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# From framework to flexibility: a heuristic scheme for institutional & individual interpretation and application of digital competencies

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## Abstract

**Introduction.** This paper introduces a tiered digital literacy taxonomy that reimagines how digital competencies are interpreted and applied across institutional and individual contexts. Moving beyond static frameworks, we propose a heuristic model that captures the dynamic, co-constructed nature of digital literacy.

**Method.** Drawing on real-world examples from Scotland, the UK, and global initiatives, we employed explanatory examples to illustrate how players dynamically construct what constitutes digital literacy in context.

**Analysis.** We demonstrate how institutional frameworks often diverge from lived practices, and how users reinterpret competencies like communication, safety, and problem-solving in context-specific ways. Institutional characterisations (for example, the EU DigComp Digital Competences, the UK's Essential Digital Skills framework, and UNESCO's global literacy framework) set the tone, while everyday practices (for example, those in the Scottish public sector or digital inclusion initiatives) reinterpret or extend them.

**Results.** Our taxonomy highlights the interpretive flexibility of digital skills and introduces an effort-versus-impact matrix to guide strategic prioritisation in resource-constrained environments.

**Conclusion.** Ultimately, we argue for a participatory, adaptive approach to digital literacy, allowing taxonomies to develop in response to users rather than focusing on fixed checklists.

## Introduction

Despite growing concerns about digital governance and cybersecurity, the everyday digital practices of Scottish public sector employees remain largely unknown. This paper is set within a policy environment shaped by frameworks such as the Scottish Public Sector Cyber Resilience Frameworks versions 1 and 2, the UK's Essential Digital Skills (DfE, 2019), and Education Scotland's digital literacy frameworks (Education Scotland, 2023). These frameworks reflect a significant policy shift, in which digital literacy is no longer regarded as an isolated set of competencies but rather as a foundation for cyber resilience. For public sector employees, this shift represents the struggle of their daily interactions with information systems, digital platforms and the complexity of information security protocols. This paper seeks to understand the socio-technical realities of how Scottish public sector employees negotiate, utilise, and construct digital competencies within the demands of their roles.

Within policy and educational frameworks, digital literacy is often viewed as an objective, technical skill set, positioned as an individual responsibility for adapting to a progressively digitised world (Law et al., 2018; Pompouri et al., 2021). Such circumscribing, while operationally significant, threatens to cloud the socio-technical and institutional intricacies that construct, co-construct and reconstruct digital literacies.

Weigl et al. (2023) provided an extension of interpretive flexibility in institutional contexts, which serves as a foundation for arguing that digital literacy frameworks developed by DigComp, and UNESCO should be regarded as socio-technical artefacts. The tenets of the DigComp2.2 and UNESCO global frameworks describe digital competencies and their vision of what it means to be digitally competent, prescribing certain normative assumptions. Their creation of a digital competence framework echoes and underpins specific institutional measures (McGarr, 2024; Vuorikari et al., 2022). The categorisation of such a framework – e.g., '*communication and collaboration*,' '*problem solving*,' or '*safety*' – is not entirely clear or consistent across contexts. Instead, frameworks are subject to conflicting analysis by different social groups (policymakers, employers, educators, learners, or campaigners). For example, policymakers may outline '*communication and collaboration*' in terms of email etiquette, privacy, and online safety. In contrast, youth campaigners may view it as a social media expression and a networked organisation (Third et al., 2019). Similarly, the meaning and implementation of '*adaptive learning*' vary significantly depending on classroom values, pedagogical approaches, and levels of digital access. These tensions between certified frameworks and actual practices reflect the dichotomy identified by Orlikowski (1992) and further expanded by Weigl et al. (2023) and Heiland (2025): between formal definitions (the institutional framework) and everyday practice (the actor-level meanings).

In this study, we do not claim to recommend a single optimum framework; instead, we engage in an analysis that honours narrative complexity over recommendation. We present a tiered digital literacy taxonomy as a socio-technical construction. We examine how the concept of digital literacy is made meaningful within various institutional and actor structures. Therefore, we draw on social constructivist theory, particularly the notion of interpretive flexibility (Collins & Pinch, 2013; Orlikowski, 1992; Weigl et al., 2023) for institutional contexts.

