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Towards an extended framework for digital competence of educators. The validation process through experts' review

Verso un quadro ampliato delle competenze digitali degli educatori. Il processo di validazione attraverso la revisione degli esperti

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ABSTRACT In response to recent changes in the educational landscape, educators are increasingly expected to possess a diverse range of skills, knowledge and competences related to teaching with ICT. However, in the complex post-COVID scenario, it seems that the essential role of social-relational and emotional skills in effectively transmitting educational content is often overlooked in the institutional and training interventions. In this article, we illustrate the validation phase of the D-Paideia Qualification Framework, which serves as an extension and update of the DigCompEdu framework about these topics. Through consultation with a panel of 30 international experts, we identified points of connection and divergence between the new competences introduced and those already present in the original framework, as well as assessing and improving the naming and descriptions of the new competences.

KEYWORDS Teaching with ICT; Social-Relational Skills; Teachers Digital Competence; DigCompEdu Framework; Educational Experts.

SOMMARIO In risposta ai recenti cambiamenti nel panorama educativo, si richiede sempre più che gli educatori posseggano una gamma diversificata di abilità, conoscenze e competenze relative all'insegnamento con le TIC. Tuttavia, nel complesso scenario post-COVID, sembra che il ruolo essenziale delle competenze socio-relazionali ed emotive nella trasmissione efficace dei contenuti educativi sia spesso trascurato negli interventi istituzionali e formativi. In questo articolo, illustriamo la fase di validazione del D-Paideia Qualification Framework, una potenziale estensione e aggiornamento del framework DigCompEdu su questi temi. Attraverso la consultazione di un panel di 30 esperti internazionali, abbiamo identificato i punti di connessione e di divergenza tra le nuove competenze e quelle già presenti nel framework originale, oltre a valutare e migliorare la denominazione e la descrizione delle nuove competenze.

PAROLE CHIAVE Insegnare con le TIC; Competenze Socio-Relazionali; Competenze Digitali degli Insegnanti; DigCompEdu; Esperti di Formazione.

1. Introduction

International school systems have undergone a transformation in how education is delivered following the COVID-19 pandemic and the experience of Emergency Remote Teaching (ERT). This period, characterised by an unparalleled integration of technology into teaching and learning processes, has stimulated digital innovation and prompted a re-evaluation of educational practices (Zhao & Watterston, 2021). Despite the challenging circumstances, remote learning has highlighted the difficulties and potentials of e-learning and underlined the need to consider new aspects in teachers' pedagogical-digital training (Carretero et al., 2021).

Four years after the ERT experience, discussions about education is no longer focused exclusively on traditional, in-person teaching methods. Today, educational institutions have the opportunity to exploit technology to enhance or extend classroom teaching, e.g. through online, hybrid or blended learning modes, encountering reduced technical barriers and mitigated resistance from teachers (Ranieri, 2022). Nevertheless, there is still significant space for enhancement and innovation within educational systems and among teaching staff. Numerous national and international programs have been implemented to accomplish this goal, such as the Digital Education Action Plan (2021-2027), outlined by the European Commission. The programme aims to promote high-quality, inclusive and accessible digital education across Europe through several actions, including the improvement of digital skills and competences for the digital transformation (European Commission, 2020).

In line with this vision, the Erasmus+ project D-Paideia "*Pedagogical Digital Competences as a key element for digital transformation*" seeks to address the evolving digital educational landscape. Based on the challenges identified during the COVID-19 pandemic, the project aims to enhance teachers' abilities and competences to effectively teach in a digital environment and to support the development of digital pedagogical strategies at the institutional level. After a rigorous literature review (Gabbi et al., 2023), the first project action was to develop a Qualifications Framework (QF), based on DigCompEdu (Redecker, 2017) – one of the most popular frameworks on educators' digital competences – focusing on dimensions that were crucial during the ERT experience (OECD, 2021), but are still scarcely explored in DigCompEdu: social and emotional learning, digital well-being and mental health.

The validation phase of the D-Paideia QF proposal, conducted by teachers and experts at international level, played a decisive role in further delineating the competence areas outlined in the literature. Two simultaneous consultation phases were initiated, each operating independently of the other. On one hand, European teachers actively participated in interactive workshop sessions to identify specific elements of digital competence in their daily teaching practice, without explicitly referring to the project framework by the D-Paideia consortium. On the other hand, international educational experts were asked to assess each competence embedded in the D-Paideia QF proposal in terms of clarity, coherence and relevance.

In this paper, we illustrate the validation stage carried out by the consortium under the guidance of the University of Florence, with the panel of experts to identify points of connection and distance between the new knowledge and competences introduced in the DigCompEdu framework and those already present in it. Moreover, the validation process also aimed to improve the naming and/or description of the new competences that have been integrated in the existing framework.

2. Theoretical background

2.1. Socio-relational and emotional skills in digital education: insights from ERT experience

In response to the important changes affecting the educational landscape, teachers are increasingly expected to possess a diverse range of skills, knowledge and competences. In this complexity, it appears that a crucial competence is being overlooked. Indeed, alongside disciplinary competence, socio-relational and emotional competences are essential for the effective transmission of educational content. This encompasses teachers' ability to understand and regulate their own emotions, demonstrate empathetic behaviour towards themselves and others and develop positive relationships throughout their teaching careers (Schonert-Reichl, 2017). Additionally, it involves the ability to recognize the needs and common challenges of specific age groups or transitory life events and to skilfully manage classroom dynamics and conflicts (Chiappetta Cajola & Ciraci, 2013; Jennings & Greenberg, 2009). While the socio-relational and emotional dimension is particularly crucial in the early years of schooling, from early childhood education to primary school, it tends to receive less attention as students' age progresses.

