Media and Communication
2025• Volume 13 • Article 8913
https://doi.org/10.17645/mac.8913

cogitatio

ARTICLE

Open Access Journal

Beyond Digital Literacy: Exploring Factors Affecting Digital Performance of University Staff

Carmen Koch and Fiona Fehlmann

IAM Institute of Applied Media Studies, Zurich University of Applied Sciences (ZHAW), Switzerland

Correspondence: Carmen Koch (carmen.koch@zhaw.ch)

Submitted: 8 July 2024 **Accepted:** 13 September 2024 **Published:** in press

Issue: This article is part of the issue "Evaluating and Enhancing Media Literacy and Digital Skills" edited by Leen d'Haenens (KU Leuven) and Willem Joris (Vrije Universiteit Brussel), fully open access at https://doi.org/10.17645/mac.i466

Abstract

Digital literacy is essential but doesn't guarantee digital performance. Many researchers consider factors such as attitude, cultural environment, or institutional setting in their frameworks when researching digital literacy. Yet, their significance often gets lost in a catalog of required skills and knowledge. Here we develop a model outlining factors influencing university personnel's digital performance across diverse tasks, and we discuss associated challenges. The model derives from literature and insights from 20 qualitative interviews with academic staff in teaching, research, or consulting roles. Results show that institutional settings and employee empowerment are pivotal in shaping openness to digital tools. Intentions fail due to resource constraints and lack of recognition, leading to limited experience with digital opportunities. Well-being significantly influences willingness to embrace digital resources amidst the balancing act of anticipating future efficiency against investing time and resources. Maintaining a team atmosphere often results in alignment with the least digitally competent. With appropriate conditions, time resources, and support, staff could efficiently utilize digital resources, even with only basic skills, which fosters the integration of all workforces. We argue for comprehensive assessments of university employees' digital performances, considering context and holistic aspects beyond personal skills and knowledge. Our model encompasses digital literacy, openness to digital developments, digital culture, primary conditions, services/empowerment offerings, and mindfulness.

Keywords

academic digital literacy; digital culture; digital literacy; digital performance; digital well-being; empowerment

© 2025 by the author(s), licensed under a Creative Commons Attribution 4.0 International License (CC BY).

1. Introduction

The wave of digitization has swept through every facet of university life, making digital tools indispensable. The Covid-19 pandemic has further accelerated this shift, as the abrupt move to online teaching and the increased use of digital technologies in academic activities have highlighted the critical importance of digital literacy for both staff and students. University staff are constantly faced with selecting and using these emerging digital resources wisely. Efficiency, resource conservation, and forward-thinking approaches are essential to navigating this dynamic landscape, especially in environments dedicated to research and educating students. New technologies are the catalyst and starting point for changing the structures and processes of working, learning, decision-making, and communicating. The scope is broad: University staff need to navigate digital tools in teaching and research, knowledge transfer, administrative tasks, and self-presentation. Digital literacy and adaptability to the ever-evolving digital landscape get more attention.

Many studies place their spotlight on media literacy or digital literacy. We assert that this focus overlooks what is genuinely central: the digital performance itself. Trültzsch-Wijnen (2020) points out that skills alone don't guarantee performance. Attitudes are central for digital literacy and for using digital tools (Arthur, 2013; Ferrari, 2013; Martin & Grudziecki, 2006; Meyers et al., 2013; UNESCO, 2013). Vuorikari et al. (2022, p. 3) describe attitude "as the motivators of performance, the basis for continued competent performance. They include values, aspirations and priorities." Moreover, a study in the realm of volunteer work (Koch & Klopfenstein, 2021) highlights that organizations can enhance the digital performance of volunteers by establishing conducive environments and setting digital framework conditions despite the volunteer's partly low digital literacy.

Our premise is that several factors—digital literacy is one—impact the digital performance of academic staff. As individuals who use digital tools daily, they are an interesting group. They are regularly exposed to innovation and are accustomed to adapting to new developments as part of their professional routines.

The following research questions guide our study:

RQ1: What challenges do academic staff meet in their digital performance?

RQ2: What factors influence the digital performance of academic university staff?

The aim is to identify the factors influencing digital performance and their characteristics. For this purpose, a model of the factors of influence will be proposed at the end of the article.

2. Theory

In this study, we argue that digital literacy, along with other factors, contributes to more effective digital performance. Aavakare and Nikou (2020, p. 11) for example found "a direct and significant relationship between information literacy and university staff's intention to use digital technologies for work activities." As Trültzsch-Wijnen (2020) argues, a reciprocal relationship is to be expected, where digital performance can also influence and improve digital literacy. Moreover, various individual factors, such as environmental factors, would moderate the transfer (e.g., motivation, interest, and memory). The practical sense of media

use is relevant for media performance, but also for the acquisition of media literacy. These statements on media performance are transferable to digital performance. In the following sections, we explore distinct aspects of the digital performance of academic staff, beginning with digital literacy (Section 2.1) and moving into the higher education context, which includes academic literacy and practice (Section 2.2). The discussion of technology acceptance (Section 2.3) is crucial to understanding how digital technologies are adopted, with organizational factors and digital culture playing significant roles. Digital culture and digital well-being (Section 2.4) are finally discussed as essential for sustaining digital engagement and ensuring academic staff maintain a healthy balance in increasingly digital environments.

2.1. Digital Literacy

Digital literacy is a highly contested term due to its broad and varied interpretations. The ambiguity surrounding its definition has its origins in the multiple disciplinary perspectives, contexts, and areas of application (e.g., entertainment, communication, working tools) in which the term is applied, to name but a few. Moreover, some definitions emphasize technical competencies, while others prioritize critical thinking, often referred to as critical literacies (Aguilera & Pandya, 2021). The wide range of different but similar concepts (Bawden, 2008; Koltay, 2011), such as media literacy, information literacy, internet literacy, and 21st-century skills (van Laar et al., 2018) blurs the discussion even more. A topic that is often discussed is whether these concepts complement each other, overlap, or are hierarchically related. UNESCO (2013, p. 27) argues that "is important to shift the focus away from the fragmentation of and differences among literacies towards what they have in common."

The problem of definition goes further, as Knobel and Lankshear (2006, p. 15) explain:

> Most definitions construct digital literacy as an It—as some kind of a "thing:" a capacity or ability, a skill (or set of skills) or "master competency" (composed of more specific competencies and dispositions). It is something you "have" or lack, and anyone who lacks it "needs" to get it.

Many definitions conform at their core to the notion that digital literacy consists of knowledge, skills, and attitudes (Martin & Grudziecki, 2006). While knowledge is acquired through learning and consists of facts, principles, theories, and practices on a particular topic, skills are needed to apply knowledge, complete tasks, and solve problems. Attitudes as the basis for performance include values, aspirations, and priorities (Ferrari, 2013). They are needed:

> To use ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming and empowerment. (Ferrari, 2013, p. 3)

The pyramid model by Celot (2015)—developed to measure media literacy in Europe—acknowledges the interaction of individual skills, social (communication) skills, and personal skills (critical understanding, usage skills), with environmental factors. These factors include the availability of media and the media literacy context (media education, media literacy policy, civil society, and media industry). They can promote or inhibit individual skills and should not be neglected. A widely discussed model in the educational context is

that of Sharpe and Beetham (2010), who describe digital literacy as a hierarchical structure, with access at its foundation. Access includes not only the availability of technology but also the time for its use. Bennett (2014) adds access to supportive individuals. The next levels involve skills (such as information literacy, cognitive abilities, and interaction skills), practices (e.g., making informed decisions and developing personal strategies), and at the top, attributes. While access is a prerequisite, it is arguable whether skills, practices, and attributes are truly hierarchical, or if they are more intricately intertwined. One way or another, the proposed levels offer valuable guidance for exploring digital performance in the academic field. As Sharpe and Beetham's (2010) model is quite general, it is also relatively stable over time.

