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Digital training in university teaching induction programmes in Spain: a comparative analysis based on DigComp and DigCompEdu

La formación digital en los programas de iniciación a la docencia universitaria en España: Un análisis comparativo a partir del DigComp y DigCompEdu

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ABSTRACT

The mass and accelerated digitisation of education in recent decades has led to the need for digitally competent teachers, especially in higher education. In this regard, a number of professional frameworks have been developed in an attempt to define and conceptualise teaching digital competence. However, most research studies and frameworks have focused on pre-university stages. Approaching novice training from a digital perspective is also a challenge that needs to be addressed at the initial stage, when fundamental habits and knowledge are established and consolidated. The general objective of this study is therefore to analyse lecturer training in digital competence within the training proposals for initiation to teaching in Spanish universities, according to the European models DigComp and DigCompEdu. This is a pioneering work because, to date, no similar study has encompassed the entire Spanish university system. Specifically, it is an exploratory–descriptive research study in which deductive documentary and content analysis is carried out on 46 introductory university teaching programmes in Spain. Analysis of the DigComp competences covers the most frequently identified areas: Communication and Collaboration, followed by Information and Data Literacy, while the least frequently detected area is Safety. For DigCompEdu, the most frequently identified areas are Professional Engagement, Digital Resources and Teaching and Learning. The results of this paper may provide useful information for developing training plans for new university teaching staff which include the different areas of digital competence and teaching digital competence, thus ultimately contributing to the improvement of the quality of higher education in Spain.

Keywords: teaching training, higher education, teaching digital competence, professional development, teaching induction, content analysis

RESUMEN

La digitalización masiva y acelerada en el ámbito educativo de las últimas décadas ha acarreado la necesidad de contar con docentes digitalmente competentes, especialmente en la educación superior. En este sentido, se han diseñado diversos marcos profesionales que intentan definir y conceptualizar la competencia digital docente. Sin embargo, la mayoría de las investigaciones y marcos se han centrado en etapas preuniversitarias. Asimismo, abordar la formación novel bajo una perspectiva digital es un desafío que debe atenderse en la etapa inicial, pues es cuando se establecen y consolidan los hábitos y conocimientos fundamentales. Es por ello que el presente estudio tiene por objetivo general analizar la formación docente relacionada con la competencia digital dentro de las propuestas formativas de iniciación a la docencia en las universidades españolas, tomando como referencia los modelos europeos DigComp y DigCompEdu. Se trata de un trabajo pionero pues, hasta el momento, no existe una investigación similar para el conjunto del sistema universitario español. En concreto, se trata de una investigación exploratoria-descriptiva en que se realiza un análisis documental y de contenido de tipo deductivo de 46 programas de iniciación a la docencia universitaria en España. En relación con el análisis

de las competencias del DigComp, las áreas identificadas con mayor frecuencia son el área Comunicación y colaboración, seguida de Alfabetización informacional y de datos; mientras que el área detectada en menor frecuencia ha sido Seguridad. Respecto al DigCompEdu, las áreas más identificadas son Compromiso Profesional, Contenidos digitales y Enseñanza y Aprendizaje. Los resultados de este artículo pueden proporcionar información útil para el desarrollo de planes de formación para el profesorado novel universitario que incluyan las diferentes áreas de la competencia digital y competencia digital docente para así, en última instancia, contribuir a la mejora de la calidad de la educación superior en España.

Palabras clave: formación de docentes, educación superior, competencia digital docente, desarrollo profesional, inducción docente, análisis de contenido

INTRODUCTION

Educational institutions are facing mass and accelerated digitisation that has occurred in higher education over the last decades, resulting in the need for digitally competent teachers (Tondeur et al., 2023). This digitisation is one of the current challenges for higher education institutions, and is a priority in European education policy, mainly supported by the NextGenerationEU economic recovery package (European Commission, 2020b). Although organisations such as the Conference of Rectors of Spanish Universities (Crue) are attempting to establish digitalisation frameworks for universities, the evidence found indicates that there is currently no uniform model for the implementation of digital technologies in Spanish public universities; this is mainly due to their idiosyncrasies, history and unique issues (Castañeda et al., 2023a).

Similarly, opportunities and challenges have emerged in the integration of digital technologies in education, highlighting the importance of digital competence in higher education (Smestad et al., 2023). Digital competence is the set of skills needed to use information and communication technology (ICT) to improve everyday effectiveness (Ferrari, 2013), as well as the safe, critical and responsible use of information society technologies at work, and in entertainment and education (European Commission, 2020a).

