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FROM DIGITAL NATIVES TO AGILE LEARNERS: RETHINKING DIGITAL SKILLS AMONG GENERATION Z

Koen Hendrawan

Universitas Negeri Jakarta
koen.hendrawan@mhs.unj.ac.id

Mardi

Universitas Negeri Jakarta
mardi@unj.ac.id

Dewi Susita

Universitas Negeri Jakarta
dewisusita_man@unj.ac.id

ABSTRACT

This study explores the digital skills of Generation Z students through a qualitative lens, emphasizing the concept of agile digital skills as a multidimensional and adaptive competence. Drawing on in-depth interviews and focus group discussions with university students, the research investigates how young people understand, apply, and evaluate digital technologies in their academic and personal lives. The findings indicate that while students demonstrate strong operational proficiency with popular applications, they face significant challenges in theoretical knowledge and evaluative competences, particularly in critical assessment of online information. Moreover, social factors such as family background, gender, and prior learning experiences significantly shape the development of digital skills. By situating these findings within the frameworks of the second level digital divide and digital literacy theory, the study highlights the importance of cultivating agility in digital competence that is, the ability to adapt, transfer, and critically apply digital skills across diverse contexts. For higher education, this underscores the urgent need for curricula that integrate technical, conceptual, and evaluative components to promote critical digital citizenship, employability, and lifelong learning. Ultimately, digital literacy must be reframed not as a static skill set but as an evolving capacity for resilience and adaptation in the rapidly changing digital economy.

Keywords: *Agile digital skills, Digital literacy Second-level digital divide, Generation Z, Higher education.*

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INTRODUCTION

In the current digital economy, the possession of digital skills has become a fundamental requirement for individuals to participate effectively in education, work, and social life. The rapid diffusion of information and communication technologies (ICTs) has transformed not only the way people access and use information but also the nature of economic and social interactions (Hanandini, 2024; Chadwick et al., 2023). In this context, digital skills are increasingly recognized as a key driver of employability, social inclusion, and lifelong learning (Vuorikari et al., 2020; Ceschi et al., 2021). More recently, scholars have highlighted the importance of agile digital skills, which refer to the ability to adapt, learn, and reconfigure digital competences in response to fast changing technologies and environments (Nash, 2024). Such agility positions digital literacy not merely as a static competence but as a dynamic capability essential for success in the digital age.

Scholars emphasize that the digital divide has evolved from mere disparities in access to technology into deeper inequalities related to skills, usage, and outcomes (Imran, 2002; Loh & Chib, 2022). While infrastructure and access gaps have been gradually reduced in many countries, differences in digital literacy remain persistent and sometimes even intensify, creating what is often referred to as the second-level digital divide (Aissaoui, 2022). This divide is particularly evident among young people, who are often labeled as digital natives but do not always demonstrate the same level of competence across different dimensions of digital literacy (Gui & Argentin, 2011). From the perspective of agile digital skills, this gap raises concerns about whether youth can continuously adapt their digital practices to emerging technologies and new socio technical contexts.

According to Gui and Argentin (2011), digital skills can be categorized into three main dimensions: theoretical knowledge (understanding how digital technologies work), operational skills (the ability to effectively use digital tools and platforms), and evaluative skills (the capacity to critically assess digital content). While younger generations tend to show proficiency in operational aspects, their performance in evaluative and theoretical dimensions is often limited, raising concerns about their readiness for the challenges of the digital economy (Jun et al., 2022). Integrating an agile perspective underscores that it is not enough for students to master existing tools; they must also develop the adaptability to transfer competences across different domains and to critically evaluate the implications of new digital environments.

Given these dynamics, the study of digital skills particularly agile digital skills is crucial not only for mapping existing inequalities but also for guiding educational policies and institutional interventions. Higher education institutions, in particular, play a strategic role in equipping students with comprehensive digital competences that go beyond technical knowhow, fostering critical, reflective, and adaptive use of digital technologies (Ng, 2012; Van Laar., et al 2020). This article aims to explore digital skills from a qualitative perspective, with particular attention to their agile dimension, focusing on how individuals understand, apply, and evaluate digital technologies in their everyday lives and learning environments.

