RESEARCH ARTICLE

THE NEW SOCIAL GAP OF THE 21ST CENTURY DIGITAL ILLITERACY

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ARTICLE INFO	ABSTRACT
	Over the past four decades, society has undergone a profound transformation, largely driven by the democratization of technology. This process has not only reshaped the technological infrastructure but has also significantly altered social, educational, and cultural landscapes. The introduction of personal computers (PCs) into homes and educational settings during the 1980s represents a key milestone in this evolution. By the late 1980s and early 1990s, the emergence of market players such as Commodore, Sinclair, and Apple, coupled with the widespread availability of clone computers, facilitated the penetration of computing technology into lower educational levels. This expansion was strongly supported by public policies, particularly in Europe and North America. The turn of the 21st century, marked by the rapid expansion of the Internet, further accelerated these shifts, fundamentally redefining the way societies engage with education and technology. However, while technological progress has opened new opportunities, it has also deepened the digital divide, creating new forms of social exclusion predicated on unequal access to and effective use of Information and Communication Technologies (ICT). Addressing this growing digital divide remains a critical challenge for fostering equitable inclusion in the digital age, ensuring that technological advancements benefit all segments of the population rather than perpetuating or widening pre-existing inequalities.

INTRODUCTION

In the past four decades, society has undergone a profound global transformation, commonly referred to as the Technological or Digital Revolution. This process has not only reshaped technical infrastructures but also redefined social, educational, and cultural dynamics on an unprecedented scale. One of the key milestones of this revolution was the development and widespread adoption of personal computers (PCs) in the early 1980s. This marked a paradigm shift as technology moved beyond academic and research environments into homes, businesses, and higher educational institutions, particularly in universities (Gorski, 2019). This technological transition not only democratized access to computational tools but also paved the way for a new era characterized by the massive digitization of knowledge and information (Selwyn, 2016). In the late 1980s and early 1990s, new market entrants such as Commodore, Sinclair, and Apple, alongside the proliferation of clone computers, accelerated the diffusion of computing technologies into lower educational levels (Roser & Ritchie, 2018). This expansion was supported by educational policies and programs promoted by public administrations, particularly in Europe and North America.

These initiatives not only encouraged the integration of technology in classrooms but also aimed to prepare future generations for an increasingly digitalized world (Selwyn, 2011). By the late 20th and early 21st centuries, custom software development and digital content creation experienced exponential growth, largely driven by the democratization of another key technological segment: the Internet. The web's expansion not only broadened access to information but also catalyzed a redefinition of social and educational dynamics, transferring pre-existing challenges into a society where technology became a central axis for change (Van Deursen & Helsper, 2015). In this context, digital literacy and technological competence emerged as fundamental skills for effective participation in contemporary society (Livingstone & Helsper, 2007). However, the rapid acceleration of these changes has also intensified social inequalities, revealing an increasingly difficult-to-overcome educational and skills gap. This shift has redefined the concept of "illiteracy," which traditionally referred to the lack of basic reading and writing abilities. Today, illiteracy encompasses the degree to which individuals acquire and apply technological skills, particularly in the context of Information and Communication Technologies (ICT) (Ragnedda & Muschert, 2013).

This conceptual evolution has resulted in the emergence of a new form of social exclusion: the digital divide. Whereas educational inequalities in the past were primarily related to access to formal education, in the digital age, disparities manifest through unequal access to ICT and the ability to use it effectively. The digital divide is especially acute among populations with limited access to these technologies, a challenge that is even more severe in resource-constrained countries (Helsper, 2021). The lack of access to ICT not only perpetuates existing inequalities but also creates new forms of exclusion that impact both individual and collective development, limiting educational, employment, and social opportunities (Hargittai & Hsieh, 2013). Traditional literacy, once focused solely on reading and writing skills, has evolved significantly in recent decades, with the advent of new technologies permeating all sectors of society. This evolution has led to the identification of four new forms of literacy: Audiovisual Literacy, Technological (or Digital) Literacy, Information Literacy, and Multiliteracy. Each form addresses specific competencies that respond to the demands of contemporary society across different sectors.