Overall, definitions struggle to keep up with the rapid change in social and technical reality (Meyers et al., 2013). Therefore, Chetty et al. (2018) argue that a definition must describe the subcomponents, which must be continually developed. Many researchers and educators use comprehensive frameworks for this purpose (amongst others Carretero et al., 2017; Clifford et al., 2020; Eichhorn, 2020; Jisc Data Analytics, 2024; Vuorikari et al., 2016). The challenge is to keep these frameworks up-to-date while avoiding too much generalization.

Often mentioned is the EU Digital Competences Framework (DigComp; Vuorikari et al., 2022), which identifies five areas of digital literacy comprising a total of 21 competencies: Information and Data Literacy involves the ability to locate, evaluate, and use digital information effectively, whereas Communication and Collaboration focus on interacting, sharing, and collaborating through digital technologies. Digital Content Creation covers the ability to create, edit, and manage digital content. Safety refers to protecting devices, personal data, privacy, and health in digital environments, and Problem-Solving includes identifying digital needs and problems, evaluating technological solutions, and adapting to evolving digital tools. Jisc Data Analytics (2024) presents another framework, which aligns with many of DigComp's main categories. It expands on them by including "digital learning and development" (covering digital teaching). Another notable aspect is that it elevates "digital identity and wellbeing" (more details below) by assigning it a dedicated category. In contrast, in the DigComp model, this is subsumed under "safety" along with topics like data protection.

Many digital literacy frameworks (Ferrari, 2013; Jisc Data Analytics, 2024; van Laar et al., 2017) address thinking skills such as critical thinking, creativity, and innovation. Still, it is argued that frameworks like DigComp could better integrate higher-order thinking skills, such as the development of responsibility (Garavaglia et al., 2022), as well as analytical and interdisciplinary thinking, which are especially crucial in Industry 4.0 environments (Ozkan-Ozen & Kazancoglu, 2022). To highlight differences between technical and critical digital literacy, discussions around critical digital literacy have gained prominence. Critical digital literacy emphasizes reflection, awareness, and a critical attitude (Ilomäki et al., 2023), encouraging individuals to become more conscious of how power dynamics shape thought and behavior in digital spaces (Darwin, 2017).

While frameworks offer a useful foundation for establishing a mutual understanding, adapting these frameworks to specific contexts requires additional effort (Vuorikari & Punie, 2019). In line with this limitation, Jahn et al. (2021) highlight the issue that requirements and application scenarios vary widely, criticizing the DigComp framework for being too general. Consequently, in this work, we aim to explore competencies tailored to the specific tasks and responsibilities of academic staff.

2.2. Academic Digital Literacy

A specific context is the workplace. Here, digital skills are needed to enable business, government, and education employees to apply digital technologies, use them as part of their job profiles, and drive the digital transformation of business processes and institutional workflows (Friedrichsen & Wersig, 2020). Efficiency is essential: "Digital competencies at work are a set of basic knowledge, skills, abilities, and other characteristics that enable people at work to efficiently and successfully accomplish their job tasks regarding digital media at work" (Oberländer et al., 2020, p. 5).

This applies to academic staff too, but a closer examination is required due to the complexity of the field and the diverse responsibilities of academic employees. Wedekind (2009) and Reinmann et al. (2013) use academic media literacy to describe the competencies needed in this specific context. Eichhorn (2020) equates it with academic digital literacy, given that most media are now digital. Frameworks like the Digital Capabilities Frameworks by Jisc Data Analytics (2024) also address universities but focus mainly on the pedagogic, teaching aspect. However, teaching is only one of their many responsibilities. Basantes-Andrade et al. (2022) emphasize the need to consider digital literacy concerning the dimensions of teaching, research, management, and community engagement. Eichhorn (2020) differentiates three main areas of work at universities, namely teaching (media didactic skills), academic work (conducting research tasks), and academic self-administration/organization (controlling the flow of information in teaching and events, presenting own research and institute profile). From earlier models, Eichhorn (2020) derives eight dimensions of digital skills, which are independent of any scientific discipline:

- IT skills;
- Information skills;
- Communication/collaboration skills;
- Digital teaching;
- Digital identity, career planning;
- Digital science;
- Digital production;
- Analysis/reflection skills.

He bases digital literacy on three levels: (a) overview of knowledge and basic skills, (b) practical application, and (c) guiding others in the acquisition of digital skills.

In the area of teaching digital skills, Basantes-Andrade et al. (2022) highlight the importance of integrating ICT effectively into the pedagogical context while considering safety criteria. Krumsvik and Jones (2013) further emphasize the need for an understanding of how digital strategies impact student learning.

Many studies on the digital competencies of academic staff focus on teaching, especially after the Covid-19 pandemic increased attention to online education. Beardsley et al. (2021) observe that, since the outbreak of the pandemic, technologies are being used with greater confidence and motivation in teaching. External coercion has enabled a positive experience. Studies (Beardsley et al., 2021; Cutri et al., 2020; Fernández-Batanero et al., 2021; Inamorato dos Santos et al., 2023) show that academic staff have an open attitude towards using digital technologies in the classroom. In practice, however, they rarely use them, with

limited time and resources being cited as the main barriers (Fernández-Batanero et al., 2021). Studies from South American countries, as well as Spain and Portugal (Fernández-Batanero et al., 2021; Inamorato dos Santos et al., 2023), highlight both a gap between the willingness to use digital resources and their actual application, as well as a low to moderate level of digital competence among university teachers. Teacher training programs have shown limited success, which is why Fernández-Morante et al. (2023) advocate personalized training plans and Inamorato dos Santos et al. (2023) self-reflection as a first step.

The perception of the use of digital tools in teaching at universities is positively influenced when institutions provide support (Fernández-Morante et al., 2023) and when infrastructure is well-developed (Inamorato dos Santos et al., 2023). However, the lack of clear guidelines complicates the situation for university teachers (Louw & Thukane, 2020). Romero-Hall and Jaramillo Cherrez (2023, p. 159) criticize the fact that higher education institutions often lack "unified practice or administrative plans for integrating digital technologies at the institutional level," which results in staff struggling with digital skills. Optimism is a key factor in the successful use of digital technologies (Cutri et al., 2020). When benefits are seen, digital tools are more likely to be adopted. As Bennett (2014) notes, educators must focus on achieving their pedagogical goals rather than becoming digital experts.

2.3. Technology Acceptance

The question arises as to what influences the use of digital tools? The discussion around technology acceptance tries to provide answers that are also of interest here. Davis et al. (1989) assume in their technology acceptance model (TAM) that perceived usefulness and perceived ease of use are crucial factors. Based on this, Venkatesh (2000) adds the factors of subjective norm (the influence of colleagues or supervisors, as well as image, i.e., how using the technology enhances an individual's reputation) and cognitive factors like job relevance, perceived quality of outcomes, and visibility of outcomes.