Nevertheless, one of the lessons learned during the COVID-19 pandemic is the importance of not neglecting the socio-relational and emotional dimension in education, particularly in distance learning contexts, because it plays a vital role in fostering deep learning and a successful learning experience (Fullan et al., 2017). A study from the European Commission's Joint Research Centre (JRC) reminds us that: "*teachers not only are expected to deal with digital technology but also with delicate social contexts and circumstances. Besides digital competence, they need to be well aware of the social, emotional and affective aspects of digital technology-based education*" (Carretero et al., 2021, p. 14). Indeed, despite the benefits of digital innovation, some situations in the educational experience require interaction and human presence: something that technology itself cannot replace. It is not the technology that impacts learning outcomes, but rather its utilisation in teaching practices and the quality of interactions it facilitates could lead to student empowerment (Llorente-Cejudo et al., 2023).

The ERT experience has sometimes caused stress in the teaching staff as interaction and non-verbal communication were further reduced when webcams and/or microphones were not used in learning sessions, making the online lesson essentially a "one man show" (Teng & Wu, 2021). Moreover, the absence of visible emotional cues in online classes presented a challenge for teachers in interpreting student responses: unlike in face-to-face lessons, where feedback is readily apparent, teachers often found themselves unaware of student reactions in online settings. Lastly, online teaching and digital learning environments have posed challenges to educators in improving student interaction and engagement.

Digital competence, as part of the key competences of citizens for lifelong learning, is nowadays considered essential in teaching work. However, teacher training should also prioritise the enhancement of socio-relational and emotional competences, essential to effectively manage the complexities of technology-enhanced learning environments with the aim of promoting digital inclusion (Burns & Kolho, 2022; Ranieri, 2022).

2.2. Rethinking DigCompEdu in the post COVID-19 Era

the tools developed by the European Commission to help educational organisations and educators promoting self-reflection and self-assessment on pedagogical-digital competences are prominent. Spe-

cifically, the DigCompEdu framework and its derivatives instruments are widely utilised on an international scale. For example, the SELFIE (Self-reflection on Effective Learning by Fostering Innovation through Educational Technology) for Teachers is oriented towards personal reflection and planning for autonomous professional development (Kampylis et al., 2016), while the recently developed DigCompEdu Check-in is oriented towards formal assessment of digital competences and the provision of structured feedback for improvement (Llorente-Cejudo et al., 2023).

The DigCompEdu framework presents 22 competences, divided into six macro areas, in which technologies are integrated into teaching in a meaningful pedagogically way (Redecker, 2017). There are six professional profiles identified with the same letters as the frameworks for European language certification (from A1 – newcomer to C2 – pioneer): the levels are cumulative and are imagined as a path of expansion and refinement of competences, developed through experience, reflection and collaboration among teachers. In Table 1, there is a brief overview of the areas of competence of the DigCompEdu and related indicators.

The DigCompEdu framework, developed in 2017 by the European Commission with the collaboration of the JRC, is the result of a series of discussions and reflections with experts and practitioners based on an initial literature review and the synthesis of existing tools at the local, national, European and international levels (Caena & Redecker, 2019). The purpose of these consultations was to reach an agreement on the main areas and elements of educators' digital competence – to determine which elements were central and which were marginal – and to establish a progression hierarchy in digital competence within each area. Although the DigCompEdu encompasses various aspects of digital communication and social interaction (e.g., organisational communication, professional collaboration and collaborative learning), their role as mediators in teacher-student relationships appears underexplored. In the following, we outline some areas that could be revised in the light of the ERT experience and on the basis of existing e-skills models for teaching that also take into account social, relational and affective aspects.

The area of professional engagement recognises the central role of educators' interactions with their professional environment in the midst of social, cultural and political changes. Competencies such as personal-ethical and personal-professional need to become part of the mindsets of teachers (Chiu et al., 2024). However, other theoretical models focusing on teachers' pedagogical-digital competence have offered diverse perspectives on the professional aspect of teaching.

A sociocultural perspective on digital competence includes, although often underestimated, critical awareness of local ICT policies and resources: an essential dimension for navigating the changing socio-economic landscape and improving effectiveness. Educators should be aware of the broader policy landscape affecting education to enhance their agency (Butcher, 2018). By understanding and navigating the complex network of policies that influence the use of ICT in education, teachers can adapt to a rapidly changing policy environment and make informed decisions for the benefit of their students and the whole school community (Generalitat de Catalunya, 2018).

The dimension relating to the approach to using teaching technologies should also concern the area of the teacher's professional development. With a perspective of continuous learning, a teacher should necessarily possess intrinsic motivation and a proactive attitude towards embracing technology. When teachers are motivated, tend to demonstrate greater investment in their schools, enthusiasm in facing new challenges, willingness to make extra efforts and acceptance of the school's vision and values, also positively influencing students' motivation (Ryan & Deci, 2020). With a constructive outlook and a willingness to explore, experiment and critically evaluate innovations, educators are better prepared to effectively integrate digital technologies into their teaching practices (McDonagh et al., 2021).