Audiovisual Literacy aims to equip students not only with the ability to analyze and produce audiovisual content but also with critical consumption skills for mass media products such as film, television, and advertising. This approach views images and their various forms as a "language" with distinct syntax and elements, recognizing their central role in modern communication (Aufderheide, 2007). While its implementation in schools began in the 1980s, integration has been uneven and inconsistent (Buckingham, 2003). Technological or Digital Literacy focuses on developing the skills necessary for the effective use of computing technologies, including personal computers, internet navigation, and the use of various software and hardware tools. This literacy is crucial in today's society, where digital competence is indispensable (Livingstone, 2004). Despite its introduction into educational systems in the 1990s, concurrent with the democratization of the Internet, the development of digital literacy remains a progressive process and a cornerstone of contemporary education (Selwyn, 2006). Information Literacy, which originated in the library sciences, emerged as a response to the increasing complexity of accessing diverse bibliographic sources housed in digital databases. Its main objective is to develop the ability to search, locate, evaluate, and effectively use information tailored to specific needs, as described by the American Library Association (2000). With the rise of vast, often overwhelming information sources, its relevance has grown exponentially. Lastly, Multiliteracy, initially formulated by the New London Group in the mid-1990s, advocates for preparing students for a multimodal society. It trains individuals to interact with various media and languages that define contemporary culture. Multiliteracy promotes an integrated approach to different forms of literacy, recognizing the necessity of developing a wide range of skills for effective participation in an increasingly diverse and technologically advanced society (Cope & Kalantzis, 2000).

Digital Literacy and Its Key Dimensions in Education: Digital literacy, promoted across various educational stages, encompasses several critical dimensions that shape the competencies developed in students and the skills they acquire. These dimensions are essential for preparing individuals to participate effectively and critically in an increasingly technology-mediated society. One of the core dimensions is the Instrumental Dimension, which focuses on the ability to access and search for information across diverse media, technologies, databases, and online libraries. This dimension emphasizes the practical skills necessary for using a wide array of media, including print, audiovisual, and digital formats, as noted by Bawden (2008). Its significance lies in equipping students with the tools required to navigate and manage the vast amount of information available in today's digital landscape (Martin & Grudziecki, 2006). The Cognitive Dimension pertains to the transformation of information into knowledge through the development of skills such as information selection, analysis, comparison, and application for problem-solving. This dimension is crucial in fostering critical thinking and enabling students to interpret and utilize information effectively (Kirkwood & Price, 2014). By enhancing these cognitive abilities, students are better prepared to meet the intellectual and creative demands of the information-rich society in which they operate. The Communicative Dimension addresses the ability to express and communicate effectively across multiple platforms and technological mediums, including the creation of textual, hypertextual, audiovisual, and multimedia documents. It also involves the ability to interact with peers through various social networks (Selwyn, 2011). Effective communication in a predominantly digital environment is fundamental for active and meaningful participation in both academic and social spheres (Alexander, 2008).

The Axiological Dimension emphasizes the ethical and democratic use of information, fostering the acquisition of critical and ethical attitudes and values in relation to information and communication. It is crucial that students not only become critical consumers of information but also responsible digital citizens (Hobbs, 2010). This dimension extends beyond technical skills, highlighting the importance of integrity and responsibility in the use of digital resources. Lastly, the Emotional Dimension involves the management of negative impulses and the development of emotional empathy, both toward oneself and others, within virtual environments. It promotes awareness of the emotional experiences that accompany the use of Information and Communication Technologies (ICT), as well as the cultivation of a balanced personality in the digital world (Rheingold, 2012). Developing emotional competencies is critical for maintaining mental health and well-being in what can often be an overwhelming and challenging digital environment.