While much of the existing research on digital skills relies on large-scale surveys and performance tests (Gui & Argentin, 2011), there remains a pressing need to understand how individuals subjectively experience, adapt, and negotiate digital technologies in their everyday lives. Quantitative studies provide valuable insights into patterns of inequality and statistical relationships, yet they often overlook the nuanced meanings and practices associated with digital engagement, particularly the adaptive strategies that define agile digital skills (McGuinness & Wellborn, 2025).

This article therefore seeks to address this gap by exploring digital skills understood here as dynamic and agile competences from a qualitative research perspective. Specifically, the study aims to capture how young people conceptualize their own digital abilities, how they adapt to the challenges of navigating fast evolving digital environments, and how they make sense of the theoretical, operational, and evaluative dimensions of digital literacy in practice. By focusing on lived experiences rather than solely on measurable outcomes, the qualitative approach provides a richer understanding of the social, cultural, and adaptive dynamics that shape digital competence (Creswell & Poth, 2018).

The objectives of this article can be summarized as follows:

1. To investigate how young people understand and describe their digital skills, particularly in relation to Gui and Argentin (2011) three dimensional model of theoretical, operational, and evaluative competences, with an emphasis on their adaptive and agile qualities.
2. To explore the challenges and opportunities young individuals face in developing digital literacy, with special attention to the persistence of the second level digital divide and the demand for agile digital skills in rapidly changing technological contexts.
3. To identify the implications of these qualitative insights for educational practice and policy, especially regarding how schools and universities can design interventions that foster not only technical training but also adaptability, critical thinking, and reflective digital citizenship.

By adopting a qualitative approach, this article aims not only to complement existing quantitative findings but also to highlight the subjective, contextual, and cultural aspects of digital skills. Such an approach is crucial in the digital economy, where the meaning of being skilled is continuously evolving and where the agility to reconfigure digital competences has become a central determinant of employability and lifelong learning (Van Laar et al., 2020).

LITERATURE REVIEW

Concept of Digital Skills

The concept of digital skills has been widely debated in the academic literature, reflecting the evolving nature of digital technologies and their integration into everyday life. Early definitions often emphasized technical abilities related to the use of computers and the Internet, such as operating hardware and software, navigating web browsers, or performing basic online searches (Vercruyssen et al., 2023). In particular Bravo, M. C. M., et al (2021) developed a comprehensive framework that distinguished between operational skills (the ability to operate digital devices and applications), formal skills (the capacity to understand and manage digital environments), information skills (the competence to search, select, and process information), and strategic skills (the ability to use digital technologies to achieve specific personal or professional goals). This typology has been influential in positioning digital skills as a multidimensional construct extending far beyond simple technical proficiency.

Building on this perspective, Gui and Argentin (2011) proposed a threefold categorization of

digital skills: theoretical knowledge, operational skills, and evaluation skills. Theoretical knowledge refers to an individual's conceptual understanding of how digital technologies work, including the principles behind digital communication and information processing. Operational skills represent the practical ability to use digital tools and perform tasks efficiently, such as managing files, navigating websites, or utilizing productivity applications. Evaluation skills involve a more critical dimension, namely the capacity to assess the credibility, relevance, and reliability of digital content. Gui and Argentin's framework is particularly valuable as it integrates both functional and critical aspects of digital literacy, highlighting that competence requires not only the ability to use technology but also the ability to understand and evaluate it.

More recently, Van Laar., et al (2020) expanded the discussion by introducing a model of 21st-century digital skills based on a large-scale survey of working professionals. Their model identifies a set of interrelated competences, including technical skills, information management, communication, collaboration, creativity, critical thinking, and problem-solving. This broader approach reflects the recognition that digital skills are not merely individual abilities but also social and cognitive competences that enable individuals to function effectively in digitally mediated workplaces and societies. Importantly, the framework positions digital literacy as a crucial enabler of innovation, employability, and lifelong learning.

Taken together, these conceptualizations illustrate a shift from narrow technical definitions of digital skills toward more holistic understandings that encompass theoretical, operational, evaluative, and socio-cognitive dimensions. This evolution underscores the necessity of considering digital skills as dynamic, context-dependent, and adaptive in other words, as agile digital skills. Agile digital skills emphasize the individual's capacity to continuously update, reconfigure, and transfer competences in response to technological change and new social practices (Nash, 2024). For the purpose of this study, the definitions offered by Gui and Argentin (2011) and Van Laar., et al. (2020) provide a solid foundation to qualitatively explore digital literacy as a process of both competence acquisition and agile adaptation.