Moreover, Venkatesh and Davis (2000) consider the user's prior experience with the technology and whether its use is voluntary or mandatory. TAM3 (Venkatesh & Bala, 2008) adds computer self-efficacy and perceived external control, which describes the extent to which users believe they have access to the necessary resources and support to use the technology successfully. This is an aspect particularly important in workplace settings, including universities. TAM3 also recognizes the importance of emotional factors like enjoyment and anxiety when using technology. A study by Nikou et al. (2022) shows that these emotions and attitudes are directly influenced by information and digital literacy. By accounting for these diverse cognitive, emotional, and contextual factors, the TAM3 offers a more nuanced understanding of the complex processes that drive technology acceptance. This multi-dimensional approach is particularly valuable in environments like academia, where personal beliefs, organizational culture, and external pressures all converge to influence how and why individuals embrace new technologies. The different TAM models, however, do not recognize technology acceptance as a dynamic, ongoing process. Another limitation is that it is too general and requires significant effort to adapt to a specific context while also being complex in terms of combining many different variables.

Although organizational factors are addressed in TAM3, they are underrated. In their version of TAM, Busolo et al. (2021) build their own categories. They differentiate between human, technological, and organizational variables, with the latter including policies, strategies, management, leadership, training, and security.

By incorporating these organizational factors, they emphasize the crucial role of institutional culture, leadership, and strategic alignment in fostering an environment conducive to technology adoption. This highlights the fact that successful implementation depends not only on individual and technological readiness but also on cohesive organizational frameworks. In universities, institutions often navigate complex technological ecosystems that require strong organizational coordination. Moreover, aligning leadership and strategy with technological initiatives ensures that faculty receive the necessary support and resources.

2.4. The Role of Digital Culture and Well-Being

The digital transformation era requires organizations to use digital technologies productively and to manage the associated changes internally, aligning them with stakeholder interests and their values and goals (Rosenberger et al., 2023). Digital change is a permanent feature of employees' working lives and requires openness and adaptability. According to Murawski and Bick (2017), beyond employees' mindsets and skills, the company's culture plays a pivotal role. Similarly, Meyers et al. (2013) define digital literacy as encompassing three key aspects: (a) the acquisition of "information age" skills, (b) the development of critical thinking habits, and (c) active engagement in digital cultures and practices. As already discussed above, skills and knowledge are highly contextual and develop differently in different contexts. According to Chief Digital Officer Ian Rogers (Buvat et al., 2017), digital transformation is not just a technical matter but a cultural change. Collard et al. (2017, p. 147) hypothesize "that the performance of competences through work practices may be affected by how DML [digital media literacy] at work is discursively constructed in organizations."

Building on the discussion of digital culture, employee well-being plays a crucial role in the digital workplace. Access to new technologies is motivating, and institutional support can contribute to positive emotions among employees, enhancing their engagement with and promotion of digital tools (Mäkiniemi, 2022; Moreira-Fontán et al., 2019). While the digitalization of work offers numerous opportunities, it also presents challenges to mental well-being. For instance, research shows that ICT can negatively affect well-being by increasing interruptions and unpredictability (Hoeven et al., 2016). The concept of "technostress" highlights the pressure employees feel when working with digital technologies, often linked to the rapid pace of change and increased expectations (Mäkiniemi, 2022). New forms of human–machine interaction can add to this strain (Körner et al., 2019), with stressors such as technical difficulties, poor usability, low situational awareness, and the need to acquire new skills (Pfaffinger et al., 2023). Technical issues are particularly stressful when employees lack the competence to resolve them (Dragano et al., 2021). A finding by Bartra-Rivero et al. (2024) concludes that improving digital literacy can reduce technostress among teachers.

Well-being, therefore, must be considered to be an important aspect of digital performance and digital literacy. Many frameworks subsume well-being under safety and security categories. Audrin et al. (2024) attribute even more importance to it by assigning well-being its own category in their model for digital competence in the workplace. The concept of digital well-being addresses "the impact of technologies and digital services on people's mental, physical, and emotional health" (Shah, 2019, para 2) and can be understood as "the ability to protect oneself and others from threats to the integrity and health consequent from digital technology use" (Audrin et al., 2024, p. 3). From an individual perspective, this entails recognizing both the positive and negative effects of digital activities and learning to manage them to

enhance well-being. Shah (2019) also highlights the responsibility of organizations to ensure proper management of digital systems and adequate training for employees in the use of digital tools. She further points to the availability of digital tools that can assist in managing aspects of digital well-being, such as digital stress and workload. Pfaffinger et al. (2023), for example, demonstrate the effectiveness of a low-dose app-based meditation and cognitive behavioral intervention in improving general well-being, which can be beneficial for individual stress management within organizations.

3. Methodology

The study employed qualitative, semi-structured interviews of about 45 minutes to an hour with 20 academic employees in autumn 2022, conducted via videoconferencing. The interview guide included a list of open-ended questions with some flexibility in the order and follow-up questions (Loosen, 2015). The aim was to create a conversation situation that was as natural as possible while keeping a structured approach to allow for a certain degree of comparability (Loosen, 2015). The primary objective was to gain new insights rather than to test existing knowledge. This approach offered in-depth insights into the academic staff's reception and experiences. The project has been reviewed by a committee within the university for both feasibility and ethical approval.

It was designed as a comprehensive case study of a single Swiss-German university, which unites various disciplines across the entire spectrum, from natural sciences to sociology and technology, under one roof. It allowed the research to be conducted under comparable overarching conditions and provided diversity through the different departments and disciplines.

The respondents are researchers and lecturers. Except for two, all have dual roles. For some, the teaching aspect is more prominent, while for others, research takes precedence. Two to three employees from each department from different scientific disciplines were interviewed. Table 1 gives an overview of the sample.

We use the term "digital tools" to describe software applications and platforms that enable people to communicate, learn, collaborate, collect, analyze, visualize, share data, and create, store, search, and find digital content (based on Vuorikari et al., 2016). Digital communication and collaboration tools are platforms or applications that allow users to communicate digitally, exchange information, collaborate, share documents, and organize workflows. They include a variety of functions (e.g., instant messaging,

Table 1. Sample overview.

		Number of respondents
Age	Up to 35 years	4
	36 to 50 years	10
	Over 50 years	6
Gender	Male	10
	Female	10
Positions	Lecturer/professor	9
	Mid-level faculty member	11

conferencing, collaborative document editing, task management). Digital tools for teaching include all digital tools used in the classroom (e.g., Moodle, Miro, Padlet, and quizzes).

Based on university job descriptions and theoretical insights (Section 2.2), a preliminary task portfolio was created to identify where digital tools could be applied. Key areas include project management (data handling, collaboration, administration), empirical research (data collection and analysis), and teaching (course preparation, delivery, and follow-up). Staying updated on practical and scientific trends, effective communication with stakeholders, networking within academic and professional circles, and building a digital identity were also emphasized. Additionally, self-management (information, resources, well-being) and administrative tasks (time tracking, software management) were included. While not exhaustive, this portfolio provided a valuable framework for structuring the interviews and guiding discussion.