Implementation of Multiliterate Educational Practice: Cope and Kalantzis (2009) assert that the implementation of educational practices aimed at enhancing multiliteracy relies on a set of pedagogical orientations aligned with key knowledge processes. These principles form a comprehensive pedagogical framework that facilitates the development of knowledge in an increasingly complex and multimodal educational context. Table 1 provides a comparative analysis of the pedagogical guidelines introduced in 1996 and the contemporary knowledge processes. This comparison underscores the evolution of educational practices toward a more dynamic, flexible, and context-responsive approach to learning, which better meets the diverse needs of 21st-century

learners. The shift reflects a growing emphasis on adaptability, critical thinking, and the integration of multiple literacies to prepare students for the multifaceted challenges of modern society.

Table 1. Principles for multi-alphabetic practice

Pedagogical guidelines	Knowledge processes
Situated Practice	Try …the known …the new
Open teaching	Conceptualize …by names …by theories
Critical milestone	Analyze …functionally …critically
Transformative practice	Apply …appropriately …creatively

METHODS

Study Context and Design: This study is situated within the broader discourse on the digital divide and its implications for social inclusion and educational equity in the context of the ongoing Technological Revolution. While the democratization of technology has expanded access to information and educational resources, it has also intensified existing disparities, particularly among populations with limited access to Information and Communication Technologies (ICT) (DiMaggio & Hargittai, 2001; Warschauer, 2004). The digital shift has not only transformed social and educational frameworks but has also engendered new forms of exclusion that require in-depth analysis (Selwyn, 2016). The research presented follows a quantitative, exploratory design, with an emphasis on data collection and analysis to identify patterns of ICT access and usage across various populations. Surveys were administered to students from diverse educational settings, ranging from Basic Vocational Training to undergraduate university programs, including participants from workshop schools and non-formal training initiatives. This methodological approach enables a comprehensive examination of contemporary educational dynamics and the persistent inequalities in digital access and literacy (Margaryan, Littlejohn, & Vojt, 2011). The sample comprised 1,200 students of varying genders from public educational institutions across multiple regions of Spain. A stratified sampling method was employed to ensure representation across different levels of the Spanish education system, including Basic Vocational Training, Intermediate and Higher-Level Training Cycles, and undergraduate university students, as well as workshop school participants. This stratification allows the data to capture a broad spectrum of educational and socioeconomic backgrounds, which is essential for diagnosing the digital divide induced by ICT disparities (OECD, 2020).

Data collection involved a structured questionnaire designed to gather information on ICT access, usage, literacy skills, and digital competencies. The survey included closed-ended questions and Likert scales to assess the frequency and efficacy of digital technology use, along with participants' perceptions of their digital literacy levels. Additional demographic variables such as age, gender, educational level, and socioeconomic status were included to explore how these factors influence the digital divide (Hargittai, 2018; Van Deursen & van Dijk, 2014). The data were collected in the first half of 2023, using digital formats to enhance accessibility and flexibility for participants. All respondents provided informed consent before participating, and their responses were kept confidential. Additionally, qualitative interviews were conducted with a subset of participants to gain deeper insights into their experiences and challenges with ICT access and usage (Zhao & Frank, 2003). Furthermore, data were curated from sources such as the European Union and UNESCO to compare different methodologies and reported outcomes. The collected data were analyzed using both descriptive and inferential statistical techniques to identify patterns and relationships among the studied variables. Regression analyses were performed to assess how demographic factors influence ICT access and digital literacy, while cluster analyses were conducted to classify user profiles based on their digital competence and access to technology (Bertot, Jaeger, & Grimes, 2012). This approach allowed for a nuanced understanding of how inequalities in ICT access manifest across various educational contexts and provided insight into strategies for reducing the digital divide and promoting greater social inclusion (Warschauer, 2004). The study acknowledges several limitations. The data, collected in early 2023, may not fully capture current trends in ICT access and usage due to the rapid pace of technological advancement and potential shifts in educational policies (Gunkel, 2019). Moreover, the qualitative interviews were limited to a subset of participants, which may affect the representativeness of the qualitative findings. While these interviews provide valuable insights, they may not reflect the full diversity of experiences and challenges associated with ICT access (Warschauer, 2004).