At the same time, another term has emerged: digital competence in teaching. Its main objectives are to facilitate student learning and to promote the acquisition of digital competence; to foster processes to improve and innovate in teaching that adapt to the demands of the digital era; and to contribute to the professional growth of teachers, in line with the changes occurring in society and academic institutions (Gairín et al., 2023). This concept involves an instrumental approach to technology, a strong pedagogical component and the development of students' competences. Digital competence in teaching is therefore a complex process and requires a strategic approach (Castañeda et al., 2023a).

In this context, several frameworks have been designed to define and conceptualise digital competence in teaching, which in turn address its assessment and development. However, most research studies and frameworks have focused on the pre-university stage, which requires further investigation (Lin and Johnson, 2021). One of the main frameworks for conceptualising digital competence in teaching at the European level is the DigCompEdu (digital competence of educators), which is based on the DigComp (digital competence of all citizens), developed by the Joint Research Centre of the European Commission (Redecker and Punie, 2017). It has also been adopted by Crue as the official framework in Spain. According to a study by Crue on the state of digital competence in teaching in higher education in Spain (Crue, 2022), teaching staff perceive themselves to be at different levels of development, with medium (B2) and high (C1 and C2) levels being predominant, according to the DigCompEdu framework. Similarly, in Latin America, they are largely perceived to be at an intermediate level (B) (Prendes-Espinosa and Carvalho, 2022).

In short, varying levels of digital competence have been detected among teaching staff, which indicates the need for specific training in technical areas, especially in the pedagogical use of technology. Therefore, more practical and experiential training should be encouraged, while the added pedagogical value of digital technologies in context should be recognised (Amhag et al., 2019; Fernández-Batanero et al., 2021).

Furthermore, addressing teacher training from a digital perspective is a challenge that needs to be met in in-service and initial training, in particular (Gairín et al., 2023). In the European context, within the framework of the European Higher Education Area, the Digital Education Action Plan (2021–2027) is worthy of note. It aims to achieve quality, inclusive and accessible digital education through appropriate teacher professional development (European Commission, 2020c), for which the promotion of innovative pedagogical approaches and the use of effective digital content are key (European Commission, 2020a). It is therefore a clear priority to ensure training in these aspects for newly recruited teachers in order to reinforce the knowledge, skills and attitudes needed to fulfil their role, especially in terms of pedagogical competence (Gast et al., 2022).

It is during this initial stage that fundamental habits and knowledge are established and consolidated. Induction is one of the most complex and critical stages (Sánchez-Tarazaga et al., 2022), as it is during this period that teaching identity is forged and socialisation into the university environment takes place (Kelchtermans, 2019). Thus, induction training or initiation to university teaching is essential to enhance teacher professional development.

Due to recent interest in improving the quality of education and thus the pedagogical training of university teachers, teacher professional development

has become one of the main focuses of new educational goals and policies (Duţă and Rafailă, 2014). Careful consideration of the elements involved in this training process could enable the creation of effective strategies to promote continuous learning from initial to ongoing training. That the concept of teacher professional development may evolve over the course of a teacher's professional career must also be acknowledged.

Professional development involves a variety of mechanisms, actions and processes, shaped in turn by individual and contextual cultural and social, economic and political characteristics and conditions (Tan and Dimmock, 2014). Several countries have implemented reforms in university education through policies and initiatives aimed at improving and professionalising teaching (European Commission, 2018; Patfield et al., 2022).

At the national level, Organic Law 2/2023, of 22 March, which establishes the University System (LOSU by its Spanish acronym), sets down the requirement to provide pedagogical accreditation to newly hired faculty, while allowing the institution the autonomy to determine its design and development. However, the absence of research, systematisation and evaluation of teacher professional development in higher education has led to a paucity of empirical evidence on policies in this field (Sánchez-Tarazaga et al., 2022). It is therefore of utmost importance to analyse the characteristics of university induction training in an increasingly digital world. Moreover, to date, no study has analysed the digital perspective of training for new university teaching staff in the Spanish university systemB. Therefore, we consider this study to be a novel and valuable contribution to research in university education policy and, in particular, to teacher training. This article aims to provide relevant results about current training in digital competence in the training proposals for early-career university teachers in order to address the need detected in recent research (Betancur and García-Valcárcel, 2022).

OBJECTIVE AND RESEARCH QUESTIONS

The general aim of this study is to analyse teacher training in digital competence within the training proposals for induction to university teaching at Spanish universities.

To this end, it aims to answer the following research questions:

RQ.1. How many Spanish universities include digital competence training in their training strategies for an introduction to university teaching?

Where they do include digital competence training in novice teacher training, the following research questions are pursued:

RQ.2. Which areas and competences of digital citizenship competence, in accordance with the DigComp framework, are detected in this induction training?

