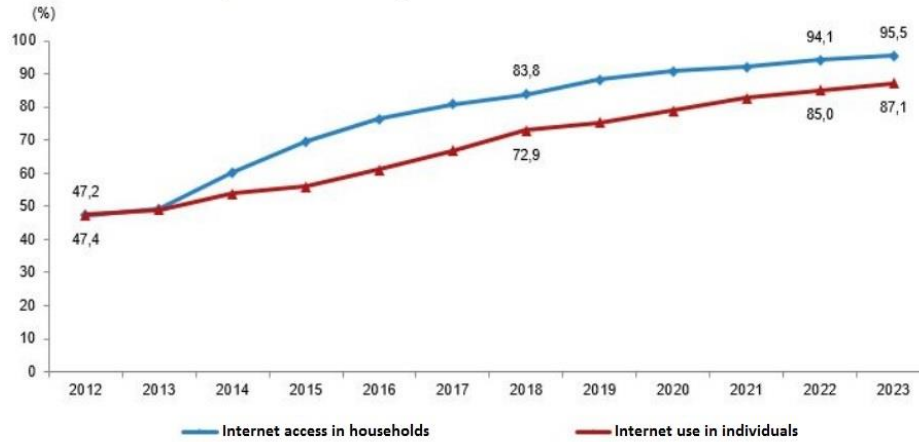


Figure 1. Internet access and usage rate 2012-2023 (Turkstat, 2023)

Although internet access and usage rates in Turkey have increased significantly over the past decade, the fact that the level of digital literacy has not experienced a similar rise poses significant risks. According to the European Statistical Office (Eurostat, 2023), Turkey ranked 30th out of 32 countries in terms of information and data literacy, as well as basic digital skills (including communication and collaboration, security, and problem-solving skills) (Figure 2).

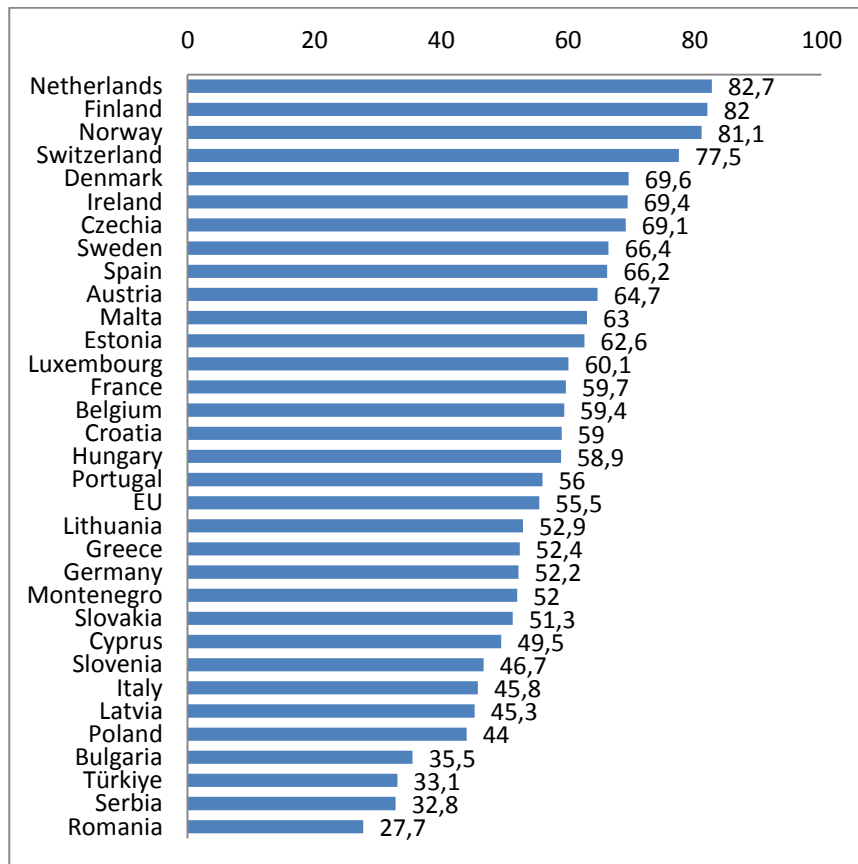


Figure 2. Digital skills level of individuals (Eurostat, 2023)

Statistical findings highlight the significance of digital skills and digital literacy in Turkey. An analysis of postgraduate studies on digital literacy in Turkey reveals that the first study was conducted in 2015, with a total of 149 studies completed to date (Table 1). Among these studies, four theses were conducted in the field of nursing and eight in the field of health. Over the years, the number of theses focused on digital literacy has shown a notable increase. Furthermore, there are currently 105 ongoing studies, including two in nursing and four in health (Thesis Center, 2024).