The interviewer started by introducing the study, explaining that the data would be collected anonymously, and clarifying the participants' roles, areas of responsibility, and tasks at their work. This initial step provided the basis for tailoring the subsequent questions and for probing deeper into specific areas. Thematically, the interview first focused on a self-assessment of their digital practice and literacy on the one hand and a team evaluation on the other. As shown in the theory section (Arthur, 2013; Ferrari, 2013; Meyers et al., 2013; Nikou et al., 2022; UNESCO, 2013), attitude plays an important role in digital performance. Therefore, participants were asked about their openness and attitudes toward digital tools in their work, their perceived flexibility in experimenting with new technologies, and any fears or barriers they encountered in using digital tools. They also provided insights into their team's attitudes, reflecting on the collective disposition towards digital innovation. Not only does the mindset of employees (Murawski & Bick, 2017) influence digital performance, but also the companies' digital culture (Busolo et al., 2021; Collard et al., 2017; Venkatesh & Bala, 2008). That's why respondents were asked to assess the degree of digital transformation of the university and their perception of the university's digital culture overall. The answers also help to contextualize other answers in terms of access, conditions, and possibilities. The subsequent part of the interview centered on the participants' specific work areas, as the digital challenges and competencies needed may be context-specific (Jahn et al., 2021). We explored how they used digital tools in project management, collaboration, teaching, research, and monitoring—both individually and as part of a team and also addressed experiences and challenges. Moreover, we asked about digital tools in their communication practice, including publication work, knowledge transfer, dialogue, and networking, and the use of administrative tools for digital administration. A dedicated section of the interview focused on digital well-being, as digital tools are potential stressors (Dragano et al., 2021), but also stress reducers (Pfaffinger et al., 2023). This included questions about the tools respondents used to manage their well-being (e.g., focus-enhancing tools, quiet work environments) as well as the impact of digital work on their overall well-being, such as concerns about burnout, information overload, and constant availability. Issues related to digital literacy emerged organically throughout the interviews, and a final section explicitly addressed this topic. Participants were asked to identify the digital competencies they considered most critical for university staff.

The guideline interviews were fully transcribed and analyzed using Mayring's (2022) summarizing content analysis. Categories were derived inductively from the interview material. Starting with reducing and consolidating the existing material, the identification of recurring themes and patterns was then summarized into categories. This was done first block by block within each interview and then at the entire interview

level. We worked with main categories, subcategories with more details, and corresponding anchor quotes. Two people analyzed the interviews in parallel through a repeated, recursive process that ensured consistent categorization. Citations were recorded for each category. Although the frequency of mention was counted, the focus was on identifying and capturing the range of influencing factors and challenges. For practical application, the findings were translated into an assessment tool that university institutes and teams can use to determine their current status.

4. Results

The study identified six areas of influence on the digital performance of academic staff, which are discussed together with the corresponding challenges. These areas are digital practice, attitude, digital knowledge and skills, digital culture, framework conditions, and service and empowerment. The transitions between the areas are fluid and show how strongly they influence each other.

Although all respondents use digital tools daily, 14 out of 20 interviewees limit them to the most basic, pragmatic use possible to avoid potential complications. Digital tools often replace other applications one to one, and their potential is not exploited. The openness to go beyond the simple sharing of a shared repository and to work digitally collaboratively is limited ($n = 14$). Nevertheless, the variety of digital tools is significant, as everyone uses something different. This poses a challenge when collaborating with various teams from different departments or universities ($n = 6$). Online monitoring of current developments in science and practice happens casually and rarely. Except for three respondents, science communication via online channels is hardly ever practiced—the respondents are even deliberately reticent ($n = 7$). Respondents are open to using administrative tools and see them as a prerequisite. However, only three people go beyond and use administrative tools for time management.

There is little reflection on personal well-being when using digital tools but the respondents find it essential to address this issue and are interested in digital tools to promote mindfulness ($n = 14$).

4.1. Attitude, Knowledge, and Skills

Respondents found openness and curiosity ($n = 8$), pragmatism and patience ($n = 6$), and flexibility to be critical characteristics for digital performance. Twelve describe themselves as open-minded towards digital tools; however, they report a lack of patience for them and therefore use digital tools at a low level. Seven respondents are open to digital tools and think they make teaching more attractive and try novel approaches. They see innovations as an opportunity. Their flexibility and attitude that experience can be transferred from one tool to another pays off, leading to them overcoming hesitation and fears. Nine are not averse, but more cautious. They don't have confidence that digital tools will always bring benefits: "You get bogged down so quickly. It's very wild with all the tools. The ones you don't know well enough, you become inefficient" (Interviewee [henceforth Int.] 19). Four explicitly lack patience and interest in learning: "You don't know the tool, so you don't want to learn it" (Int. 2). They report frustration when something doesn't work as expected and see dealing with it as a waste of time. Fears hinder them from working with new digital tools. Common fears include data loss and synchronization issues ($n = 5$), losing track of multiple data repositories ($n = 3$), or losing control ($n = 4$). One explains: "That feeling of 'are the others not seeing the document. Is it secure?' is a barrier. So I just make another Word document and share it by email." (Int. 1). The fear of technical

difficulties is inhibiting teaching. Employees are also reluctant to present themselves on social media platforms ($n = 2$), and it is a hurdle to share content publicly as they're afraid of a backlash (Int. 8). Moreover, they criticize the way that social media blurs the lines between personal and professional life.

Basic user skills and knowledge are considered essential, as this can be transferred from one digital tool to another. One respondent stressed: "If you can do one, you can usually do the others" (Int. 6). Some find it difficult to have an overview of the range of digital tools, their possibilities ($n = 6$), and limitations ($n = 3$). A good selection of digital tools includes the consideration of one's competencies (Int. 9) and the team culture ($n = 3$). Implementing new digital tools often fails due to a lack of awareness of possibilities and missing resources. This applies to project management, teaching, administration, and mindfulness. The efficient and meaningful use of digital tools is considered crucial ($n = 9$), and the importance of using digital advantages and not simply transferring analog processes to digital tools is highlighted (Int. 3). Other skills considered are process management skills, including the organization and overview of workflows ($n = 4$), a holistic use approach (Int. 9), the ability to handle large amounts of data ($n = 5$), and to avoid data loss (Int. 12). Although considered essential, basic knowledge of data protection ($n = 3$) and awareness of its relevance ($n = 4$) bore and overstrain many ($n = 8$). Int. 15 illustrates the challenge: "If the tool tells me in which country the data is stored, then I still don't know what to do with it." Finally, problem-solving skills, i.e., the ability to tackle problems independently, were emphasized ($n = 3$).

4.2. Digital Culture, Framework Conditions, and Services

When it comes to digital culture, the attitudes, practices, and competencies within the team play a crucial role. While six teams are perceived as very open-minded and digitally adept, amongst all others, there is great diversity in terms of openness and competence. Seven pointed out a generational difference, with older people often showing signs of being more easily overwhelmed and less open to new digital developments. Digital collaboration initiatives fail due to implementation problems: "Everyone likes to try things out, but we're not so strong when it comes to implementation" (Int. 3). After the initial euphoria, digital tools are reduced because colleagues lack the willingness and patience to get involved ($n = 8$). Most teams miss role models ($n = 15$). Digital culture is tailored to the needs of those least open to and competent in using digital tools to accommodate the various levels of knowledge (Int. 13). Digital project management tools are not used extensively to avoid potential overload and conflicts, as one quotation illustrates: "You don't ask to share it in MS Teams, although it would be easier. Because every conflict comes down to trivial things like that" (Int. 2). A fear-free environment where mistakes are allowed promotes the willingness to try things out ($n = 3$), especially if valued by supervisors and the team ($n = 3$). It is manifested in the framework conditions of the university. This also applies to the (perceived) degree of digital transformation of the university (e.g., software offered, innovative administrative tools, digital platforms), which respondents adapt. If a university is not innovative, adaptation often means downgrading ($n = 5$).