Dimensions of Digital Skills: Theoretical, Operational, and Evaluative

Digital skills are not a monolithic construct but rather encompass multiple dimensions that reflect different ways individuals interact with digital technologies. Gui and Argentin (2011), building on earlier frameworks of digital literacy, proposed three central dimensions: theoretical knowledge, operational skills, and evaluation skills. These dimensions offer a nuanced understanding of how digital competence develops and why disparities persist, even among populations often assumed to be digitally proficient.

1. Theoretical Knowledge

The first dimension, theoretical knowledge, refers to an individual's conceptual awareness of how digital technologies function. This includes understanding the logic of computer systems, the role of servers and networks, the principles of digital communication, and the processes underlying online information retrieval. Gui and Argentin (2011) argue that theoretical knowledge is essential for developing resilience when facing unfamiliar technological problems. Without a foundational understanding, users may be able to perform routine tasks but struggle to adapt when confronted with novel challenges. From an agile perspective, theoretical knowledge enhances adaptability, as it provides users with the mental models necessary to transfer existing competences into new technological contexts. Empirical studies show that gender differences often appear in this domain, with male students typically reporting higher confidence and performance in theoretical aspects of digital literacy (Christensen, 2023). However, these disparities are not absolute and may be mitigated by educational interventions that explicitly teach conceptual knowledge about digital environments (Hefter., et al 2022).

2. Operational Skills

Operational skills constitute the practical and functional dimension of digital literacy. They

encompass the ability to perform everyday digital tasks such as managing files, navigating websites, using productivity applications, or configuring basic settings on digital devices. This dimension is closely aligned with what Nyman, Bødker, and Jensen (2024) termed operational and formal skills basic competences that enable individuals to use computers and digital networks effectively. Gui and Argentin (2011) found that among high school students, operational skills were generally the strongest area of performance, reflecting the ubiquity of daily digital practices such as browsing, social networking, and multimedia use. However, while proficiency in operational tasks is widespread, these skills alone are insufficient for ensuring meaningful participation in the digital economy. As Van Laar., et al (2020) note, operational competence must be complemented by higher order skills such as critical thinking, collaboration, and problem solving. From an agile perspective, operational skills also require adaptability: it is not enough for students to master routine applications; they must also be capable of transferring these competences to new platforms, tools, and contexts. This form of operational agility is particularly vital in professional and academic environments, where digital ecosystems evolve rapidly and demand flexibility.

3. Evaluation Skills

Perhaps the most critical and challenging dimension is evaluation skills, which involve the capacity to assess the reliability, relevance, and credibility of digital information. Gui and Argentin (2011) reported that their sample of Italian high school students performed particularly poorly in this dimension, with even the highest-performing students struggling to critically evaluate online content. This finding aligns with other research showing that young people, despite being frequent Internet users, often lack advanced information literacy and critical awareness (Diepeveen & Pinet, 2022). Evaluation skills are vital not only for academic success but also for civic engagement and protection against misinformation in digital spaces. The ability to critically assess digital information has become a cornerstone of 21st-century literacy and an essential determinant of employability and active citizenship. Within the framework of agile digital skills, evaluative competence serves as the foundation for adaptability: students must be able to filter, question, and re-assess information in order to reconfigure their practices when technologies or knowledge domains shift. Without strong evaluative agility, young people risk remaining passive consumers of digital content rather than active, reflective participants in knowledge societies.

4. Synthesis of Dimensions

Taken together, these three dimensions demonstrate that digital literacy requires more than technical fluency. While operational skills may be widespread among young people, theoretical knowledge and evaluative competences remain unevenly distributed and more susceptible to social, cultural, and educational influences. This tripartite framework thus provides a valuable analytical lens for understanding both the strengths and vulnerabilities of digital natives in contemporary societies. Importantly, viewing these dimensions through the lens of agile digital skills reframes them as dynamic competences: operational, theoretical, and evaluative skills are not static achievements but adaptive capabilities that must be continuously updated and applied in new contexts.