Table 1. Overview of the areas of competence of the DigCompEdu.

AREAS		INDICATORS
Educators' Professional Competences	**1. Professional Engagement** Using technology effectively for communication, collaboration and reflecting on teaching practices.	1.1 *Organisational communication*: using technology to communicate with students, families and territory; 1.2 *Professional collaboration*: using technology to communicate, exchange experiences and materials with other colleagues; 1.3 *Reflective practice*: using technology to critically evaluate one's own or others' digital pedagogical practice; 1.4 *Digital continuous professional development*: using digital sources and resources for resources for CDP.
Educators' Pedagogic Competences	**2. Digital Resources** Selecting, creating and managing digital educational materials while adhering to data protection and copyright laws.	2.1 *Selecting*: selecting digital resources, taking into account objectives, targets, context; 2.2 *Creating and modifying*: modifying existing resources and adapting them to the context of use; 2.3 *Managing, protecting and sharing*: organising digital content and sharing it with students and families while respecting personal data, privacy and copyright.
	3. Teaching and Learning Integrating digital tools to facilitate collaborative and self-regulated learning, with guidance and support.	3.1 *Teaching*: planning and implementing digital resources in teaching, effectively managing intervention strategies and experimenting through the development of new methods; 3.2 *Guidance*: using technologies to foster interaction between students inside and outside the classroom, providing support and guidance; 3.3 *Collaborative learning*: using technology to facilitate the organisation of work among students in a collaborative way; 3.4 *Self-regulated learning*: using technology to make students reflect on their own learning.
	4. Assessment Using digital technology for assessment and timely feedback.	4.1 *Assessment strategies*: using technology for assessment; 4.2 *Analysing evidence*: generating, selecting, critically analysing and interpreting empirical evidence on student activity and performance; 4.3 *Feedback and planning*: using technology to provide students with responses that are planned over time and categorised by target audience.
	5. Empowering Learners Designing personalised learning experiences with equal access to digital tools.	5.1 *Accessibility and inclusion*: using technology to meet the learning needs, especially with SEND students; 5.2 *Differentiation and personalisation*: using technology to differentiate learning paths; 5.3 *Actively engaging learners*: using technology to develop transversal skills and make learners more active and creative.
Learners' Competences	**6. Facilitating Learners' Digital Competence** Supporting students in using digital technology safely and responsibly, promoting digital literacy and problem-solving skills.	6.1 *Information and media literacy*; 6.2 *Communication*; 6.3 *Content creation*; 6.4 *Responsible use*; 6.5 *Problem solving*.

Moreover, ensuring a harmonious balance and safe use of technology in the educational context is another indispensable aspect of professional teaching. Indeed, in an extension of the TPACK framework, Falloon (2020) focused on elements such as personal-ethical and personal-professional skills, emphasising the importance of ethical conduct, safety and effectiveness in navigating various digital

environments. Educators are often subject to the risks of digital overload and, therefore, they need strategies to efficiently manage their online activities and adopt safe practices when using ICT (EdDi-co, 2021; ETF, 2019). This is especially noticeable in a context where the boundary between online and offline is increasingly blurred, as these two realms have merged into what is now termed "onlife" across various domains of human existence (Floridi, 2017).

In addition to professional competence, educators' pedagogical competences must also take into account the transformations that have impacted the socio-economic context since the development of DigCompEdu in 2017, up to the present day.

The COVID-19 pandemic significantly emphasised crucial aspects of digital education, such as emotional, social and psychological dimensions. During Emergency Remote Teaching, maintaining relationships through collaboration and communication with students, families and colleagues became crucial for mental health (OECD, 2021). Furthermore, school and student life now takes place predominantly on social platforms, through the sharing of short videos or pictures: the dynamics of social networks have led to the emergence of new forms of anxiety, such as FOMO (Fear of Missing Out), the fear of being excluded from experiences in which others participate (Antonacci, 2023). There is a growing educational imperative to promote media education and foster socio-relational and emotional competences, in both teachers and students, to better cope with these new social situations. In particular, teachers should foster positive relationships in the digital learning environment, using communication as a tool to promote educational relationships with all actors involved, including families (OECD, 2021).

Moreover, online and blended learning has required greater consideration for students with special educational needs, particularly those with disabilities and from disadvantaged backgrounds (Carretero et al., 2021; European Commission, 2022). Technologies are essential for the inclusive process of all members of a class, but it is necessary to go beyond the mere introduction of digital tools or materials: the teacher must build, first and foremost, a supportive and inclusive learning community that strengthens the sense of belonging and well-being of all individuals (Llorente-Cejudo et al., 2023; School Education Gateway, 2020).

To enhance social-relational skills, educators should also have the ability to adapt teaching strategies across diverse learning modalities while prioritising affective and communicative elements essential for their success. It entails critical reflection on the efficacy and appropriateness of chosen digital tools, empowering educators to make agile adjustments in their guidance and monitoring actions, with a focus on computer-mediated communication (Ong & Quek, 2023). Addressing pedagogical, relational and socio-emotional dimensions enhances teaching and learning experiences across various settings to support the continuity of the educational relationship in different modes such as fully online, blended or hybrid (ETF, 2019; Kelentrić, Helland & Arstorp, 2017).