Respondents emphasize the importance of having user-friendly, intuitive, and modern digital tools ($n = 12$). Especially in teaching, technological hurdles can be too high (usability of platforms, lack of interfaces between different digital tools), as there is little room for maneuver during a course ($n = 8$). Int. 3 would prefer digital solutions to be developed at the institute level, as this allows for better consideration of employees' specific working contexts and challenges, ensuring the solutions are more tailored to their needs. Lacking time resources hinders 17 respondents from becoming familiar with new digital tools: "You need

know-how, but you also need a lot of time. Where does this time come from?" (Int. 4). The idealism need is missing when there is low interest and appreciation from supervisors (n = 14). Lack of resources can lead to falling back into old habits (n = 7). University members frequently work in inter-university teams, which all have different requirements for digital tools and platforms, other access, or different hardware (not all programs run on all devices), making collaboration difficult (n = 8). Data protection rules and ethical concerns can make it challenging to choose digital tools (n = 3) and hinder practicability: "I agree that you have to be extremely careful and take a close look at it, but I'm very slowed down by it" (Int. 2).

Employee training is not encouraged enough: "I have never received a request to look at manuals or training courses" (Int. 1). Relevance could be emphasized, e.g., by setting an annual goal in the appraisal interview. The dilemma is that although training is desired, it is not used due to lack of time (n = 2). The experience shows that training is not sufficiently tailored to the individual case (n = 8). Contact persons in the immediate environment who are familiar with the situation are desired (n = 6): "I think that many people are not aware of how different the approach to digital tools is" (Int. 16). Ultimately, the university needs to provide a service that saves the academic staff time, for example, by showing them what tools are currently available, curating them in terms of data security and ethics, and providing a personal, in-house contact person who knows the environment and helps with specific problems.

5. Conclusion

5.1. Challenges

The results section brought up many challenges that teams face. Time resources to think things through, keep an overview, or keep track of the diversity of options are some of the biggest problems. As a result, teams adapt to the one with the lowest digital level, and initial efforts to try something are often abandoned. Overall, some areas of tension can be named as the following. Freedom of choice vs. uniformity as many want to choose if, what, and how to use digital resources. Restrictions and guidelines from the university are perceived as limiting and devaluing. However, more uniformity is desired so that different communication channels, platforms, and management tools don't have to be managed in parallel. Unification eases the development of a consistent, long-term understanding of collaboration and communication and support services could be more focused.

Simplicity vs. variety concerns respondents' desire to focus on a small number of digital tools that offer many distinct functions. At the same time, the versatility of digital tools is seen as a challenge, as it is difficult to keep track of all possibilities.

Freedom of choice vs. data protection where the desire for freedom of choice collides with data protection. Even if the relevance is undisputed, the requirements are challenging, especially when working with external partners.

Openness vs. priorities concerns when the interest in engaging with new digital tools clashes with one's priorities to focus on research, advising, and teaching and not spend time understanding digital tools. This aligns with Fernández-Batanero et al. (2021) and Inamorato dos Santos et al. (2023), who identified a gap between openness to digital practices and actual digital action.

Finally, the demand for training vs. resources concerns respondents' wish for training and information-sharing platforms. However, they rarely take advantage of such opportunities due to a lack of time and resources.

5.2. Influencing Factors

Based on our research and the literature review, a model of the factors influencing digital performance was developed. The model (see Figure 1) includes the following dimensions: digital performance, motivation, digital culture, conditions, and services and empowerment.

Digital performance (Trültzsch-Wijnen, 2020) refers to whether and how digital tools are used in research, educational tasks, monitoring, scientific communication, administration, and self-management. We found different moderating factors that influence performance.

Motivation stems from openness and patience to try new things, as well as from the attitude that digital tools can be used to one's advantage. The more employees worry about technical issues or fear that they might fail, the less likely they are to try new things. It demonstrates the importance of "cultivation of 'habits of mind,' " as Meyers et al. (2013, p. 13) explain, and confirms the importance of mindset (Murawski & Bick, 2017) and attitudes often noted in literacy definitions (Martin & Grudziecki, 2006). TAM (Davis & Granić, 2024) can address many motivational aspects. For example, it is driven by perceived usefulness and usability, job relevance, and personal experience, self-efficacy but also by existing fears. To do justice to the importance of this dimension, it is not treated here as part of digital literacy but is included separately. It can be influenced and encouraged, while digital skills and knowledge can be learned.

Respondents agree that a certain level of digital literacy—knowledge and skills—increases motivation and flexibility to adapt and test new things, but it is not their primary concern. Eichhorn's (2020) list of digital skills aligns with their assessment of what is essential. However, they state that basic user knowledge and

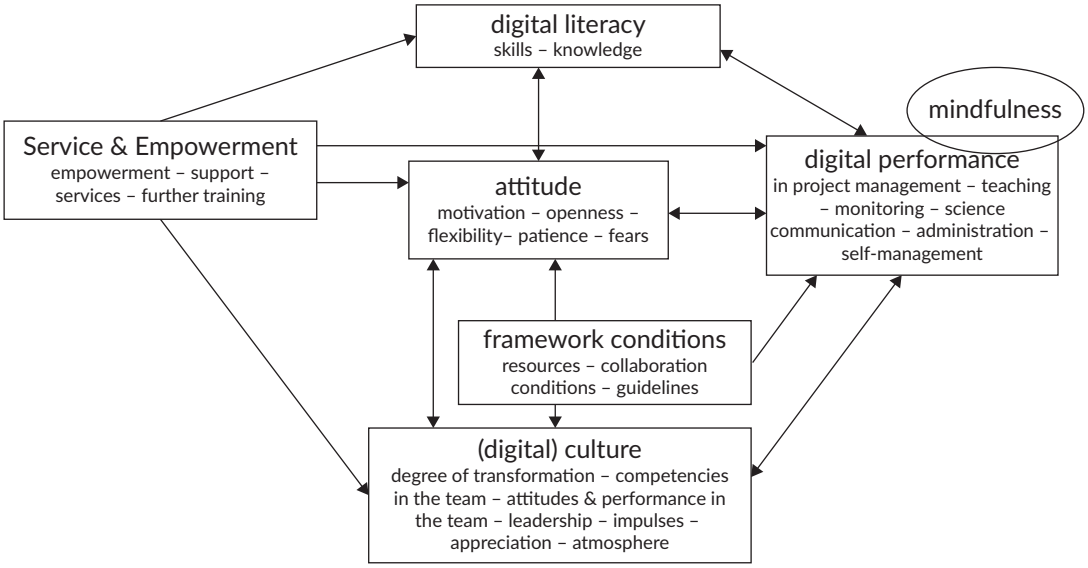

Figure 1. Factors influencing digital performance.

skills are at the core because they are transferable. It is crucial to have an overview of the possibilities of digital tools and a vision of what digital tools can be used for.