The structure of this paper is as follows. First, a literature review establishes digital literacy in its theoretical and institutional contexts, distinguishing broad competency characterisations with critical, socio-technical assessments. The Methodology section describes our informative approach to investigating the existing framework and related texts. A discussion of the taxonomy structure and analysis follows this. We discuss the themes of actor construction and co-construction, institutional framing, and tensions between established frameworks and everyday practice. Finally, we illustrate our points with practical examples from Scotland, the UK, and global initiatives, demonstrating how the taxonomy is applied in real-world settings.

## Literature review

### Rethinking digital literacy from technical skills to hybrid dimensions

Digital literacy remains conceptually fluid, shaped by varied definitions and institutional agendas that influence how it is interpreted, measured, and integrated into policy. At the policy level, dominant frameworks, such as the EU DigComp2.2 (Vuorikari et al., 2022) and the UK's essential digital skills (DfE, 2019) recommend well-defined categorisations that present digital skills into different domains: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving. These frameworks, while operationally significant, tend to present digital literacy as a static construct, isolated from the socio-material environments that construct and co-construct it. Similar tensions are visible in Scottish public sector cyber resilience policy, where safety and information security awareness are framed primarily through governance instruments, leaving limited space for contextual interpretation by employees (Ovie et al., 2025). UNESCO's global reference for Sustainable Development Goals (SDG) indicator 4.4.2 defines digital literacy as *'the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies'* (Law et al., 2018). Although this definition is all-inclusive, it often leans toward a digital orientation, privileging technical proficiency over critical engagement with digital tools and content (Doherty et al., 2006).

However, as some researchers have argued, digital literacy is not separate from the socio-cultural and institutional measures that construct it. For example, (Rinaldi, 2014) in a depiction of new literacy studies, argued that digital literacy should be viewed as the competence to associate successfully within digital contexts, highlighting the embeddedness of exact practices in social life. Likewise, other scholars pointedly underlined the critical thinking and civic dimensions of digital engagement, contesting narrow skill-based approaches (Jenkins, 2009; Lankshear & Knobel, 2008; Ng, 2012). In recent educational guidelines in Scotland, affective and ethical dimensions are at the core of making sense of digital technology and understanding its personal and societal implications (Education Scotland, 2023). These views align with the broader shift toward responsible technology use and enhancing quality of life, as outlined in the UN and UNICEF charters (UNICEF, 2022; Welby & Chauvet, 2021), which aims to combine mental and educational perceptions into literacy schemes.

### Interpretive flexibility and socio-technical constitution of literacy

To conceptualise a taxonomy, we rely on the Social Construction of Technology (SCOT) theory and its related models (Klein & Kleinman, 2002). SCOT scholars argue that digital tools, including theoretical framings, possess contextual adaptability (Trenerry, et al., 2021). This means such tools are subject to divergent interpretations and uses across various groups and contexts. For example, early researchers studying the human layer of technology adoption observed a striking pattern. Users often find creative and innovative ways to utilise technology. Sometimes, these uses stand in complete contrast to the original intentions of the designers (Collins & Pinch, 2013; Orlikowski, 1992). Orlikowski (1992) introduced the idea of duality of technology to highlight that, while technology (by extension, taxonomies) constructs users' thoughts and actions, the effect of human agency is to reconstruct the same technology.

Weigl et al. (2023) added a layer to this discussion by proposing an extended model of interpretive flexibility. In their view, it is not just people and technology shaping each other; institutional structures also play a key role. In their framework, technologies are not simply created and used; they are constructed by institutional apparatuses, negotiated through semantics, and applied in various contexts. Therefore, we present the digital literacy taxonomy as an ongoing process that is shaped and reshaped by guidelines, governance, and human agency. For example, educational directorates may frame what it means to be digitally literate into curricular or career readiness models. At the same time, civic educators may reframe these categories to highlight collaborative interaction or cultural agility. As SCOT idealists argue, *'innovations do not exist as neutral things,*

but they are constructed through a set of practices that emerge from the social setting of their use' (Wafai & Aouad, 2023). This perspective suggests that literacy frameworks are not passively created; instead, they are actively derived through meaningful co-construction governing frameworks and professional practice, blurring the lines between prescriptive characterisations and practical experience.