Finally, educators need to understand how to use and share personal and professional information, deal with online identity management and consider the potential impact of digital actions on professional and educational relationships. This aspect emphasises professional interactions within contexts such as online communities, interactions with students and the broader educational community. It entails the teacher's responsibility to uphold ethical boundaries within their digital identity, to maintain a balance between their digital and professional personalities and to preserve online privacy and safety (ETF, 2019; Falloon, 2020).

2.3. The innovation proposed by the D-Paideia QF

Due to its prominence and significance, the DigCompEdu Framework served as the foundational basis for developing the D-Paideia QF, which was refined through an iterative process, consistently with the process followed to develop the original model. Initially, based on extensive desk research, theoretical references (e.g., Butcher, 2018; Falloon, 2020), operational models (e.g., ETF, 2019; McDonagh et al., 2021) and institutional surveys on teachers' digital competence in Europe before and after COVID-19 (e.g., OECD, 2021; School Education Gateway, 2020) were identified and selected (Gabbi et al., 2023). This review helped identify existing competencies and highlight gaps, particularly in addressing socio-relational and emotional skills and digital wellbeing issues. The basic elements of the selected resources were then mapped to form the new set of competences to be added to DigCompEdu and grouped to form the competence areas of the D-Paideia QF. Special attention was given to ensuring that each competency was comprehensive, actionable and reflective of the latest developments in digital education and policy. Specifically, the proposed enhancements concerned the integration of three new elements in the Professional engagement dimension, the introduction of a new area in teachers' pedagogical competences named "Social skills and communication" and, finally, the alignment of students' competences with the latest version of the DigComp2.2 (i.e. "Responsible use" has been replaced by "Safety").

Table 2. The D-Paideia QF new dimensions and their description.

DIGCOMPEDU AREA	NEW COMPETENCES
1. Professional engagement (in *Educators' professional competences*)	*1.5 Awareness on local and global policy* To organise and manage the school environment and educational resources in a responsible and sustainable way. To be aware of implications of national and international policies in relation to teaching with technology. *1.6 Motivation for adopting digital technologies* To be open to exploring and experimenting with new digital technologies. To critically evaluate currently used digital practices and make informed decisions about their educational merits and limits. *1.7 Balance and safety 'onlife'* To promote a sustainable, safe and ethical way of accessing and using digital resources for teachers and learners. To be prepared and to educate the students about the implications and effects of their digital actions and behaviours on other users.
7. Social skills and communication (in *Educators' pedagogic competences*)	*7.1 Managing educational relationships with ICT* To interact effectively, efficiently and ethically with colleagues, students and families, as well as to facilitate the acquisition of skills in students. To manage the relational dynamics of the online classroom, especially for students with disabilities and those with low socio-economic backgrounds. *7.2 Diverse and flexible teaching strategies* To design, manage and evaluate face-to-face, blended and fully online learning strategies. To consider the communication needs and relational management involving dynamics and strategies peculiar to each modality, when selecting and using resources, digital tools and online learning platforms to ensure students' learning inside and outside the classroom. *7.3 Digital reputation and identity management* To distinguish and manage the consequences of digital identity in terms of social interactions and educational relationships. To participate in virtual educational environments and showcase the digital identity to provide and share professional and educational resources.

Alongside elements concerning attitudes towards learning technologies and attention to the balance between online life and work, attention to the regulatory environment, which emphasises certain aspects of digital skills, also emerges. Being aware of policies that affect students' lives enables educators to empathize with their challenges and provide appropriate support. For example, policies related to inclusive education, mental health and digital safety require educators to address students' emotional and social needs sensitively and effectively. Competencies in the new area of communication in social and educational relationships include aspects related to enhancing positive connections within the school community, understanding the impact of technologies on the design of teaching and support activities and maintaining attention to the ethical and professional boundaries related to digital exposure.

The defined competences and areas were then subjected to consultations with stakeholders, respectively teachers and educational experts (Ranieri et al., 2023). The present contribution focuses on the expert review, aiming to assess the significance attributed to the highlighted aspects by practitioners and validate it.

3. Methodology

3.1. Aim and context of the study

The D-Paideia QF, formulated in light of the educational and skill requirements of the COVID-19 pandemic and the evolving social needs, seeks to incorporate innovative components in the definition of teacher digital competence. Expert consultations aim to receive precious insights to review and consolidate the framework, so that it becomes valuable and shareable, through the collaborative exchange of experiences and expertise of educational specialists.

The primary goal of the research is to validate the D-Paideia QF, an updated version of the DigCompEdu framework (described in Par. 2.3), achieving two main purposes: (a) to develop a conceptual QF outlining various facets of teachers' digital competences in the post-COVID era concerning relational, emotional and affective skills, and (b) to identify potential gaps or overlaps among specific dimensions constituting teachers' digital competences.

The non-probabilistic sampling method employed is the expert sampling technique, which consists of the intentional selection of participants based on their specific qualities and "*involves identification and selection of individuals or groups of individuals that are proficient and well-informed with a phenomenon of interest*" (Etikan, Musa & Alkassim, 2016, p. 2). The concept behind purposive sampling is to focus on individuals with specific characteristics who can provide more meaningful assistance in the relevant research. The target group comprises experts identified by the partners of the international project[1] who have established experience in educational technology and the professional development of teachers in the context of teaching in digital environments. Individuals with expertise from academia and research institutes (researchers, professors, doctoral students), school administrators, teachers' trainers and decision-makers can be nominated for the selection. In the recruitment process, 47 professionals were initially contacted by the research group, directly through invitations over emails.