Digital culture describes the atmosphere regarding the use of digital resources, behavior, and engagement with digital developments at the university as a whole and in individual teams. Its importance, as stated by Murawski and Bick (2017) and Meyers et al. (2013), can be confirmed and is shaped by several factors. If employees perceive the university level of digital transformation as less innovative, this can inhibit their willingness to develop, whether due to a lack of incentives or perceived barriers. Skills and attitudes within the team are crucial. The more open it is, the more people follow or benefit from the pioneers and impulses within the team. In TAM3, the image created by a person's use of technology and the opinion of important people are identified as central factors in technology acceptance (Venkatesh, 2000). Managers can encourage and value training. They are responsible for negotiating a mutual understanding of communication. This is reflected in project collaboration and exchange. A positive atmosphere encourages experimentation and allows people to make mistakes and try new things. Finally, appreciation also has a significant impact—whether through resources provided or through gratitude and recognition.

With regard to conditions, these refer to resources mentioned as an important factor in TAM3 (Venkatesh & Bala, 2008). Lack of resources—whether time or money to invest in hardware or software—is the biggest reported barrier to digital performance. It is equated with a lack of appreciation. Requirements such as data protection and ethical guidelines are recognized as important when using digital tools. However, they are often so restrictive that many choose to avoid using these digital tools altogether because the use of them becomes too complicated. In-depth use of digital tools often falls victim to different teams working with different digital tools. In-depth training is then seen as having little value.

Services and empowerment are considered offerings from the university that relieve and support employees. These include, for example, contact points for questions, technical support, coaching, and training opportunities. It is important that these offerings are adapted to the limited time resources of employees. That's why they should be very situation- and person-specific. Services that reduce the workload and demands on employees help to reduce overload and remove initial barriers to using digital resources by academic staff. A similar finding by Koch and Klopfenstein (2021) shows that the demands on digital skills can be reduced if organizations create proper conditions.

An aspect that "hovers" over digital performance is *mindfulness*. Technology stress must not be underestimated. Mindfulness involves managing one's resources (both emotional and practical) and being aware of the impact of digital tools and communication (e.g., how can I manage criticism on social media? How does digital communication stress me?). Pfaffinger et al. (2023) demonstrate that mindfulness apps can help reduce stress at work.

The different dimensions are interrelated and influence each other. A person's openness is a crucial determinant of their willingness to engage with digital tools and channels and to acquire the skills to do so. This has a direct impact on digital performance and digital skills. As a team member, an individual's openness and mindfulness directly influence the digital culture, which in turn influences the individual's openness. Services and empowerment offerings partly reflect digital culture but also directly promote digital skills and can contribute to (further) openness and reduce employee anxiety. Framework conditions can potentially

support openness and digital culture but can also be restrictive and thus inhibiting. All the dimensions mentioned above—openness, culture, digital skills, framework, and services/empowerment—have an impact on digital performance. The use and experimentation with digital tools and channels can have an impact on openness and digital culture.

6. Prospects and Limitations

The model has been transformed into an assessment tool that provides a structured self-assessment of the team's digital performance. It is designed for executives and project managers to identify challenges and needs for action related to digital performance in the team. The assessment is structured according to the sub-dimensions of the model and includes statements such as:

- I have NO reservations about using digital communication and collaboration tools (openness);
- The team is regularly encouraged to try new digital communication and collaboration tools (digital culture);
- The digital tools we have available for teaching meet my needs (framework conditions);
- Employees are empowered to use new digital tools with care (self-management, empowerment);
- I know which digital communication and collaboration tools are relevant to my work (digital literacy);
- There are contacts for questions about social media activities (science communication, empowerment);
- I would like a collection of tips for working with digital tools (service requests).

A specific section deals with science communication and requests. The assessment can be completed specifically for research/advising or teaching. It's based on a 6-point Likert scale, and it's possible to indicate if an item is considered irrelevant. The next step is to test its applicability and reliability in a quantitative survey and to reduce the number of items to make it more applicable.

The assessment tool provides a means for developing awareness of, and reflection on, one's digital literacy and performance. Moreover, it includes an assessment of the organizational setting, which is crucial for employees' performance and motivation. Self-reflection is already acknowledged as a valuable method to foster the digital literacy of academics (Inamorato dos Santos et al., 2023). A crucial first step in improving the digital competence and performance of academic staff is recognizing both personal but even more organizational deficits and limitations for digital performance. Identifying potential hurdles and demotivating factors is essential, as it can prompt discussions on how organizations can better support and alleviate staff burdens. This is particularly important given that personal time constraints are a major factor limiting the advancement of digital literacy and performance. Organizations can create environments that foster skill development and alleviate competency demands by providing tailored overviews of tools and their applications in the academic context. This requires an understanding of the specific work within various disciplines. Customization of offerings by the institution is important, as training is often not at the right time or is too general. This also has been highlighted by Fernández-Morante et al. (2023). Personalization may be through field-specific contacts, discipline-specific guides, or personal training. We, therefore, recommend using the assessment tool within teams and institutes as an indicator of the position of employees to define areas for action. It creates a basis for discussion, in which weightings should be made jointly and decisions made as to where action is required.

In regards to the limitations of this article, first, designed as a case study, only one university was examined. The specific context of that institution has influenced the participants' responses. Secondly, the sample is composed exclusively of academic staff, though it is diverse due to different hierarchies and disciplines. Thirdly, the results are based on participants' self-assessments and assessments by others, without the use of concrete measurements or objective indicators. Assessments are individualized but reflect employees' perceptions. The comprehensive survey of all work and application areas is both an advantage and a limitation. For future study, it seems essential to focus on the field of science communication separately from teaching and research, as there are different prerequisites and use cases. Therefore, this aspect sometimes gets less attention in this study. It is assumed that the factors of the framework model are likely to apply to all fields of university work.

Funding

The study was made possible by a DIZH Fellowship through ZHAW digital. Open access funding was provided by ZHAW Zurich University of Applied Sciences.

Conflict of Interests

The authors were employed at the university under study. Their institute was not included in the research. The respondents were not personally acquainted with the authors.

Data Availability

A German version of the interview guide is available at ResearchGate. To protect the anonymity of the respondents, the interview transcripts cannot be made publicly available.

References

Aavakare, M., & Nikou, S. (2020). *University staffs' everyday engagement with digital technology—Exploring the role of information literacy and digital literacy*. International Telecommunications Society. https://www.econstor.eu/bitstream/10419/224840/1/Aavakare-Nikou.pdf

Aguilera, E., & Pandya, J. (2021). Critical literacies in a digital age: Current and future issues. *Pedagogies: An International Journal*, *16*(2), 103–110. https://doi.org/10.1080/1554480X.2021.1914059

Arthur, S. (2013). Digital literacy in a global context. In S. Kurbanoğlu, E. Grassian, D. Mizrachi, R. Catts, & S. Špiranec (Eds.), *Communications in computer and information science. Worldwide commonalities and challenges in information literacy research and practice* (pp. 141–147). Springer.

Audrin, B., Audrin, C., & Salamin, X. (2024). Digital skills at work—Conceptual development and empirical validation of a measurement scale. *Technological Forecasting and Social Change*, *202*, Article 123279. https://doi.org/10.1016/j.techfore.2024.123279

Bartra-Rivero, K., Vásquez-Pajuelo, L., Avila-Sánchez, G., Andrade-Díaz, E., Méndez-Ilizarbe, G., Rodriguez-Barboza, J., & Alarcón-Villalobos, Y. (2024). How digital competence reduces technostress. *Data and Metadata*, *3*(303), 1–14. https://doi.org/10.56294/dm2024303

Basantes-Andrade, A., Casillas-Martín, S., Cabezas-González, M., Naranjo-Toro, M., & Guerra-Reyes, F. (2022). Standards of teacher digital competence in higher education: A systematic literature review. *Sustainability*, *14*(21), Article 13983. https://doi.org/10.3390/su142113983

Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear (Ed.), *Digital literacies: Concepts, policies and practices* (pp. 17–32). Lang.