### **Institutional framing and context-based practice: a dialectic**

A recurring tension in academic literature concerns the gap between how governing frameworks and institutions define digital literacy and the realities of context-based practice. Digital literacy is often framed in policy documents as a fixed performative inventory of competencies designed to measure and assess individual skill level and to align with broader policy requirements (Littlejohn et al., 2012). While this competency-based approach is easily implementable, it often ignores the social fabric and human actors that shape literacy practices. For instance, the UK's essential digital skills framework lists 'communicating' and 'transacting' as essential tiers; however, how these tiers are understood and utilised in various classrooms varies profoundly, revealing the limitations of top-down frameworks. In Global South contexts, digital literacy cannot be discussed implicitly without addressing social material conditions, such as access to digital devices and internet connectivity (Ragnedda & Gladkova, 2020). Nevertheless, in approved digital literacy frameworks, these foundational issues are not recognised, because abstract competences take precedence over baseline foundation and access (Lammers & Astuti, 2021). This gap highlights our argument that any framework is an idealised design and not a comprehensive recommendation. It emerges from institutional narratives but is absorbed through informal literacy ecosystems such as peer-learning and home-based computing cultures that construct and co-construct digital competence.

This dialectic between institutional definitions and context-based practice underscores the need for a reflexive and interpretive stance to digital literacy. As Weigl et al. (2023, p. 1) advised, framing emerging technologies in a conflicting, narrow, and uncritical manner can 'damage the public discourse' by blurring the practices and lived experiences that construct them. Therefore, we adopt this cautionary lens in approaching digital literacy as a shared reference point, rather than as a universal taxonomy (Star & Griesemer, 1989) -an adaptable and negotiated terrain where various actors converge, each shaped by distinct epistemologies, systemic approaches, and socio-cultural margins.

### **Method**

Our methodological stance is deliberately interpretive and situated within the study of human-system interaction. Our approach combines discursive analysis and narrative interpretation of the digital literacy taxonomy as a socially shaped and debated subject. This approach is grounded in interpretive paradigms in information systems research (De Villiers, 2005), where the emphasis shifts from measurement to interpreting and making sense of how actors and institutions co-construct the impact of digital systems frameworks.

### **Data sources and analytical procedures**

We assembled a targeted collection of relevant policy documents, curricular frameworks, practitioner narratives, and educational resources that highlight how digital and literacy competencies are constructed, shared, and understood. These include:

- Governance instruments such as the EU DigComp2.2 digital competence framework for citizens (Vuorikari et al., 2022), the UK's essential digital skills framework (DfE, 2019), Scotland's Digital Learning and Teaching Strategy (Education Scotland, 2023), and international models from UNESCO (Law et al., 2018).

- Theoretical contributions from interpretive and systems-oriented perspectives, including (Collins & Pinch, 2013; Heiland, 2025; Klein & Kleinman, 2002).

We used a layered, theme-focused method that evolved over multiple examinations. We structured our inquiry around the EU DigComp2.2's six core domains. We created a three-part structure based on them, which comprises the three tiers of the proposed taxonomy: core domains, subdomains, and competencies. For each tier, we asked: what dominant discourses frame this context, and how do users make sense of, challenge, construct and reconstruct it in practice? Following Weigl's (2023) method of interpretive inquiry that maps the '*technical implementation*' (the taxonomy structure), '*socially constructed knowledge*' (how people imagine, interpret, and use it), and '*governance structures*' (policies and frameworks). This model aims to amplify conflicting interpretations and— to reveal the interpretive richness surrounding the taxonomy.

### Case illustrations and situated narratives

To ground our analysis, we draw on cases from contexts we have studied (e.g., Scottish education policy), digital inclusion initiatives, and international development programs. These cases are presented as interpreted narratives that expose the construction of the taxonomy in practice. They serve to exemplify the interpretive flexibility of digital competence domains and the systemic pressures that unfold during application.

Throughout this paper, we write from a first-person perspective to reflect our epistemological stance, as active participants in the analytic process, weaving together theory and practice. Our goal is to understand how such frameworks act as shared reference points (Star & Griesemer, 1989), mediating between systemic structures and the lived experience of human agents. We provided rich contextual insight over generalisability, and layered understanding oversimplification.