3.2. Research methods and analysis tools

The research study adopted a mixed-methods approach that combines quantitative and qualitative data collection and analysis methods to provide a holistic understanding of experts' perspectives

[1] The D-Paideia consortium consists of 6 organizations from Italy, Greece, Belgium, Spain and Bulgaria.

(Creswell & Plano Clark, 2011). The online consultation with educational experts involved the participation of 30 individuals in the period from September to October 2023. The consultation phase was conducted through a semi-structured questionnaire administered online focused on the D-Paideia QF. The questionnaire was developed by three researchers and underwent evaluation by all members of the European project partnership. The survey with 18 questions on a Likert scale (1-7) was implemented on Qualtrics. A definition was provided for each of the six proposed additions to DigCompEdu. In connection with this, the degree of agreement on the following statements was asked:

1) The definition is clear and understandable
2) The competence is consistent with the background of the QF and DigCompEdu
3) The addition of this specific competence to DigCompEdu is relevant.

The questionnaire was enriched with an open-ended question to collect any insightful suggestions on the framework ("*Do you have any further comments on the D-PAIDEIA Qualifications Framework?*").

Before completing the online survey, experts were informed about the questionnaire's context to clarify the approach and ensure a common understanding of the questions. This was achieved by explaining the purpose of the expert consultation through email and presenting the broader context of the D-Paideia QF development.

During the data analysis phase, various techniques were employed: data from the consultations underwent analysis using SPSS v.28, involving descriptive statistics and frequencies, while qualitative data from the open-ended question were subjected to content analysis (Mayring, 2014). The analysis categories applied to the textual corpus were: a) definitions of teachers' digital competences concerning relational, emotional and affective skills, and b) potential overlaps with the existing dimensions of DigCompEdu.

4. Results

4.1. Participants

The final sample of experts in the consultations consisted of 30 participants. The average age was 47.67 years (SD = 10.76), with a minimum age of 27 years and a maximum age of 65 years. The experts had professional experience in teaching, with an average of 20.40 years (SD = 10.36). Regarding gender, the majority of experts were female and, from a nationality perspective, experts were from various parts of the world, mostly from European countries involved in the project partnership (Table 3).

The largest nationality group among participants was Italian, followed by Spain, Greece and Bulgaria, while other represented countries included Belgium, Croatia, Brazil and more. In terms of profession, experts had a wide range of professional backgrounds, with a prevalence from the field of research and academia. The most represented category was Researcher, followed by Teacher. Other professions included Educator, Computer Engineer, Educational Developer, PhD in Education Technology, Scientific Officer, Teacher Trainer and Advocacy regarding education policies. In summary, the sample of experts in the consultations was diverse in terms of age, gender, nationality and profession, bringing a variety of perspectives and experiences to the discussions on the D-Paideia QF.

4.2. Evaluation of the proposed competences

To provide an overview of the most relevant aspects for the experts about the proposed additions to DigCompEdu, the data are now shown. Table 4 provides an overview of the 30 expert opinions regard-

Table 3. Sample demographics.

Characteristics of the experts	Frequency	%
Gender		
Female	22	*73.3*
Male	8	*26.7*
Nationality		
Italy	7	*23.3*
Spain	6	*20.0*
Greece	4	*13.3*
Bulgaria	3	*10.0*
Other	10	*33.3*
Profession		
Researcher	9	*30.0*
Teacher	6	*20.0*
Lecturer	3	*10.0*
Full/Associate Professor	3	*6.7*
Headteacher	2	*6.7*
Other	7	*23.3*

ing the clarity of various competences and their definitions. In addition to the average, the degree of agreement is represented in the different items, showing the percentages of experts who responded with high or moderate agreement. This percentage was obtained by grouping the 7-point Likert scale scores into a general agreement category (for scores of 5 "Slightly Agree" or 6 "Agree" or 7 "Strongly Agree").

The data presented in the table above indicate that experts generally found the definitions of the assessed competences to be clear and understandable. In the Professional engagement area, the dimension concerning local and global policy awareness received favourable agreement. However, the dimensions of Motivation for adopting digital technologies and Balance and safety 'onlife' were rated more positively in terms of clarity. The new area of Social skills and communication includes the competence of Managing educational relationships with ICT, which is perceived as less clear compared to others. On the other hand, the competences of knowing how to adopt Diverse and flexible teaching strategies and Digital reputation and identity management achieved a high degree of agreement in terms of definition.

Table 4. Clarity of the new dimensions and their definition: answers from the experts (n = 30).

	M	SD	%
Professional engagement			
1.5 Awareness on local and global policy	5,70	1,53	*86,7*
1.6 Motivation for adopting digital technologies	5,93	1,48	*83,3*
1.7 Balance and safety 'onlife'	5,83	1,42	*83,3*
Social skills and communication			
7.1 Managing educational relationships with ICT	5,60	1,43	*86,7*
7.2 Diverse and flexible teaching strategies	5,80	1,35	*90,0*
7.3 Digital reputation and identity management	5,63	1,43	*90,0*

Table 5. Coherence and relevance: answers from the experts (n = 30).