RQ.3. Which areas and competences of digital teacher competence, in accordance with the DigCompEdu framework, are detected in this induction training?

METHOD

This is an exploratory–descriptive research study, in which documentary and content analysis was used as a technique (Krippendorff, 2018). This process entailed a comparative study of different Spanish university institutions (García Vargas et al., 2019).

Sample

The sample was obtained by non-probabilistic purposive sampling. The procedure for obtaining the sample was based on the official data provided by the Spanish Ministry of Universities (2022). First, the universe of Spanish universities was identified and numbered a total of 84 institutions. Of these, 50 were public and 34 private, and 90.5% provided in-person teaching.

Based on this identification, universities offering induction training for novice university teachers were selected. Each university was a sampling unit, which resulted in a total of 41 universities offering induction training, all of which were public and provided in-person teaching, except for one.

Once the database had been compiled, a documentary analysis of the induction programmes of these 41 universities was carried out. The unit of record was comprised of the documents or web pages explaining each training proposal offered by the universities selected. In this phase, two different training programmes were found in five universities. The total number of units of analysis was 46 training programmes aimed at new teaching recruits (Table 1).

Training courses were selected according to three inclusion criteria: (1) current programmes, (2) access through official university websites and (3) primary focus on junior faculty. To guarantee the veracity of the information obtained, those responsible for the training programmes were consulted by email and telephone, in accordance with the public information of each institution. Data collection was carried out between November 2022 and February 2023.

Table 1

Sample of Spanish universities that offer introductory training in university teaching

No.	Sampling units - universities	Identification code	Registration units - induction training for university teaching
1	U. of Almería	UAL	*Plan de Formación del Profesorado Novel* (Novice lecturer training plan)
2	U. of Cádiz	UCA	*Iniciación a la labor docente en la universidad de Cádiz* (Introduction to teaching at the University of Cadiz)
3	U. of Córdoba	UCO	*Título de Experto en Docencia Universitaria* (Expert diploma in university teaching)
4	U. of Granada	UGR	*Curso de iniciación a la docencia universitaria* (Introductory course to university teaching)
5	U. of Huelva	UHU	*Máster en Docencia Universitaria* (Master's degree in university teaching)
6	U. of Málaga	UMA	*Curso de formación para el profesorado universitario novel -1ª Fase- y Seminario de formación docente para el profesorado universitario novel -2ª Fase-* (Training course for new university lecturers, 1st Phase, and Seminar on teacher training for new university lecturers, 2nd Phase)
7	U. Pablo de Olavide	UPO	*Formación de bienvenida para PDI de nuevo ingreso* (Induction training for new lecturers)
8	U. of Sevilla	US	1) *Programa de Creación, Desarrollo y Consolidación de Grupos de Apoyo entre Docentes* (Programme for the creation, development and consolidation of teacher support groups) 2) *Fase Preliminar del Programa FIDOP (Formación e Innovación Docente del Profesorado): Fase de iniciación - Curso General de Docencia Universitaria (CGDU)* (Preliminary phase of the FIDOP (Teacher training and teaching innovation) programme: Induction phase - General university teaching course)
9	U. of Zaragoza	UNIZAR	*Programa de Formación del Profesorado Novel* (Novice lecturer training programme)
10	U. of Oviedo	UNIOVI	*Programa de formación inicial del profesorado novel* (Initial teacher training programme for novice lecturers)

No.	Sampling units - universities	Identification code	Registration units - induction training for university teaching
11	U. of La Laguna	ULL-1	1) *Programa de Acogida y Mentorización para el Profesorado de Nuevo Ingreso en la Universidad de La Laguna* (ProNov-ULL) (Induction and mentoring programme for new teaching staff at the University of La Laguna)
		ULL-1	2) *Título de Experto Universitario en Docencia Universitaria* (EDU-ULL) (Expert diploma in university teaching)
12	U. of Cantabria	UNICAN	*Itinerario 1 del Plan de Formación: Formación para el profesorado novel* (Itinerary 1 of the training plan: Training for novice lecturers)
13	U. Católica de Ávila	UCAV	*Plan de Formación para el Profesorado Universitario Novel* (Training plan for new university teaching staff)
14	U. of Burgos	UBU	Plan de Formación del Profesorado Novel (PFPN) (Training plan for new lecturers)
15	U. of Salamanca	USAL	*Formación Inicial del Profesorado Universitario* (FIPU) (Initial university teacher training)
16	U. of Castilla-La Mancha	UCLM	*Introducción a la docencia universitaria en la UCLM* (Introduction to university teaching at UCLM)
17	U. Autònoma de Barcelona	UAB	*Formació Docent en Educació Superior* (FDES) (Teaching training in higher education)
18	U. of Barcelona	UB	*Formació per al professorat UB de nova incorporació* (Training for new UB teaching staff)
19	U. Politècnica de Catalunya	UPC	*Formació en competències docents per a becaris FPU, del Programa de Postgrau: Ensenyament Universitari en Ciències, Tecnologia, Enginyeria i Matemàtiques* (STEM) (Training in teaching skills for FPU (teacher training) scholarship holders on the Postgraduate programme: University Education in Science, Technology, Engineering and Mathematics)
20	U. Pompeu Fabra	UPF	*Formación Inicial en Docencia Universitaria* (FIDU) (Initial university teaching training)
21	U. of Girona	UdG	*Módulo formativo para profesorado de nueva incorporación* (Training module for new lecturers)