### Framework structure and analysis

The taxonomy is organised hierarchically across three tiers: Tier 1 (Core Domains), Tier 2 (Subdomains), and Tier 3 (Competencies). Our analysis aims to investigate their construction and application through the lens of interpretive flexibility (Collins & Pinch, 2013; Weigl et al., 2023).

#### Tier 1: core domains as interpretive anchors

Tier 1 domains—such as communication and collaboration, information and data literacy, digital content creation, problem solving, and safety—function as high-level interpretive anchors. These categories, while universal, are institutionally inscribed and socially negotiated. They reflect what governing bodies, educational institutions, and corporate actors deem essential for digital participation (DfE, 2019; Vuorikari et al., 2022)

For example, communication and collaboration. While formal frameworks tend to define it in terms of functional competencies—such as managing emails, adhering to online etiquette, or navigating multilingual exchanges—these definitions often reflect institutional priorities more than lived realities. In practice, what counts as '*collaboration*' is far from uniform. For many young people, this may involve co-creating in digital spaces, such as TikTok Live, producing memes, or collaborating in online games (Jenkins, 2009). In contrast, employers may frame collaboration through the lens of productivity and workflow, privileging tools like Slack or Microsoft Teams. These contrasting enactments reveal the domain's interpretive flexibility: the same term can carry quite different meanings—ranging from civic participation to corporate efficiency to cultural play—depending on who uses it and for what purpose.

Similarly, (Law et al., 2018) defines information and data literacy as a multifaceted capacity to access, evaluate, manage, and create information. While institutions often interpret this as a set of research and critical thinking skills, its practical application varies across professional domains. Librarians, for instance, may prioritise media literacy and source verification (Rinaldi, 2014),

whereas data scientists focus on statistical reasoning and ethical data practices (Utts, 2021). These divergent emphases illustrate how the concept is shaped by communities of practice, with some expanding its scope to include privacy, environmental ethics, and broader socio-political concerns. This evolving interpretation underscores the inherently contextual and contested nature of literacy itself.

Digital content creation is a broad and evolving concept. While institutions often define it in terms of technical skills, such as using word processors or building apps, people understand and use it in diverse ways. Older adults might view it as formatting documents, while younger users may see it as creating TikTok videos, modifying games, or producing activist content (Ng, 2012). These differences show that social and cultural contexts shape content creation. The domain is also influenced by ideology: businesses may focus on producing content that aligns with their brand, while educators may encourage content that challenges social norms and power structures (Ei, 2021). Therefore, digital content creation is not just about using tools—it is also about expressing values and negotiating meaning.



**Figure 1.** DigComp2.2 digital competence framework core domains as interpretive anchors from (Vuorikari et al., 2022).

The problem-solving domain is increasingly emphasising higher-order thinking and self-regulated learning. Policy documents often describe this through structured approaches like procedural logic and learning analytics (Education Scotland, 2023). However, in everyday educational settings, problem solving can take more creative and collaborative forms, such as coding projects, peer

learning, or community-based inquiry (McLoughlin & Lee, 2010). These differences highlight the identified key tension that: while institutions tend to promote standardised models of competence, learners and educators often adapt these practices to fit local needs and values. As a result, problem solving is not just a technical skill, but a dynamic process shaped by context, culture, and power.

### **Tier 2: subdomains and competency groups**

The second tier of the taxonomy provides a more detailed breakdown of the broader tier 1 domains by identifying specific subdomains or clusters of related skills. For example, within communication and collaboration, this level may include areas such as netiquette, social networking, and the use of online collaboration tools. In information and data literacy, subdomains might include information retrieval, data analysis, and media literacy, while safety could encompass privacy management, cybersecurity, and digital well-being. These categories often reflect the structural logic of formal policy documents, functioning similarly to second-level headings.

These subdivisions are not purely technical or organisational; they also reflect underlying value judgements (Vuorikari et al., 2022). The inclusion of *'algorithmic thinking'* under programming or *'netiquette'* under communication illustrates how such frameworks are shaped by institutional priorities, often linked to curriculum development or assessment design. However, these choices also signal what is considered important. Emphasising *'netiquette'* suggests a focus on responsible digital behaviour, whereas highlighting *'multimedia communication'* might have prioritised creativity and expression. Similarly, the inclusion of *'global and cultural awareness'* within digital citizenship reflects a commitment to intercultural competence, while its absence would imply a diminished emphasis on such skills (Ala-Mukta, 2011). These decisions reveal how broader sociocultural and political values shape digital competence frameworks.