Beardsley, M., Albó, L., Aragón, P., & Hernández-Leo, D. (2021). Emergency education effects on teacher

abilities and motivation to use digital technologies. *British Journal of Educational Technology*, *52*(4), 1455–1477. https://doi.org/10.1111/bjet.13101

Bennett, L. (2014). Learning from the early adopters: Developing the Digital Practitioner. *Research in Learning Technology*, *22*, Article 21453. https://doi.org/10.3402/rlt.v22.21453

Busolo, G., Nderu, L., & Ogada, K. (2021). A multilevel technology acceptance management model. *AIRCC's International Journal of Computer Science and Information Technology*, *13*(1), 57–74. https://doi.org/10.5121/csit.2020.101802

Buvat, J., Solis, B., Crummenerl, C., Aboud, C., Kar, K., El Aoufi, H., & Sengupta, A. (2017). *The digital culture challenge: Closing the employee-leadership gap*. Digital Transformation Institute; Capgemini.

Carretero, S., Vuorikari, R., & Punie, Y. (2017). *The digital competence framework for citizens: With eight proficiency levels and examples of use*. Publications Office of the European Union.

Celot, P. (2015). *Assessing media literacy levels and the European Commission pilot initiative*. European Association for Viewers Interests. https://eavi.eu/wp-content/uploads/2017/08/assessing.pdf

Chetty, K., Qigui, L., Gcora, N., Josie, J., Wenwei, L., & Fang, C. (2018). Bridging the digital divide: Measuring digital literacy. *Economics*, *12*(2018-23), 1–20. https://doi.org/10.5018/economics-ejournal.ja.2018-23

Clifford, I., Kluzer, S., Troia, S., Jakobsone, M., & Zandberg, U. (2020). *DigCompSat: A self-reflection tool for the European digital framework for citizens*. European Commission. https://data.europa.eu/doi/10.2760/77437

Collard, A., de Smedt, T., Dufrasne, M., Fastrez, P., Ligurgo, V., Patriarche, G., & Philippette, T. (2017). Digital media literacy in the workplace: A model combining compliance and inventivity. *Italian Journal of Sociology of Education*, *9*(02), 122–154. https://doi.org/10.14658/pupj-ijse-2017-1-7

Cutri, R., Mena, J., & Whiting, E. (2020). Faculty readiness for online crisis teaching: Transitioning to online teaching during the COVID-19 pandemic. *European Journal of Teacher Education*, *43*(4), 523–541. https://doi.org/10.1080/02619768.2020.1815702

Darwin, R. (2017). Language, ideology, and critical digital literacy. In S. Thorne & S. May (Eds.), *Encyclopedia of language and education* (pp. 17–30). Springer.

Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

Davis, F., & Granić, A. (2024). *The technology acceptance model: 30 years of TAM*. Springer.

Dragano, N., Riedel-Heller, S., & Lunau, T. (2021). Haben digitale Technologien bei der Arbeit Einfluss auf die psychische Gesundheit? *Der Nervenarzt*, *92*(11), 1111–1120. https://doi.org/10.1007/s00115-021-01192-z

Eichhorn, M. (2020). Digital literacy, fluency und scholarship: Ein Entwicklungsmodell digitaler Kompetenzen von Hochschullehrenden. In M. Merkt, A. Spiekermann, T. Brinker, A. Werner, & B. Stelzer (Eds.), *Hochschuldidaktik als professionelle Verbindung von Forschung, Politik und Praxis* (pp. 81–94). wbv Media.

Fernández-Batanero, J., Román-Graván, P., Montenegro-Rueda, M., López-Meneses, E., & Fernández-Cerero, J. (2021). Digital teaching competence in higher education: A systematic review. *Education Sciences*, *11*(11), Article 689. https://doi.org/10.3390/educsci11110689

Fernández-Morante, C., López, B., Casal-Otero, L., & León, F. (2023). Teachers' digital competence. The Case of the university system of Galicia. *Journal of New Approaches in Educational Research*, *12*(1), 62–76. https://doi.org/10.7821/naer.2023.1.1139

Ferrari, A. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe*. Publications Office of the European Union. https://data.europa.eu/doi/10.2788/52966

Friedrichsen, M., & Wersig, W. (2020). Digitale Kompetenz—Notwendigkeit und Kerngedanken. In M. Friedrichsen & W. Wersig (Eds.), *Synapsen im digitalen Informations—und Kommunikationsnetzwerk*.

Digitale Kompetenz: Herausforderungen für Wissenschaft, Wirtschaft, Gesellschaft und Politik (pp. 3–6). Springer.

Garavaglia, A., Petti, L., & Triacca, S. (2022). Integration of LifeComp and DigComp 2.2 as a theoretical framework for media education. In M. Ranieri, M. Pellegrini, L. Menichetti, A. Roffi, & D. Luzzi (Eds.), *Social justice, media and technology in teacher education* (pp. 59–70). Springer.

Hoeven, C., van Zoonen, W., & Fonner, K. (2016). The practical paradox of technology: The influence of communication technology use on employee burnout and engagement. *Communication Monographs*, *83*(2), 239–263. https://doi.org/10.1080/03637751.2015.1133920

Ilomäki, L., Lakkala, M., Kallunki, V., Mundy, D., Romero, M., Romeu, T., & Gouseti, A. (2023). Critical digital literacies at school level: A systematic review. *Review of Education*, *11*(3), 1–28. https://doi.org/10.1002/rev3.3425

Inamorato dos Santos, A., Chinkes, E., Carvalho, M. A. G., Solórzano, C. M. V., & Marroni, L. S. (2023). The digital competence of academics in higher education: Is the glass half empty or half full? *International Journal of Educational Technology in Higher Education*, *20*, Article 9. https://doi.org/10.1186/s41239-022-00376-0

Jahn, S., Dathe, R., Boberach, M., & Czech, A. (2021). *Digital Skill Gap: So (unterschiedlich) digital kompetent ist die deutsche Bevölkerung*. Initiative D21 e. V. https://initiatived21.de/app/uploads/2021/08/digital-skills-gap_so-unterschiedlich-digital-kompetent-ist-die-deutsche-bevlkerung.pdf

Jisc Data Analytics. (2024). *Building digital capabilities framework: The six elements defined*. https://digitalcapability.jisc.ac.uk/what-is-digital-capability/individual-digital-capabilities

Knobel, M., & Lankshear, C. (2006). Digital literacy and digital literacies: Policy, pedagogy and research considerations for education. *Nordic Journal of Digital Literacy*, *1*(1), 12–24. https://doi.org/10.18261/ISSN1891-943X-2006-01-03

Koch, C., & Klopfenstein, N. (2021). Mit digitaler Kultur zur verbindlichen Freiwilligenkommunikation. Wie Strukturbedingungen Inklusion in der Freiwilligenarbeit fördern können. In G. Keel & W. Weber (Eds.), *Media Literacy* (pp. 143–156). Nomos Verlagsgesellschaft. https://doi.org/10.5771/9783748920656-143

Koltay, T. (2011). The media and the literacies: media literacy, information literacy, digital literacy. *Media, Culture & Society*, *33*(2), 211–221.