Additionally, the statistical techniques employed, such as regression and cluster analyses, have inherent limitations in capturing the full complexity of interactions between demographic variables and digital competencies. Although these analyses offer important insights, they cannot fully account for the contextual and personal factors that contribute to the digital divide (van Dijk, 2005). Despite these constraints, the study provides a robust foundation for understanding digital inequalities in educational contexts. The identified limitations present opportunities for future research to explore these issues in greater depth and across broader settings.

RESULTS

This study presents an analysis of the shifting conceptualization of the term "illiteracy" and explores the broader social and educational implications of this transformation in the context of rapid technological change. Specifically, it investigates the impact of the evolving definition of literacy on society and the anticipated challenges and opportunities it presents for the near future. The research has focused on both the social and educational consequences of this emergent form of the digital divide, as well as the potential political and educational interventions necessary to mitigate its effects. The findings indicate the persistent existence of a significant Digital Divide at a global level, exacerbated by unequal access to Information and

Communication Technologies (ICT). This divide is reflected in literacy index data, which provides a stark contrast between regions and countries. As illustrated in Figure 1, the average literacy rates across Europe highlight the disparities in digital competencies within the continent. Figure 2 further disaggregates this data, displaying the variations in literacy levels among individual European nations. These figures underscore the uneven progress in digital literacy development and suggest that certain countries are more vulnerable to the impacts of the digital divide than others. The data reveals that while technological advancements have created new opportunities for learning and information access, they have also introduced new forms of exclusion, particularly for individuals in lower socioeconomic brackets or those residing in areas with limited infrastructure. In many cases, digital illiteracy perpetuates existing social and educational inequalities, creating a feedback loop that hinders efforts toward greater inclusion.
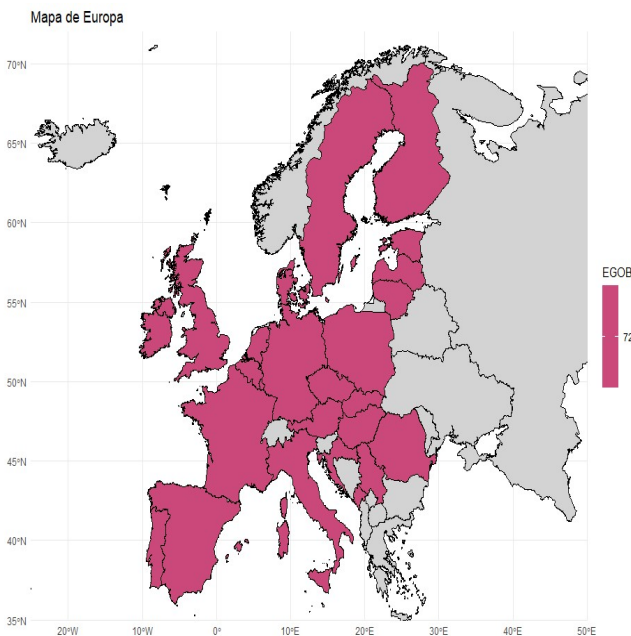
Moreover, the findings suggest that the concept of literacy is no longer confined to traditional reading and writing skills but now encompasses digital competencies such as the ability to navigate, critically assess, and create digital content. This expanded definition of literacy is essential for active participation in the modern information society, yet access to the necessary tools and education remains uneven. The study also highlights the need for targeted political and educational interventions. Policymakers and educators must focus on addressing the root causes of the digital divide by improving access to technology and providing the necessary training for developing digital literacy skills. Without such interventions, the risk of further marginalization of vulnerable groups is likely to increase, leading to more pronounced disparities in educational and social outcomes.
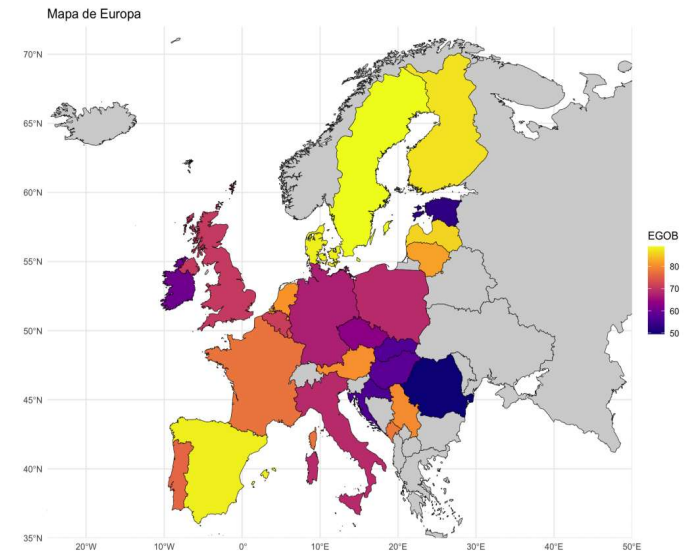
Use: The Figure shows the European average vs. ICT management degree value (EGOB) for each of the countries involved in the study. Source: Own elaboration (2024) based on UNESCO data (2023)