This level of the taxonomy also reveals the interconnected nature of digital skills. For instance, data analysis—typically situated within information literacy—often overlaps with problem solving when applied in practical contexts. While some frameworks acknowledge these intersections, others maintain more rigid separations between domains. In educational practice, however, such boundaries are frequently blurred. A spreadsheet, for example, may be formally categorised under data skills, yet used pedagogically to support problem-solving and critical thinking. These examples demonstrate how educators and learners adapt and reinterpret competencies across domains, softening the hierarchical structure of the taxonomy and highlighting the importance of context in shaping digital literacy.

### **Tier 3: specific competencies and behaviours**

At the most granular level, digital competence frameworks often present specific skills or behaviours, typically articulated as *'can-do'* statements. Examples include: *'create and format a spreadsheet,'* *'evaluate the credibility of an online article,'* or *'use secure passwords.'* These statements appear straightforward and measurable and are commonly used in digital skills assessments and training materials. However, even at this level, interpretation plays a significant role. Take, for instance, the competency *'evaluate the credibility of online sources.'* In formal contexts, this might involve checking URLs, identifying authorship, or cross-referencing information. However, in practice, the assessment of credibility varies across cultural and situational contexts (Corradini, 2020). A community navigating misinformation may rely on social heuristics—such as peer recommendations or local knowledge—while an academic setting may prioritise citation tracing and source triangulation. The framework may name the behaviour, but it cannot prescribe how it is applied or valued in different settings.

Similarly, a skill like *'use a video-editing tool to produce content'* may appear neutral, but its application is shaped by purpose and audience. Producing a video for public advocacy differs significantly from creating a private family archive. These examples illustrate that specific

competencies function as shared reference points that are interpreted and adapted differently across contexts. This interpretive flexibility is also evident in how institutions implement competencies. One school might interpret ‘posting on a forum respectfully’ as basic online etiquette. At the same time, another might use it as a springboard for critical debate on controversial issues, embedding deeper layers of civic engagement and critical thinking. The same competency, therefore, can support quite different pedagogical aims depending on local values and practices.

Some frameworks also embed social categories within competency statements. For example, sub-statements such as ‘digital literacy for senior citizens’ or ‘for teachers’ reflect targeted adaptations. These distinctions reveal the designers’ assumptions about which groups require tailored support, and whose needs are prioritised. Importantly, such categories are not static. Local programmes may introduce new groupings—such as ‘digital literacy for refugees’—demonstrating that the taxonomy is open to ongoing interpretation and contextual expansion.

Across all levels of the framework, a consistent pattern emerges, while the taxonomy offers a structured analytical tool, its meaning is shaped through use. Broad domains are drawn from institutional discourse but are interpreted through practice; subdomains group skills that often merge in real-world application; and specific competencies are practised differently by diverse social groups. This analysis highlights the interpretive flexibility of the taxonomy. It underscores that digital literacy is not a static set of skills, but a dynamic, context-dependent construct shaped by technologies, policies, pedagogical norms, and learner identities.

## Discussion

### Framing digital literacy as a socio-technical construct

Digital literacy frameworks serve as institutional constructs that shape prevailing understandings of digital competence. Empirical analysis of Scottish cyber resilience frameworks similarly illustrates how institutional artefacts stabilise interpretations of digital competence while remaining open to reinterpretation in practice (Ovie et al., 2025). Typically developed by governmental or educational bodies, they delineate specific domains and skills, often under the guise of objectivity. Yet, as the SCOT framework highlights, such artefacts are embedded with the values and assumptions of the social groups that produce them (Klein & Kleinman, 2002). The process of codifying competencies is not merely technical—it carries political weight, privileging specific literacies while sidelining others. Although these taxonomies may appear definitive, their meaning is continually reinterpreted by practitioners, learners, and institutions, reflecting the interpretive flexibility that SCOT scholars emphasise (Doherty et al., 2006; Klein & Kleinman, 2002). As such, the taxonomy may appear stable in its published form, but practitioners, learners, and institutions continually reinterpret its meaning.