Körner, U., Müller-Thur, K., Lunau, T., Dragano, N., Angerer, P., & Buchner, A. (2019). Perceived stress in human-machine interaction in modern manufacturing environments. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *35*(2), 187–199. https://doi.org/10.1002/smi.2853

Krumsvik, R., & Jones, L. (2013). *Teachers' digital competence in upper secondary school*. In L. Morris & C. Tsolakidis (Eds.), *ICICTE 2013 proceedings* (pp. 171–183). http://www.icicte.org/Proceedings2013/Papers%202013/05-1-Krumsvik.pdf

Loosen, W. (2015). Das Leitfadeninterview—eine unterschätzte Methode. In S. Averbeck-Lietz & M. Meyen (Eds.), *Handbuch nicht standardisierte Methoden in der Kommunikationswissenschaft* (pp. 139–156). Springer.

Louw, L., & Thukane, M. (2020). Teaching and learning sciences in times of disruption: Blended Learning in action. *Journal for New Generation Sciences*, *17*(2), 31–43.

Mäkiniemi, J. (2022). Digitalisation and work well-being: A qualitative study of techno-work engagement experiences related to the use of educational technology. *International Journal of Educational Management*, *36*(2), 152–163. https://doi.org/10.1108/IJEM-07-2021-0276

Martin, A., & Grudziecki, J. (2006). DigEuLit: Concepts and tools for digital literacy development. *Innovation in Teaching and Learning in Information and Computer Sciences*, *5*(4), 249–267. https://doi.org/10.11120/ital.2006.05040249

Mayring, P. (2022). *Qualitative Inhaltsanalyse: Grundlagen und Techniken*. Julius Beltz.

Meyers, E., Erickson, I., & Small, R. (2013). Digital literacy and informal learning environments: An introduction. *Learning, Media and Technology*, *38*(4), 355–367. https://doi.org/10.1080/17439884.2013.783597

Moreira-Fontán, E., García-Señorán, M., Conde-Rodríguez, Á., & González, A. (2019). Teachers' ICT-related self-efficacy, job resources, and positive emotions: Their structural relations with autonomous motivation and work engagement. *Computers & Education*, *134*, 63–77. https://doi.org/10.1016/j.compedu.2019.02.007

Murawski, M., & Bick, M. (2017). Digital competences of the workforce—A research topic? *BPMJ*, *23*(3), 721–734. https://doi.org/10.1108/BPMJ-06-2016-0126

Nikou, S., de Reuver, M., & Mahboob, M. (2022). Workplace literacy skills-how information and digital literacy affect adoption of digital technology. *Journal of Documentation*, *78*(7), 371–391. https://doi.org/10.1108/JD-12-2021-0241

Oberländer, M., Beinicke, A., & Bipp, T. (2020). Digital competencies: A review of the literature and applications in the workplace. *Computers & Education*, *146*, Article 103752. https://doi.org/10.1016/j.compedu.2019.103752

Ozkan-Ozen, Y., & Kazancoglu, Y. (2022). Analysing workforce development challenges in the Industry 4.0. *International Journal of Manpower*, *43*(2), 310–333. https://doi.org/10.1108/IJM-03-2021-0167

Pfaffinger, K., Reif, J., Spiess, E., Czakert, J., & Berger, R. (2023). Using digital interventions to reduce digitalization-related stress: Does it work? *International Journal of Occupational Safety and Ergonomics*, *29*(3), 1196–1211. https://doi.org/10.1080/10803548.2022.2115234

Reinmann, G., Hartung, S., & Florian, A. (2013). *Akademische Medienkompetenz im Schnittfeld von Lehren, Lernen, Forschen und Verwalten*. In P. Imort & H. Niesyto (Eds.), *Grundbildung Medien in pädagogischen Studiengängen* (pp. 143–156). Nomos Verlagsgesellschaft; Kopaed.

Romero-Hall, E., & Jaramillo Cherrez, N. (2023). Teaching in times of disruption: Faculty digital literacy in higher education during the COVID-19 pandemic. *Innovations in Education and Teaching International*, *60*(2), 152–162. https://doi.org/10.1080/14703297.2022.2030782

Rosenberger, N., Niederhäuser, M., & Krämer, K. (2023). *Kommunikation in der digitalen Transformation: Trendstudie Schweiz 2022* (Working Papers 22). ZHAW. https://doi.org/10.21256/zhaw-2808

Shah, A. (2019). *Defining digital wellbeing*. Jisc. https://digitalcapability.jiscinvolve.org/wp/2019/09/03/defining-digital-wellbeing

Sharpe, R., & Beetham, H. (2010). Understanding students' uses of technology for learning: Towards creative appropriation. In R. Sharpe, H. Beetham, & S. de Freitas (Eds.), *Rethinking learning for a digital age: How learners are shaping their own experiences* (pp. 85–99). Routledge.

Trültzsch-Wijnen, C. (2020). *Medienhandeln zwischen Kompetenz, Performanz und Literacy*. Springer.

UNESCO. (2013). *Global media and information literacy assessment framework: Country readiness and competencies*.

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, *72*, 577–588. https://doi.org/10.1016/j.chb.2017.03.010

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2018). 21st-century digital skills instrument aimed at working professionals: Conceptual development and empirical validation. *Telematics and Informatics*, *35*(8), 2184–2200. https://doi.org/10.1016/j.tele.2018.08.006

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, *11*(4), 342–365. https://doi.org/10.1287/isre.11.4.342.11872

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, *39*(2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *Digcomp 2.2: The digital competence framework for citizens: With new examples of knowledge, skills and attitudes*. Publications Office of the European Union. https://doi.org/10.2760/115376

Vuorikari, R., & Punie, Y. (2019). *The use of reference frameworks to support digitally competent citizens—the case of DigComp*. Joint Research Centre of the European Commission. https://www.researchgate.net/publication/336071434_The_use_of_reference_frameworks_to_support_digitally_competent_citizens_-the_case_of_DigComp#full-text

Vuorikari, R., Punie, Y., Carretero, S., & van den Brande, L. (2016). *DigComp 2.0: The digital competence framework for citizens*. Publications Office of the European Union. https://data.europa.eu/doi/10.2791/11517

Wedekind, J. (2009). *Akademische Medienkompetenz: Virtuelle Ringvorlesung e-teaching.org 19.01.2009*. e-teaching.org. https://www.e-teaching.org/projekt/personal/medienkompetenz/Medienkompetenz_JW.pdf

About the Authors

Carmen Koch holds a PhD in media and communication studies and works as a researcher, lecturer, and research coordinator at the IAM Institute for Applied Media Studies at the ZHAW Zurich University of Applied Sciences. She received a scholarship from the ZHAW Digital Initiative, which made this study possible. Her research interests include media literacy, digital literacy, and news literacy. At this interface, she is also interested in volunteer communication and school communication.

Fiona Fehlmann holds a PhD in media and communication studies and works as a research associate at the IAM Institute for Applied Media Studies at the ZHAW Zurich University of Applied Sciences. In her dissertation, she investigated the interaction of young people with public service media content in Switzerland. Her research interests include media literacy, public broadcasting, and news literacy.