Table 1. Graduate theses on digital literacy

Completed Theses	Nursing	Health	Other	Total
Master's Degree	4	5	128	137
PhD	0	3	9	12
2015 year	-	-	1	1
2016 year	-	-	-	0
2017 year	-	-	1	1
2018 year	-	1	2	3
2019 year	-	-	16	16
2020 year	-	-	9	9
2021 year	-	-	20	20
2022 year	-	3	40	43
2023 year	4	3	34	41
2024 year	-	1	14	15
Total	4	8	137	149

Thesis in Progress	Nursing	Health	Other	Total
Master's Degree	1	3	78	82
PhD	1	1	21	23
Total	2	4	99	105

Source: Thesis Center (2024)

In Turkey, various measurement tools have been developed or adapted to assess the digital literacy levels of individuals. Some of these tools are designed for specific age groups or occupational categories, while others are applicable to the general population. The names of these measurement tools include the 21st Century Digital Literacy Skills Scale (Kalaycı, 2023), the Digital Literacy Scale (Hamutoğlu et al., 2017), the Digital Literacy Scale (Bayrakcı & Narmanlıoğlu, 2021), the Adult Digital Literacy Scale (Nabiyeva et al., 2022), and the Digital Literacy Scale (Üstündağ et al., 2017).

The Importance of Digital Literacy in Nursing

In the era of the fifth industrial revolution, possessing digital literacy and continually improving with each technological advancement has become essential (Polizzi, 2020; Tejedor, 2020). Technological innovations have influenced the work life of employees across all sectors, including the healthcare sector (Eden et al., 2019). Given the digital advancements in healthcare, the importance of integrating digital literacy into education has been emphasized (Behrends & Paulmann, 2021). Workplace requirements now demand applicable technological knowledge, and employees must continuously use relevant technologies while updating their digital skills (Peromingo & Pierson, 2018). The infrastructures in healthcare are rapidly digitalizing, resulting in a significant

improvement in the quality of healthcare services. Digital literacy is essential for accessing and interpreting data, analyzing medical images, and utilizing technology to enhance patient care (Krupinski, 2015). However, nurses' informatics competencies are reported to be below "average" (Hwang & Park, 2011).

Globally, there is a growing call for nurses to be trained in digital competence in order to work effectively in technology-mediated healthcare settings (Cummings et al., 2016; Harerimana et al., 2022a; Honey et al., 2020; Veikkolainen et al., 2023). Digital literacy skills should be incorporated into the undergraduate nursing curriculum, and National Nursing Digital Literacy competencies for entry into practice as registered nurses should be developed and tailored to individual jurisdictions (Reid et al., 2023). Digital literacy plays a critical role in understanding the ethical implications and potential risks of using technology in healthcare (McBride, 2018). Employees with high digital literacy are more aware of online privacy issues, such as data protection, security breaches, information security, and the ability to search and interpret information (Park, 2013; Weinberger et al., 2017). Additionally, it is predicted that digital technologies will play a crucial role in the future in facilitating disease prevention and health promotion (De Santis et al., 2021). Evidence suggests that the nursing workforce will struggle to keep pace with these developments, and substantial investments are needed to enhance digital capabilities (Peltonen et al., 2019). Poor digital skills and limited digital literacy are critical factors contributing to this issue (Terry et al., 2019).

Healthcare services in the third millennium are predominantly delivered through systems that incorporate technological devices and services. However, to ensure the effective delivery of digital healthcare services, users must be digitally literate, meaning they need to be capable of using technology purposefully (Campanozzi, 2023). The infrastructure in healthcare is rapidly becoming digitalized, leading to significant improvements in the quality of health services. Digital literacy is essential for accessing and interpreting data, analyzing medical images, and leveraging technology to enhance patient care (Krupinski, 2015). According to Kleib and Nagle (2018), digital skills in technology increase with the level of education among nurses. Additionally, nursing experience, alongside age and qualifications, influences IT competence. Increased clinical experience is linked to a higher likelihood of utilizing technology at the point of care, and is predicted to have a positive impact on digital literacy (Hwang and Park, 2011; Wei-Lan et al., 2013).

Research on Digital Literacy in Nursing

Digital literacy is a concept that has been increasingly studied in relation to nursing students in the literature. Jeon and Kim (2022) explored the relationship between learning attitudes, E-health literacy, digital literacy, and self-efficacy among Korean nursing students. The study found a positive correlation between digital literacy and self-efficacy.