Theoretical Framework

Second-Level Digital Divide Theory

The concept of the digital divide has evolved from its initial focus on disparities in access to technology toward a deeper understanding of inequalities in skills, usage, and outcomes. Diepeveen and Pinet (2022) introduced the notion of the second level digital divide, which emphasizes that even when access to digital devices and the Internet is nearly universal, significant inequalities remain in individual ability to use these resources effectively. These disparities in online skills are often shaped by socio demographic variables such as gender, socioeconomic status, and educational background (Szpakowicz, 2023). This perspective highlights that the digital divide is not merely a technological issue but a social one, as unequal

digital skills lead to unequal opportunities in education, employment, and civic participation. Importantly, the second level digital divide also underscores the need for agile digital skills, since inequalities are not only about what skills individuals currently possess but also about their ability to adapt to emerging technologies and evolving digital demands.

Digital Literacy Frameworks

Building on the second-level digital divide, scholars have developed frameworks to conceptualize the multidimensional nature of digital literacy. Korovkin, Park, and Kaganer (2023) proposed a layered model consisting of operational, formal, information, and strategic skills, emphasizing that true digital competence goes beyond basic technical use to include the ability to process information critically and employ digital resources for achieving broader goals. Gui and Argentin (2011) further refined this perspective by categorizing digital skills into three dimensions:

1. Theoretical knowledge, conceptual understanding of how digital technologies function.
2. Operational skills, the ability to perform practical tasks with digital tools.
3. Evaluation skills, the competence to critically assess the credibility and relevance of digital content.

This tripartite model is particularly useful for analyzing young peoples digital competences, as it distinguishes between functional proficiency and critical engagement. When viewed through the lens of agile digital skills, these dimensions are not static abilities but dynamic capabilities they must be continuously updated, transferred, and reconfigured to meet new technological and social contexts.

Digital Skills in Relation to Employability, Learning, and Social Inclusion

Digital skills are increasingly recognized as a cornerstone for success in education, work, and social life. In the labor market, digital competence is considered a prerequisite for employability, with employers seeking graduates who not only master operational skills but also demonstrate creativity, problem-solving, adaptability, and critical thinking (Van Laar et al., 2020). In higher education, digital literacy plays a central role in supporting student learning, enabling access to resources, collaboration, and knowledge production (Ng, 2012).

Furthermore, digital skills are closely linked to social inclusion. Individuals who lack critical digital competences risk exclusion from important aspects of civic life, including participation in democratic processes and access to public services (Hefter et al., 2022). Conversely, strong and agile digital literacy fosters empowerment, allowing individuals to engage meaningfully with information and communication technologies in ways that enhance their personal, educational, and professional development. Agile competences ensure that individuals remain resilient in the face of rapid technological change, positioning digital literacy as both a tool for equity and a driver of lifelong learning.

In this study, the theoretical framework integrates the second level digital divide theory and digital literacy frameworks to examine how young people understand and experience their digital skills. By emphasizing their agile dimension, the framework situates digital competences within broader outcomes of employability, learning, and social inclusion, highlighting that digital literacy is not only a skill set but also a dynamic capability essential for thriving in contemporary society

METHODOLOGY

Research Design

This study adopts a qualitative research design aimed at exploring how university students understand, use, and evaluate digital technologies in their daily academic and personal contexts. Qualitative methods are particularly appropriate for this inquiry, as they allow for the capture of participants lived experiences and the meanings they attach to their digital practices (Creswell &

Poth, 2018). Data collection methods include in-depth interviews and focus group discussions (FGDs). In depth interviews provide rich, individual narratives, while FGDs encourage collective reflection and highlight shared or divergent perspectives among peers (Krueger & Casey, 2015). In line with the study focus on agile digital skills, the qualitative design emphasizes not only static competences but also the adaptive strategies students employ when confronted with new or evolving digital environments.

Participants

The participants of the study are Generation Z university students, born between the late 1990 and early 2010, who are often referred to as digital natives. They represent an important group for analysis, as their higher education experience coincides with the pervasive integration of digital technologies. A purposive sampling strategy is employed to recruit students from different academic disciplines and socioeconomic backgrounds, ensuring diversity in digital experiences and competences (Zhang, L., et al 2022). The expected sample size is approximately 30 participants, which is sufficient to achieve data saturation in qualitative research. This diversity enables the study to capture variations in not only skill levels but also in students capacity for digital agility, such as their ability to adapt to unfamiliar platforms or learning contexts.