	The competence is consistent with the background of the QF and DigCompEdu			The addition of this competence to DigCompEdu is relevant		
	M	*SD*	*%*	*M*	*SD*	*%*
Professional engagement						
1.5	5,60	1,43	*83,3*	5,53	1,68	*80,0*
1.6	5,63	1,75	*83,3*	5,80	1,83	*80,0*
1.7	6,03	1,50	*90,0*	5,83	1,74	*80,0*
Social skills and communication						
7.1	5,63	1,45	*86,7*	5,57	1,70	*80,0*
7.2	5,77	1,57	*90,0*	5,87	1,85	*83,3*
7.3	5,57	1,52	*86,7*	5,37	1,63	*80,0*

Subsequently, a comprehensive analysis of the experts' opinions was conducted, focusing on the coherence of competences with the QF and the DigCompEdu model, as well as their perceived relevance for integration into the European educational model (Table 5).

Overall, the experts found these competences to be consistent with the background of the QF and the DigCompEdu model and relevant for inclusion in the European model. The standard deviations reflect some variability in expert opinions, but the general trend is positive. Specifically, the competence Balance and safety 'onlife' received the highest mean score, suggesting a strong alignment with the QF background and the DigCompEdu model. Instead, awareness on local and global policy had the lowest mean score but still maintained an acceptable level of consistency. Besides assessing clarity and coherence about the theoretical and empirical background, the most crucial aspect is the relevance of updating the DigCompEdu in the proposed direction, thereby emphasising those dimensions of professional engagement and social-relational skills that can transform teaching practice through digital. In this case, the experts showed a more moderate acceptance, although the trend of general agreement remains positive. The dimensions of motivation, health and flexible strategies met with greater support for inclusion in the framework.

4.3. Content analysis of expert feedback

In addition to the quantitative data, the experts also commented on the overall proposal. Content analysis was conducted on the text of the responses to the open-ended question by identifying the data related to the two analytical categories: a) the suggestions regarding the definitions of teachers' digital competences related to relational, emotional and affective competences and b) the potential overlaps with the existing DigCompEdu dimensions.

In general, the answers to the open question refer to the structure of the proposed update and the content of the individual dimensions, the wording of the definitions and further elements for the review of the model (e.g., "*I think that the most important to include are 1.6, 1.7 and 7.2, because they focus on topics that are very relevant nowadays"; "In my view, the competence "Managing educational relationships with ICT (7.1)" is too broad as it overlaps with other competences of the framework").* Table 6 summarises the discussion elements that emerged for each dimension, after analysing the content of 16 replies including detailed opinions on the new competences.

Table 6. Experts' comments for each additional dimension).

New dimensions	Specific suggestions in the description of competences	Overlaps with the dimensions of DigCompEdu
Professional engagement Area		
1.5	Awareness of policies refers more to local or regional authorities than teachers Suggestion to include awareness of political and corporate interests	Proposed a separate dimension (self-awareness about tech impact on teachers)
1.6	Distinction between attitude and competence discussed Suggestion to change the title and definition for clarity	Proposed moving the competence to area 2 (Digital resources)
1.7	Proposed a revised title and definition for clarity	Concerns raised about the distinction or connection with competence 6.4 (Responsible use)
Social skills and communication Area		
7.1	A request for more clarity regarding the situations and contexts covered, especially for vulnerable groups	Concerns about the broadness and overlap with other competences: 5.2 (Differentiation & personalisation), 5.3 (Actively engage students), 1.1 (Organisational communication) and 6.2 (Communication)
7.2	Proposed a revised title and definition for clarity	Proposed moving competence to area 3 (Teaching and learning). Concerns about the overlap with other competences: 1.1 (Organisational communication), 1.2 (Professional collaboration) and 3.1 (Teaching)
7.3	Suggestion to change the definition to adequately cover the digital reputation aspect	The suggestion that the competence should be included in category 1.1 (Organisational communication) Concerns about the overlap with other competences: 2.3 (Managing, protecting, sharing)

In the Professional engagement area, the suggestion to broaden the awareness of policies beyond local or regional authorities to include "*political and corporate interests*" may enhance the competence in understanding the wider context of educational technology implementation and its implications, "*having the best interests of learners in mind*". The comments about Motivation for adopting digital technologies highlights the need to clarify the "*intrinsic and extrinsic aspects*" and to clearly distinguish between motivation, attitude and competence ("*motivation is a difficult concept or variable that should be better defined*"). Although motivation "*is a different construct than a competence*", it holds the potential to impact skills by influencing an individual's willingness to engage in learning or perform tasks. Indeed, this proposed competence was deemed "*very important, as we do not need digital technology for its own sake, but only when it benefits the learning experience*". In addition, suggestions were made by experts to revise the title and the definition of Balance and safety 'onlife' to better reflect the intended meaning, considering specifically health issues for teachers and the "*promotion of a sustainable, safe and ethical use of educational resources*". Regarding the Social skills and communication area, there is a request for more transparency regarding the situations and contexts covered in Managing educational relationships with ICT ("*I consider that it should be another concept to manage the relational dynamics of the online classroom, for students with disabilities and those with socio-economic backgrounds, because it is not clear what situations contemplates and/or how it should be addressed in*

the contexts of vulnerable groups"). Moreover, on Diverse and flexible teaching strategies, suggestions were made to include the teacher's ability to "*resolve problems and unforeseen events that may arise*" and to use both "*analogue and digital tools and learning platforms*" to ensure student learning inside and outside the classroom. Lastly, there is a recommendation to refine the definition of Digital reputation and identity management to "*address the relation and distinction between digital and "real-life" identity [...], as well as to lead by example when participating in virtual educational environments*". This emphasizes the importance of ethical boundaries on digital identity for teachers, finding a balance between digital and professional identity and ensuring online privacy and security.