### Co-construction of meaning

The meaning of specific competencies is not fixed by the taxonomy but is co-constructed by users within institutional and cultural settings. What constitutes ‘problem solving’ or ‘collaboration’ may vary significantly across sectors and communities. The taxonomy then becomes a site of negotiation, where different stakeholders bring their own priorities and interpretations to bear. In many national contexts, digital competence is closely tied to economic productivity, employability, and civic participation. The language of these frameworks often reflects dominant institutional values, privileging certain forms of digital engagement over others. This reflects the broader critique within science and technology studies that technological classifications are embedded with normative assumptions about what constitutes legitimate knowledge and practice.

Finally, the internal structure of digital literacy taxonomies often contains ambiguities. The classification of sub-skills may overlap or conflict, requiring users to interpret where a given

competency belongs. These ambiguities highlight the taxonomy's role as a boundary object—a conceptual tool that facilitates coordination across different communities while allowing for local variation in meaning and use.

### **The taxonomy of digital literacy beyond DigComp2.2**

The DigComp2.2 digital competence framework has been widely used as it provides structure and measurability to policymakers. However, the risk in presenting a structured framework is inherent in introducing digital literacy as a stable or fixed competence. As earlier contended, digital literacy is about how users construct their experiences and negotiate agency in the digital environment.

Following Weigle et al (2023), it is safe to say that the DigComp2.2 digital competence framework underscores the institutional construction of digital literacy because this framework was primarily motivated by governance needs. Weigl et al (2023) proved that technologies are not neutral artefacts. Their interpretation and application are shaped by surrounding institutional properties and individual autonomy. This is also applicable to digital literacy. Users are active agents, constructing experiences within and sometimes against established constructs.

On this basis, the taxonomy of digital literacy (see Figure 2) presents a critical extension. Unlike the conventional provisions of DigComp2.2, our proposed taxonomy maps digital competencies as interdependent practices. It recognises that digital communication is a matter of collaboration and negotiating identities across work cultures and asserting agency within digital publics. We also recognise that digital safety extends beyond data protection, challenging individuals and organisations to rethink what it means to secure digital life.

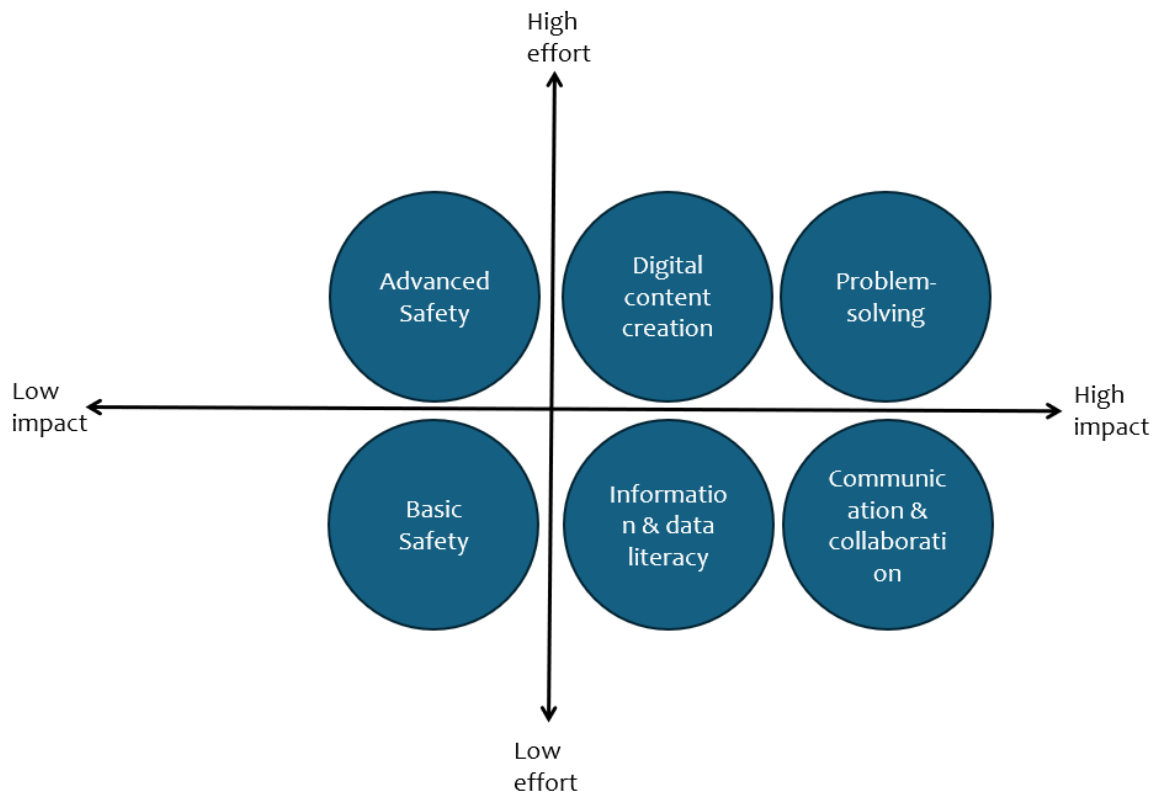
The most notable domains in our taxonomy include adaptive learning, which acknowledges that diverse individuals use technologies differently. Emerging technologies, such as AI and blockchain, are recognised as literacies - areas where organisational control and individual autonomy will continue to conflict. Therefore, DigComp2.2 and our taxonomy are complementary. Our taxonomy balances DigComp2.2's measurement standard by offering human agency and lived experiences. We reframe digital literacy as an ongoing negotiation between individuals seeking autonomy and institutions seeking to control them, encompassing the effort to acquire digital competencies and the impact of their application.