Data Collection

Data are collected through semi-structured interview protocols and FGD guides that focus on the three dimensions of digital skills identified by Gui and Argentin (2011): theoretical knowledge, operational skills, and evaluation skills. In addition, the study probes students' adaptive strategies, for instance, how they respond to technological updates or the introduction of unfamiliar platforms. Questions include:

1. How do you usually learn to use new digital tools or platforms?
2. Can you describe a time when you struggled with digital technology and how you managed it?
3. How do you decide whether the information you find online is reliable?
4. When faced with a new digital tool, how do you adapt your approach compared to tools you already know?

Interviews last approximately 30–40 minutes, while FGDs involve 7–8 participants. All sessions are recorded (with participants' consent) and transcribed verbatim for analysis.

RESULT AND DISCUSSION

Theoretical Skills

The findings reveal that students theoretical understanding of digital technologies remains limited, even though they demonstrate confidence in routine digital practices. Many participants admitted that they could perform tasks such as using search engines or navigating applications but struggled to explain how these technologies function. For example, some students reported that they just follow tutorials or keep trying until it works, without a deeper comprehension of the processes behind digital communication, data storage, or algorithmic search results. This indicates a gap between practical ability and conceptual knowledge, suggesting that students may be vulnerable when facing new digital environments or complex technological challenges.

This result aligns with Gui and Argentin (2011), who emphasized that theoretical competences are the weakest among digital natives. Similarly, Nikou, S., et al (2005) argued that digital literacy requires more than hands-on skills, as conceptual awareness enables individuals to transfer existing knowledge to unfamiliar situations. Tham, J. C. K., et al (2021) also highlighted that without theoretical knowledge, young people risk becoming surface level users of technology, unable to critically reflect on its underlying mechanisms or broader social implications.

The implications of this finding point to the need for higher education institutions to provide stronger theoretical foundations in digital literacy curricula. Rather than assuming that students will acquire these competences informally, universities should incorporate explicit instruction on the logic of digital systems, data flows, and the principles of information retrieval. Embedding this theoretical dimension across disciplines would equip students with greater flexibility, adaptability, and resilience in the face of technological change. In doing so, higher education can ensure that students are not only consumers of technology but also informed and reflective users capable of engaging with digital systems at a deeper level.

Operational Skills

The findings indicate that students are generally highly proficient in operational skills, particularly in the use of popular applications and platforms. Most participants reported daily engagement with social media, messaging apps, and common productivity tools such as Microsoft Office and Google Workspace. They expressed confidence in performing routine tasks including file management, online communication, and multimedia sharing. This proficiency reflects the pervasiveness of digital technologies in their personal and academic lives, reinforcing the notion that Generation Z students are adept at navigating familiar digital environments.

However, the analysis also reveals that students' operational competences are narrowly focused on a limited range of popular applications, with little exposure to more advanced or specialized tools. Few participants reported familiarity with software for data analysis, digital collaboration platforms beyond classroom requirements, or emerging technologies relevant to professional contexts. This observation echoes earlier studies by Ng (2012), which found that while young people are confident users of everyday technologies, they often lack the breadth of digital literacy required for academic and professional demands. Van Laar et al. (2020) further argued that operational skills must be complemented by higher-order competences such as problem-solving, creativity, and critical thinking if they are to contribute meaningfully to employability in the digital economy.

From the perspective of agile digital skills, operational proficiency must be reconceptualized as operational agility: the capacity to transfer existing competences into new digital contexts and to adapt quickly to unfamiliar tools. Without this agility, students risk being confined to repetitive use of familiar platforms, limiting their ability to respond to technological innovation in academic and professional domains. The implications of this finding suggest that higher education curricula should move beyond reinforcing students' existing operational skills and instead focus on expanding their digital repertoires. By integrating training in academic and professional applications such as statistical analysis software, project management platforms, or discipline-specific digital tools, universities can help students cultivate adaptability alongside competence. Encouraging exploration beyond popular platforms will not only broaden operational literacy but also enhance students' readiness for dynamic and evolving digital environments.

Evaluative Skills

The findings reveal that students' evaluative competences remain weak, particularly in terms of critical literacy toward online information. While participants frequently use the Internet for academic assignments and problem solving, many admitted that they tend to trust the first result on Google or rely on well-known websites without questioning the credibility of the sources. Only a few students reported engaging in more advanced evaluative practices, such as cross-checking multiple sources, considering authorship, or examining potential biases in digital content. This pattern demonstrates that while operational proficiency is widespread, the ability to critically assess digital information is still underdeveloped.