Figure 1. Digital literacy in Europe in 2023

Use: The Figure shows the European average vs. ICT management degree value (EGOB) for each of the countries involved in the study. Source: Own elaboration (2024) based on UNESCO data (2023)
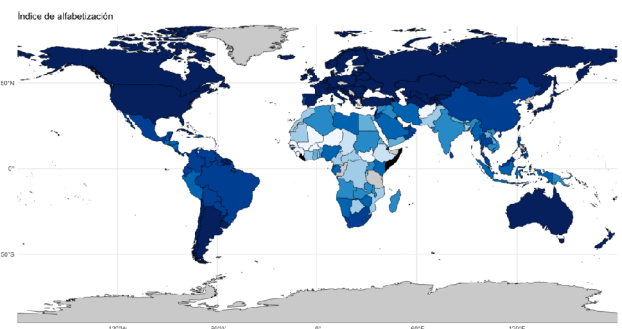
Figure 2. Digital literacy in Europe by country in 2023

Far from suggesting that the data represent merely regional or isolated phenomena, it is crucial to emphasize that, given the global nature of Information and Communication Technologies (ICT) in terms of their impact and usage, the Digital Divide manifests at a global scale, as evidenced by Figure 3.

**Figure 3. Literacy rate by country**

Use: The index values correspond respectively to 0=No data reported, 1=values less than 35%, 2=35-50% 3=50-60%,4=60-70%,5=70-80% ,6=80-90%,7=90-97% and 8 values greater than 97%. Source: Own elaboration (2024) using RStudio based on UNESCO data.

This figure illustrates that the Digital Divide is more pronounced in intertropical countries in Africa and Asia, while it is less visible in countries situated at northern and southern latitudes, respectively. Spain is not exempt from the effects of globalization, and consequently, it also experiences a Digital Divide. This is evidenced by Figures 4 and 5, which analyze the impact of Information and Communication Technologies (ICT) on the skills acquired by students across different communities and provinces.
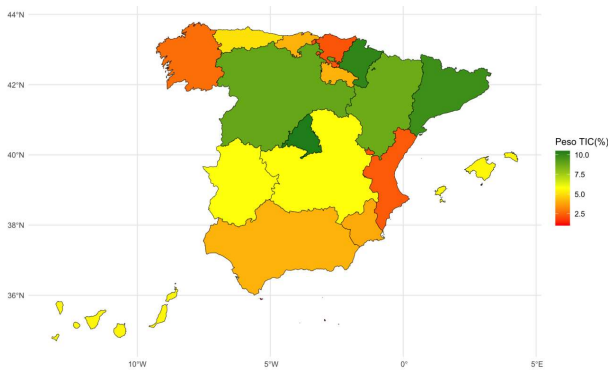
Source: Data taken from COTEC-Social Security. Own elaboration (2024)