Kuek and Hakkennes (2019) investigated the digital literacy levels and attitudes towards information systems among healthcare personnel in Australia. The study revealed that participants were generally confident and exhibited positive attitudes toward information systems. Additionally, the study identified that the digital literacy levels of staff aged 50 and older were lower, and suggested improvements in this area.

Harerimana et al. (2022b) conducted a cross-sectional study on the digital literacy of nursing students. The authors noted that sufficient digital literacy among nursing students positively influences their ability to perform electronic documentation, engage in communication and collaboration, and search for evidence that supports the quality of patient care.

Erbir (2021) investigated the digital literacy levels of nurses in relation to demographic characteristics. The study found that digital literacy levels were significantly higher among younger nurses, single nurses, those with postgraduate education, and those who had recently started their careers compared to other groups.

Kars-Fertelli and Kücükballı (2023) examined the relationship between digital literacy levels and counseling skills among nursing students in Turkey. The study revealed that nursing students had high levels of digital literacy. Furthermore, a positive, moderate correlation was found between students' digital literacy levels and their counseling skill scores.

Erdar et al. (2023) examined the impact of technical, cognitive, and socio-emotional factors on digital literacy among nursing students. The study identified that internet self-efficacy, online information search strategies, and online privacy concerns were positive predictors of digital literacy, while social media use was found to be a negative predictor.

Conclusion and Recommendations

The COVID-19 pandemic has significantly contributed to the global development of new technologies and has accelerated the digitalization of various aspects of daily life (Zeeb and Pigeot, 2020). Digital technologies have demonstrated considerable potential for innovation, particularly in the areas of individual health promotion, the use of health apps for prevention and early disease diagnosis, as well as health education (Dadaczynski, 2018). As a result, it is anticipated that digital technologies will increasingly influence health-related decisions in the future (Odone, 2019).

The incorporation of technology into nursing practice requires a solid foundation in digital literacy (Reid et al., 2023). The National Nursing and Midwifery Digital Health Capability Framework emphasizes the integration of digital literacy across nursing and other healthcare disciplines through five key domains: digital professionalism, leadership and advocacy, data and information quality, information-supported care, and technology. This approach will empower future healthcare professionals to provide safe, high-quality, and person-centered care that is well-connected and supported by technology (Williamson et al., 2020).

Holt et al. (2020) emphasized that nursing students worldwide exhibit varying levels of digital literacy, and there is limited understanding of the factors influencing these levels. Consequently, it is crucial for academics to be adequately trained and upskilled in educating nursing students, equipping them with the essential knowledge and digital literacy skills necessary to work in a digitally advanced clinical environment. It is equally important for education providers to support nursing students in becoming proficient in nursing informatics, thus preparing them for the rapidly digitizing healthcare landscape (Cummings et al., 2016).

The ongoing expansion of technology use in patient care will persist, necessitating that nurses are prepared to effectively embrace the digital health environment. To make this expectation realistic, nurses must be actively involved in the development of systems, platforms, and devices used at the point of care, and provided with sufficient time and resources to implement them effectively. Building digital capability in nurses will require the adoption of a wide array of strategies and the involvement of all relevant stakeholders, including nurses, employers, managers, and policymakers. Drawing upon the synthesis of literature on the integration of digital capability in nurses' workplaces, we propose practice, policy, and educational programs aimed at enhancing nurses' ability to utilize both existing and emerging clinical care technologies. It is recommended that further research be conducted to explore nurses' knowledge and attitudes toward next-generation technology in the workplace.

In line with the aforementioned information, the following recommendations are proposed:

- Assign trainers and mentors to support the development of digital literacy among nurses.
- Encourage continuous professional development programs aimed at enhancing digital literacy in nurses.
- Ensure the provision of the necessary infrastructure to allow nurses to explore and practice digital platforms in care delivery.
- Develop a comprehensive implementation strategy, including stakeholder engagement and a well-defined timeline for the adoption of new technologies.
- Establish clear guidelines on the confidentiality and privacy of patient information.
- Provide digital services, including help and support, to assist nurses in troubleshooting and resolving usability, technical, and reliability issues promptly.
- Promote the widespread use of electronic medical records as a means of enhancing the quality and safety of care.
- Increase awareness of the importance of digital literacy within the profession to foster its development and contribute to the ongoing progress of nursing practice.

Ethical Approval

All scientific and ethical guidelines were strictly adhered to throughout the study. All data and information utilized in the study were properly cited, and the study complied with the standards set by the Committee on Publication Ethics (COPE).

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