No.	Sampling units - universities	Identification code	Registration units - induction training for university teaching
22	U. of Alcalá	UAH	*Formación de Profesores Universitarios Noveles* (Teacher training for novice lecturers)
23	U. Antonio de Nebrija	NEBRIJA	*Plan específico de Acogida para personal de nueva incorporación* (Specific induction plan for new lecturers)
24	U. Autónoma de Madrid	UAM-1	1) *Título de Experto en Metodología Docente Universitaria* (Expert diploma in university teaching methodology)
		UAM-2	2) *Título de Experto en Mentoría Universitaria* (Expert diploma in university mentoring) (*Trainee teachers take a short, basic initial training course beforehand)
25	U. Carlos III de Madrid	UC3M	*Taller de Introducción a la docencia* (Workshop on an introduction to teaching)
26	U. Complutense de Madrid	UCM	*Proyecto de acogida docente y mentoría* (Teacher hosting and mentoring project)
27	U. Politécnica de Madrid	UPM	*Programa de Formación Inicial para la Docencia Universitaria* (Initial training programme for university teaching)
28	U. of Navarra	UNAV	*Programa DOCENS* (Training programme for new lecturers)
29	U. of Alicante	UA-1	1) *Programa de Formación del PDI Novel-I3CE* (Training programme for new lecturers)
		UA-2	2) *Acogida del profesorado novel de la Universidad de Alicante* (Welcoming new teaching staff to the University of Alicante)
30	U. Miguel Hernández de Elche	UMH	*Programa de Formación Inicial en Docencia Universitaria* (PFIDU) (Initial training programme in university teaching)
31	U. Jaume I	UJI-1	1) *Programa de Formación del Profesorado Novel* (Training programme for new lecturers)
		UJI-2	2) *Formación de acogida* (Induction training)
32	U. Católica de Valencia San Vicente Mártir	UCV	*Experto Universitario en Iniciación a la Docencia Universitaria* (IDU) (Expert diploma: introduction to university teaching)

No.	Sampling units - universities	Identification code	Registration units - induction training for university teaching
33	U. Politècnica de València	UPV	*Programa de Acogida Universitario* (PAU) (University induction programme)
34	U. of València	UV	*Formación Inicial del Profesorado Universitario* (FIPU) (Initial training for new lecturers)
35	U. Nacional de Educación a Distancia	UNED	*Programa de Formación Inicial del Profesorad*o (FID) (Initial training programme for lecturers)
36	U. of Extremadura	UNEX	*Plan de Formación de Profesores Noveles para la docencia Universitaria* (University teaching training plan for new lecturers)
37	U. of Coruña	UDC	*Plan de Formación Inicial* (PFI) (Initial training plan)
38	U. of Vigo	UVIGO	*Formación del profesorado universitario novel* (Novice university teacher training)
39	U. of La Rioja	UNIRIOJA	*Curso de acogida para el nuevo profesorado de la Universidad de La Rioja* (Induction course for new teaching staff at the University of La Rioja)
40	U. of Deusto	DEUSTO	*Plan de Formación del Profesorado Novel* (Training plan for novice lecturers)
41	U. of País Vasco / Euskal Herriko Unibertsitatea	EHU / UPV-1	1) *Acogida y Orientación para el Profesorado Novel* (irakasberri ON) (Induction and guidance for novice lecturers)
		EHU / UPV-2	2) *iRAKER: Programa de desarrollo de la competencia académica del profesorado de la UPV/EHU* (Programme for the development of academic competence for UPV/EHU teaching staff)

Source: Authors' own work

Data analysis

Documentary content analysis was the method used to retrieve and identify the original documents via a thematic approach to the information. In addition, content analysis of the textual data enabled the formulation of reproducible and valid inferences applicable to their context (Krippendorff, 2018). Qualitative and quantitative thematic content analysis, in which the unit of meaning was words or

phrases, were combined. An Excel template was created for content cleaning and the database. This is a mixed-case analysis that combined basic univariate descriptive and frequency analyses. To count the units and indicators of the phenomena, a coding and categorisation system was established for quantification, following the rules of presence and frequency counting (Bardin, 1996).