Figure 5. Weight of ICT vs. Autonomous Communities of Spain
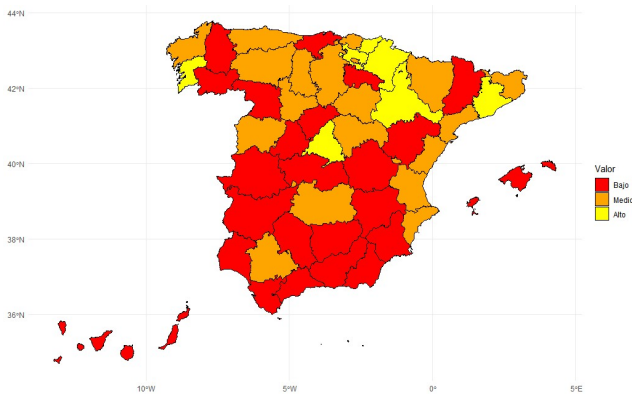
Source: Data taken from COTEC-Social Security. Own elaboration (2024)

**Figure 6. Weight of ICT vs. Provinces of Spain**

Acquisition of Skills in Digital Literacy: The acquisition of digital literacy skills among the students participating in this study is crucial for their successful integration into an increasingly digitalized environment. In programs facilitated by local administrations, approximately 75% of the training is specifically designed to develop practical skills in managing and using office devices and software. This training encompasses not only basic office applications and internet navigation tools but also the use of advanced file management applications, which are essential for functioning effectively in modern administrative and professional settings (Van Deursen & Van Dijk, 2014). The emphasis on digital literacy addresses the urgent need to equip citizens with the necessary skills to interact effectively with digital technologies, which are omnipresent in daily life and work environments. Research has demonstrated that proficiency in using and understanding digital technologies is a critical factor for employability and active participation in contemporary society. This underscores the importance of these competencies in reducing the existing digital divide (Eshet-Alkalai, 2004). At the European level, inequalities manifest through three key technological indicators. The first indicator pertains to the human capital that engages with new technologies, encompassing aspects such as access, knowledge, and performance. The second indicator addresses the connectivity available in various usage contexts, including home, work, and educational settings. The third indicator reflects the extent to which ICTs are integrated into users' lives, along with the services accessed through their use. These indicators are illustrated in Figure 7, presented as a cumulative diagram.
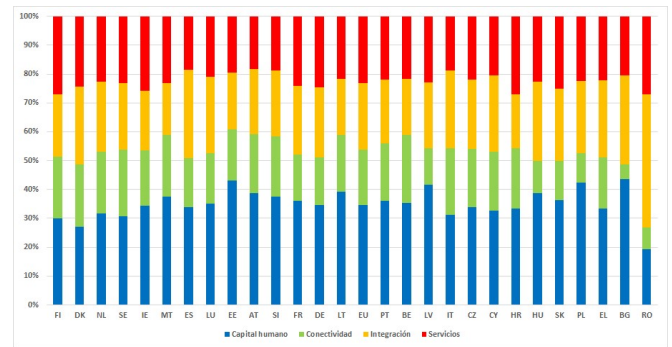
Source: Nominalia taken from Escueladeinternet.com. Own Preparation (2024)