Figure 2. Proposed extended taxonomy of digital literacy.

### Impact vs effort: interpreting and applying digital competencies

The proposed extended taxonomy of digital literacy above provides conceptual clarity, as well as the overlapping and prioritisation of skills and their application in practical decision-making scenarios. However, the translation of the key competencies (information and data literacy, communication and collaboration, digital content creation, safety, and problem solving) into actionable strategies at both the individual and organisation levels is informed by the efforts required in acquiring/applying those skills and their expected impact on the individual or the organisation.



**Figure 3.** Digital competence impact vs effort quadrant.

A critical interpretation of this effort-impact quadrant provides a cognitive representation of digital competencies, differentiating them based on their practical relevance. The scope of the DigComp 2.2 digital competence dimensions is complex. In terms of significance, the five core competencies do not hold the same level of criticality across diverse roles. Within a resource-constrained, role-diverse public sector setting, there is a need to examine the significance of a competence beyond framework categorisation through a more transparent lens (impact vs effort). By mapping these competencies across the effort and impact dimensions (Figure 3), organisations become aware of which skills should be prioritised, which competencies matter most and how limited resources should be deployed for targeted training in digital upskilling for individuals.

Frameworks such as the DigComp2.2, while designing digital competence, often provide coverage of these competencies with equal conceptual weight. The framework also overlooks critical concepts such as role diversity, sectoral priorities, and the dynamics of effort (training, resources) versus impact (outcomes, value), thereby creating a gap between how we interpret frameworks and how they are acquired and applied in practice.

Our quadrant (Table 1) organises the five DigComp digital competencies across two axes: (1) the effort axis suggests the time and resources required to acquire digital proficiency, and (2) the impact axis reveals the potential benefits of application to the individual and organisation. Critically, we perceived some of these competencies as foundational in any organisation (e.g., information and data literacy, and communication and collaboration) and classified them as high-impact, low-effort. Secondly, there are advanced competencies in areas such as safety, digital content creation, and problem-solving. We also split safety into basic and advanced to address

generalisation in the DigComp framework. The practical implications and applications of these for individuals and organisations in education, healthcare and society are discussed in the next heading to promote critical awareness, support evidence-based training and digital maturity programs.