In relation to the Professional engagement new dimensions, more suggestions were offered about the description but few connections to the existing dimensions in DigCompEdu are observed, while the new area of Social skills and communication is affected by numerous comments to this effect. The connections with the pedagogical aspects of integrating technology into teaching were particularly emphasized, focusing on teachers' abilities to effectively manage and orchestrate the use of digital tools in educational settings. Nevertheless, potential overlaps are not consistently indicated by the experts, who emphasise the relationships between the competences in very different directions. For instance, regarding the dimension of Managing educational relationships with ICT, one expert underscored its overlap with competences related to empowering learners in the classroom, such as differentiation and personalization of the teaching activities and methods to actively engage students. Another expert highlighted its connection with teachers' professional development abilities, specifically organizational communication with families and colleagues, while yet another expert pointed out its relevance to facilitating student competences, particularly fostering digital communication and collaboration skills. Apart from these comments, there was only one opinion against the introduction of the new area ("*Generate a new area isn`t necessary, just rephrase each framework's skill to clarify the motivation for digital skills, digital track, digital relationships and diversify technologies*"). The introduction of this area, however, is intended to emphasise the role of socio-affective components in the management of the teaching-learning process and the idea encountered no further criticism.

While nine experts opted not to provide additional suggestions, some comments did not align with the predefined coding categories used in the content analysis. Nonetheless, a concise summary of the key points is provided. Besides comments generically positive and approving (e.g., "*Overall, I find the additions relevant and appropriate*"; "*I strongly agree with the proposed competences*"), there were two other opinions on more formal aspects, not focused directly on competences: two experts point out issues related "*to the way labels are formulated*", emphasising a lack of uniformity and concerns about sentence length and readability. In two other cases, the experts suggested changes outside the field under investigation: self-regulated learning should be classified under learners' competences rather than in the area of teachers' pedagogical skills and awareness of the impact of ed-tech corporations on the own professional self should be added in the original DigCompEdu. This criticism seems to apply to the original structure of the framework, rather than the adaptations the D-Paideia project proposes.

In conclusion, it can be observed that the experts endorsed the structure and main contents of the proposed D-Paideia QF to increase the effectiveness and dissemination of discussion on these issues ("*The adaptation of the DigCompEdu Framework makes it more significant in the contemporary socio-technological context*"). Overall, the experts found connections between the existing dimensions and the new competences, however, no clearly defined overlaps with the original dimensions were identified. Specifically, they directed their attention to asking for a more precise correspondence between category and definition and carefully justifying the possible links with the other dimensions of DigCompEdu.

5. Discussion

This contribution illustrates the main results of the stage of expert consultation to validate a framework aimed at updating DigCompEdu concerning the relational, social and affective competences elicited by teaching-learning processes involving technologies. The study explores through a mixed-method approach the alignment between the proposed competences and the existing framework. The feedback from 30 educational experts on the D-Paideia QF showed no relevant differences in evaluating the six proposed competences and indicated that they mostly possessed clear and understandable definitions, aligned with the literature review and the DigCompEdu and were deemed relevant for incorporation into the European framework. The open-ended responses primarily revolved around the structure and content of the proposed update, the distinction between what already exists in DigCompEdu and the definitions' wording, indicating a favourable acceptance of the theoretical framework that guided the selection and definition of the various competences. Although experts have pointed out various connections between the competences, although in different ways, it should be noted that the dimensions of DigCompEdu are structurally interconnected (Redecker, 2017) and that the extension should reflect this feature of the framework without this leading to overlapping content.

The topics addressed in the study were considered important and relevant for future implementations, particularly after the ERT experience and the consequences of the COVID-19 period (Carretero et al., 2021). The theme of awareness regarding policies is linked to the need to understand and comply with institutional regulations related to the use of digital technologies in education, as well as to effectively manage the resources and digital strategies within one's working environment. Recognizing and managing ICT practices in the classroom in accordance with institutional and national policies ensures consistent and effective implementation of teaching activities (Butcher, 2018). The teacher's role is crucial as they are at the forefront of implementing digital transformation within schools. On one hand, the ability to organize and manage the school environment and educational resources responsibly and sustainably is essential for creating an effective and stimulating learning environment for students. On the other hand, teachers' digital competence not only impacts the effective adoption of digital technologies in the classroom but can also drive innovation and change in the local educational context (Generalitat de Catalunya, 2018). Furthermore, having awareness and motivation to critically intervene in education reform policies is crucial to contribute to improving the overall education system and adapting it to the current and future needs of students and teachers, facilitating informed participation of all stakeholders. In a context where the risk of platformisation – the increasing dependence on digital platforms – is growing, the importance of adopting a critical and reflective approach has also emerged (Kerssens & van Dijck, 2022). Self-awareness regarding technological impact and different economic interests can play a significant role in supporting European and national policies for sustainable and independent development.