Figure 7. Analysis of the digital divide in Europe

The analysis of participants' results indicates that students have acquired varying degrees of the skills necessary to manage digital technologies effectively. This learning experience has not only facilitated their integration into the labor market but has also enhanced their ability to interact with public administrations, which increasingly rely on digital platforms for service delivery and procedural management (Martin, 2008). Moreover, the acquisition of these skills contributes to achieving social equity by ensuring that a greater number of citizens have access to essential information and technological resources in the 21st century, a period characterized by significant technological advancements (Van Dijk, 2020).
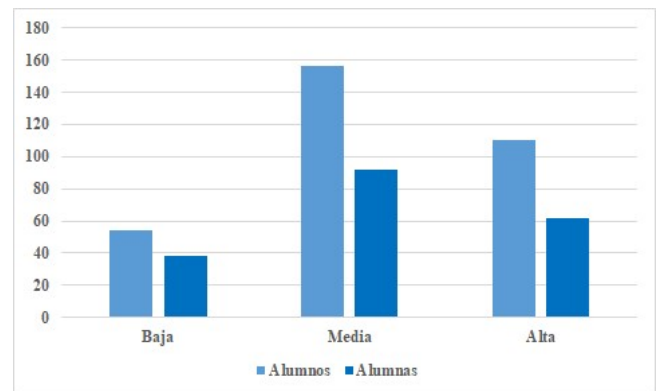
Fountain: Own elaboration (2024)

Figure 8. Distribution of degree of acquisition of skills vs. gender

DISCUSSION AND CONCLUSION

The statistical analysis conducted on the sample of students interning in public administration has yielded significant findings regarding digital competencies in the current context. By employing inferential and descriptive statistical techniques, we identified critical gaps, particularly in relation to sociodemographic variables such as age, educational level, and gender. These results align with previous research indicating that inequalities in access to and use of Information and Communication Technologies (ICT) remain a pressing challenge for digital inclusion policies (van Deursen & Helsper, 2015; Selwyn, 2004). One alarming finding is that despite ongoing efforts to integrate ICT into education, digital divides persist, hindering the full participation of specific groups in the digital society.

If these gaps are not effectively addressed, they are likely to perpetuate existing inequalities in both educational and employment contexts. The ability of individuals to interact effectively with public administrations through digital platforms is essential, not only for the efficiency of the system but also for ensuring the inclusion of all citizens in the democratic process (DiMaggio et al., 2004). This study has underscored the importance of considering the historical and social context when analyzing literacy. Factors such as educational policies, economic development, and the influence of religious institutions have played a significant role in shaping literacy levels over time. The findings highlight the necessity for an integrated approach that encompasses both traditional and digital dimensions of literacy, especially as technology becomes increasingly central to everyday life.

From the findings obtained in this study, the following key conclusions can be drawn:

- **Relevance of Digital Literacy**: Digital literacy has emerged as an essential component for social and labor inclusion, building upon traditional literacy. However, significant digital gaps persist, necessitating effective public policies to ensure equitable access to ICT.
- **Inequalities in Digital Skills**: Inequalities in digital skills, influenced by sociodemographic factors such as age, gender, and educational level, pose a crucial challenge. These inequalities not only limit access to digital opportunities but also perpetuate existing educational and employment disparities across different social classes and geographic regions within Spain.
- **Need for an Integrated Approach**: Understanding literacy levels in Spain requires an approach that considers both historical context and contemporary dynamics. Political, economic, and religious factors have significantly shaped literacy levels over time.
- **Implications for Public Policies**: The findings underscore the importance of developing educational policies that integrate both traditional and digital literacy, with a focus on reducing digital divides. Such policies must be inclusive and tailored to the needs of diverse demographic groups to promote a more equitable and digitally competent society.

The insights presented in this study aim to deepen the understanding of the challenges posed by the digital divide in contemporary society, offering perspectives on how educational and technological policies can be adapted to address these challenges effectively

Future Perspectives: The present study provides a nuanced understanding of the various dimensions of digital literacy and its implications in the current context. The results obtained highlight the need to develop public policies that not only address digital literacy but also recognize the complexity of the interactions between literacy, access to technology, and socioeconomic factors. The existence of persistent digital divides underscores the urgency of adopting inclusive and equitable approaches to education that consider the needs of different demographic groups, particularly those historically marginalized. Furthermore, it is suggested that future research delve deeper into the relationship between digital literacy and socioeconomic factors, exploring how these variables influence individuals' capacity to fully participate in an increasingly digital society. Understanding these interactions will allow for the development of more effective and innovative strategies that promote the reduction of the existing digital divide, thereby ensuring that technological advancement benefits all sectors of the population.

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