Mapped Dimensions	Quadrant	Mapped Dimensions	Quadrant
Advanced Safety	<b>Impact:</b> It does not make a noticeable difference overall. <b>Effort:</b> Requires significant work for a relatively small result.	Digital Content Creation & Problem Solving	<b>Impact:</b> Can change things for the better in a big way. <b>Effort:</b> Takes a lot of work, time, and learning
Basic Safety	<b>Impact:</b> Helps somewhat, but not a significant change. <b>Effort:</b> Simple to accomplish with minimal effort required.	Information & Data Literacy & Communication & Collaboration	<b>Impact:</b> Makes a significant positive difference quickly. <b>Effort:</b> Easy to do, does not take much time or energy

**Table 1.** Digital competence impact vs effort mapped dimensions.

## Case studies and empirical applications

### Scotland: policy framing and pedagogical adaptation

In Scotland, digital literacy has been framed as a reflective and socially embedded practice. The national framework for digital literacies in initial teacher education emphasises meaning-making, critical engagement, and the societal impact of digital technologies (Atkinson, et al., 2020) and the minimum digital living standard outlines baseline digital tasks for civic participation. However, while these frameworks provide structure, their implementation is shaped by local pedagogical and family cultures. Research has shown that educators often reinterpret formal competencies to align with community values and learner needs (Atkinson, et al., 2020). This reflects the co-construction of meaning between institutional policy and practitioner agency.

### United Kingdom: employability and sectoral reinterpretation

Across the UK, the Essential Digital skills Framework (DfE, 2019) positions digital literacy primarily within the context of employability and economic participation. The framework's five domains are designed to support adult learners in navigating digital environments for work and life. However, empirical studies indicate that different sectors reinterpret these competencies based on their operational needs. For instance, small businesses often adapt communication skills for digital marketing, while community organisations may emphasise creative problem-solving using open-source tools (Audrin & Audrin, 2022). These variations demonstrate how the same taxonomy is appropriated differently across institutional and socio-economic contexts.

### Global contexts: development, inclusion, and localisation

At the international level, digital literacy is frequently linked to development goals and social inclusion. UNESCO's global frameworks promote digital competence as essential for achieving the Sustainable Development Goals (SDGs), particularly in education and economic empowerment (Education Scotland, 2023). However, national and local implementations vary widely. Some

initiatives prioritise basic access and functional ICT skills, while others focus on advanced competencies such as coding and digital entrepreneurship. Non-governmental organisations and educational institutions often hybridise global frameworks with local cultural and linguistic practices, creating context-specific taxonomies that reflect regional priorities (Education Scotland, 2023). This underscores the iterative and negotiated nature of digital literacy in global development discourse.

### Cross-contextual insights

Across these contexts, a common pattern emerges, while digital literacy frameworks offer structured guidance, their meaning is not static. Institutions use taxonomies to set agendas, but local actors reinterpret and rearticulate competencies in response to economic, cultural, pedagogical, and technological conditions. This supports the view that such frameworks function as boundary objects—tools that facilitate coordination while allowing for interpretive flexibility (Doherty et al., 2006; Klein & Kleinman, 2002). As such, digital literacy should be understood not as a static set of skills, but as a dynamic, socially situated practice shaped by ongoing negotiation among diverse stakeholders

### Conclusion

We have reconceptualised a tiered digital literacy taxonomy through an interpretive, socio-technical lens. We have demonstrated that each level of the taxonomy—from overarching domains to discrete skills—is subject to ongoing negotiation and reinterpretation within institutional contexts. Rather than functioning as a fixed or neutral framework, the taxonomy emerges as a dynamic socio-technical construct: institutional actors embed their strategic priorities into its structure, while individuals and communities continually reconfigure its meaning through situated practice.

Building on the work of Weigl et al. (2023), we underscore the mutual shaping of conceptual technologies (such as taxonomies), social actors, and institutional environments. From this perspective, digital literacy is not a static endpoint but a fluid constellation of practices that evolve alongside technological and societal change. This interpretive stance carries significant implications: it calls for reflexivity among educators and policymakers regarding whose interests and epistemologies the taxonomy reflects, advocates for the inclusion of diverse stakeholders in its ongoing development and recognises the legitimacy of emergent competencies.

Rather than prescribing a singular or definitive taxonomy, our analysis foregrounds the contingent processes through which such frameworks are constructed and legitimised. In doing so, we aim to reframe digital literacy not as a checklist of competencies but as a contested, co-produced set of competencies—one that reflects the broader socio-technical dynamics of the digital transformation. We agreed that digital competence is not a finite subject but an evolving socio-technical construct whose understanding emerges through iterative engagement.

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