Attitude and motivation towards the use of educational technologies are crucial elements in the effective adoption of technologies, both for exploring new methods and tools and for assessing the appropriateness of current practices. Therefore, digital competence cannot be understood solely based on technical knowledge and skills, as attitude is also considered an essential element in its definition (European Commission, 2019). Openness to new digital technologies, along with self-efficacy, may serve as predictors of teachers' technology use (McDonagh et al., 2021). This suggests that a positive attitude and belief in one's ability to effectively use technologies could significantly influence the degree of technology adoption by teachers.

Another element confirmed by expert opinion concerns the theme of digital health and well-being. Consistent with other models, being able to identify and address risks related to excessive use of digital devices involves understanding how such technologies can impact the physical and mental well-being of educators (EdDiCo, 2021). For instance, they should be able to manage stress resulting from the intensive use of digital technologies, maintain a balance between work and digital life and adopt strategies to prevent visual fatigue or other health issues related to prolonged screen time. Moreover, it is important to consider the risks of overexposure and the right to disconnect, to manage stress stemming from the high use of digital technologies and to maintain a balance between work and private life (Murphy et al., 2021).

The area of social skills and communication emphasizing the importance of social-relational and emotional dynamics within educational relationships and their impact on student learning experience, received a good evaluation from the experts. It highlights the central role of educators in cultivating positive digital learning environments, with a focus on fostering communication to nurture educational relationships among stakeholders and prioritizing inclusion and well-being (OECD, 2021; School Education Gateway, 2020). It also accentuates educators' adaptability in facilitating diverse learning modalities, prioritizing affective and communicative elements to ensure successful outcomes, thereby enhancing teaching and learning experiences in diverse settings, such as face-to-face, blended and online learning (ETF, 2019). Finally, it focuses on understanding and managing personal and professional information in the digital environment, emphasizing ethical behaviour, maintaining a harmonious balance between digital and professional identities and safeguarding privacy and security (Falloon, 2020). This competency construct aims to empower educators to effectively navigate the complexities of digital learning environments while promoting the well-being and success of students and educational communities.

Lastly, from a methodological standpoint, engaging experts – most of them peers from the scientific and academic community – enables the verification and validation of a framework with the assistance of professionals possessing informed perspectives and skills honed in the field. Indeed, familiarity with the original framework and expertise in digital competences for teaching were essential prerequisites for obtaining valuable insights and relevant suggestions. Although the results of the study are not generalizable, in purposive sampling subjects are selected according to the goal of the study, with the expectation that each participant provides unique and valuable information (Etikan et al., 2016). This approach is also aligned with the development procedure of most European institutional frameworks, such as DigCompEdu, which have included numerous stages of consultation with several stakeholders (Caena & Redecker, 2019).

Despite the promising results, this study has certain limitations that should be acknowledged, in addition to the aforementioned lack of representativeness of the experts' sample. The potential integration of several aspects to teachers' digital competence – only focusing on the socio-relational and emotional dimensions of digital teaching and learning – can't be exhaustive. Additionally, while the proposed new competences were thoroughly examined, the study did not include an evolution of these competences along the same six-stage progression model (from newcomer to pioneer) as utilized in the DigCompEdu framework. Incorporating this progression model at a more advanced stage of the project will be a priority, addressing this gap in future research developments.

6. Conclusions

The integration of the new dimensions into the DigCompEdu framework emphasises the commitment to improving the professional skills of educators in digital education in light of the societal

changes that have taken place since the advent of the COVID-19 pandemic and the experience of ERT. The D-Paideia QF aims to equip teachers with the necessary skills, knowledge and mindset to teach effectively in digital learning environments, while also recognizing the indispensable socio-relational and emotional dimensions of teaching and learning experience. The attitudinal and critical awareness dimensions of technology use can support teachers to design and implement interventions with the students' interests and well-being in mind. Furthermore, social-relational and communication skills play a crucial role in technology-mediated communication, particularly in environments where non-verbal contextual cues are absent and disparities can lead to unequal learning opportunities.

Concluding, the overall acceptance by educational experts was uniform across the framework, with minimal discrepancies noted between the six added dimensions. The current study is part of a strategy that aims to harness the experience and knowledge of academic research to develop targeted practical interventions in the field of digital education, through in-depth analysis of existing literature and empirical data collection and analysis. In the end, the reflection on DigCompEdu's update has been enriched with insights from academic literature and practical experience, consolidating its value and relevance as a resource for educators in the digital age. The results of the study, in addition to refining the D-Paideia QF, will be used to inform the curriculum design for professional development of teachers, providing them with the necessary social and relational skills to adapt to the changing digital educational environment. Concurrently, it will be necessary to conduct an analysis of existing self-evaluation tools – such as the SELFIE for teachers and DigCompEdu Check-in – in order to validate a new instrument that accurately reflects the assessment of the newly proposed competences. This integration will demonstrate how the instrument can be embedded into educators' self-evaluation practices, thus facilitating the adoption of the revised competences. With this integrated approach bridging academic research and field practice, the endeavour is to foster high-quality learning and facilitate the ongoing enhancement of digital education.

7. Author contributions

This contribution can be attributed for paragraphs 2.3, 3, 4 and 6 to Elena Gabbi, for paragraphs 1, 2.1 and 2.2 to Ilaria Ancillotti, while paragraph 5 was jointly authored by the authors.

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