These findings echo earlier research. Gui and Argentin (2011) identified evaluative skills as the weakest dimension of digital literacy among young people, despite their high exposure to online environments. Similarly, Tinmaz, H., et al (2022) showed that digital literacy requires

critical judgment as well as technical abilities, yet young people often lack the former. Diepeveen, S., & Pinet, M (2022) further emphasized that without strong evaluative competences, young users are vulnerable to misinformation, manipulation, and superficial engagement with online resources.

Within the lens of agile digital skills, evaluative competence is not just about assessing information quality but also about maintaining critical agility the ability to re-assess, recalibrate, and adapt evaluative strategies as digital contexts evolve. Students lacking this agility risk being passive consumers of information rather than active, reflective participants in knowledge societies. The implications of this finding highlight the urgent need for targeted interventions to strengthen students' critical digital literacy. Higher education should not only provide access to digital tools but also explicitly train students to evaluate the quality, credibility, and relevance of online information. Such interventions may include dedicated workshops, assignments requiring source verification, or the integration of media and information literacy into existing curricula. By cultivating evaluative agility, universities can prepare students to navigate misinformation and engage responsibly in dynamic digital societies.

Influencing Factors

The findings indicate that students digital competences, especially in the theoretical and evaluative dimensions, are shaped by several social and educational factors, including family background, gender, and learning experiences.

First, family background emerged as an important determinant of digital literacy. Students from families with higher levels of cultural and educational capital tended to demonstrate more advanced evaluative practices, such as questioning the credibility of online sources or verifying information across multiple platforms. This pattern supports Helsper, E (2021), who argued that digital inequalities are strongly mediated by offline socio-economic resources, as families with greater cultural assets often provide richer opportunities for learning and critical engagement.

Second, gender differences were also observed. Male students frequently expressed greater confidence in technical and theoretical aspects, while female students described themselves as more careful and reflective in online activities. However, this did not always translate into stronger evaluative outcomes. Such patterns are consistent with Zahedi, L., et al (2006), who found that gender plays a role not only in actual skill levels but also in self-perceptions of competence.

Finally, learning experiences in both formal and informal contexts had a significant influence. Students who had participated in structured digital literacy programs whether through coursework, workshops, or project based activities demonstrated comparatively higher critical awareness and evaluative skills. This aligns with Ng (2012) and Van Laar., et al (2020), who emphasized that educational interventions are essential for bridging the second-level digital divide and cultivating 21st-century competences.

From the standpoint of agile digital skills, these factors also shape students *capacity for adaptability*. Family resources can provide or constrain opportunities to experiment with diverse digital tools, gendered socialization may influence confidence in exploring new technologies, and prior learning experiences determine how flexibly students approach unfamiliar platforms. The implications of these findings suggest that digital literacy programs in higher education should not adopt a one size fits all approach. Instead, they must consider the socio psychological factors that shape students digital agility. By accounting for differences in family resources, gender dynamics, and prior learning experiences, universities can design more inclusive and adaptive interventions that promote equity in digital learning and empower diverse student populations to engage more critically and effectively with digital technologies.

CONCLUSION

Conclusion This study reaffirms that digital skills are an essential requirement in the digital economy, but it also demonstrates that competence must be understood in terms of agility

the capacity to adapt, transfer, and reconfigure skills across contexts. While Generation Z students display strong operational proficiency, their limited theoretical knowledge and weak evaluative practices reveal vulnerabilities in their ability to engage with unfamiliar technologies and critically assess digital information. The dimensions of theoretical, operational, and evaluative skills therefore should not be viewed as static abilities but as interconnected domains that support digital agility and resilience in dynamic technological environments.

For higher education and policy, this implies the need for curricula that foster not only technical competence but also conceptual understanding and critical digital agility. Strengthening evaluative agility is particularly urgent to prepare students against misinformation and equip them as reflective digital citizens. Future research should continue to investigate how digital agility develops across socio economic and educational contexts, using qualitative and longitudinal approaches. Ultimately, digital literacy must be recognized not as a fixed skill set but as an evolving capacity for adaptation, positioning it as a core competence for employability, lifelong learning, and active participation in 21st-century societies.

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