The qualitative content analysis process was conducted using a deductive coding model based on the respective European reference frameworks, DigComp for the second research question (Table 2) and DigCompEdu for the third (Table 3).

RESULTS

The results are presented below in a descriptive narrative, combining a quantitative approach with examples of the programmes analysed (Gibbs, 2012).

Digital competence training offered by Spanish universities forms part of the continuous professional development for all university teaching and research staff, and various courses relating specifically to the digital competence of teaching staff have been found. However, in the case of induction strategies (RQ.1), 59% include digital training. Below is a detailed outline of the areas of digital competence and digital competence in teaching covered by these training programmes.

DigComp results

Analysis of the DigComp competences reveals that they focus particularly on area (2), Communication and collaboration (n = 54), and (1) Information and Data literacy (n = 45), and much less on (4) Safety (n = 4) (Figure 1). Analysis by competences (Table 2) shows that the most repeated is Browsing, searching and filtering data, information and digital content (n = 25, 93%), followed by Interacting through digital technologies (n = 15, 66%). However, the least identified are Engaging in citizenship through digital technologies (n = 1, 4%) and Identifying needs and technological responses (n = 1, 4%), while others are not identified at all (Programming, Protecting devices, Protecting health and well-being, Protecting the environment, and Identifying digital competence gaps).

Figure 1

Absolute frequency of DigComp model areas being identified
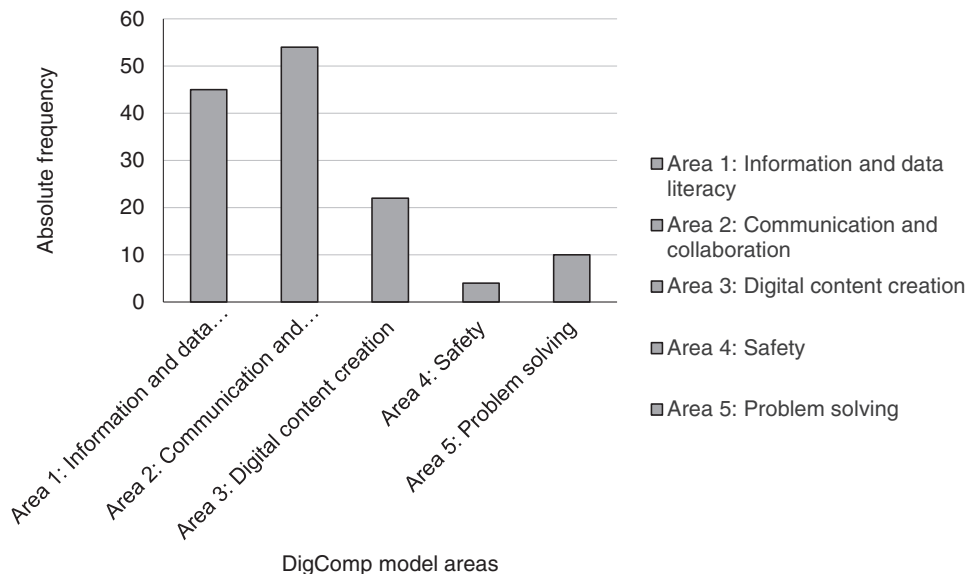
Source. Authors' own work.

Table 2

Results of DigComp model (RQ.2)

Area	Competences	n_i	$f_i\%$
1. Information and data literacy	1.1. Browsing, searching and filtering data, information and digital content	25	93%
	1.2. Evaluating data, information and digital content	11	41%
	1.3. Managing data, information and digital content	9	33%
2. Communication and collaboration	2.1. Interacting through digital technologies	19	70%
	2.2. Sharing through digital technologies	15	56%
	2.3. Engaging in citizenship through digital technologies	1	4%
	2.4. Collaborating through digital technologies	7	26%
	2.4. Netiquette	3	11%
	2.6. Managing digital identity	9	33%

Area	Competences	n_i	$f_i\%$
3. Digital content creation	3.1. Developing digital content	10	37%
	3.2. Integrating and re-elaborating digital content	5	19%
	3.3. Copyright and licences	7	26%
	3.4. Programming	0	0%
4. Safety	4.1. Protecting devices	0	0%
	4.2. Protecting personal data and privacy	4	15%
	4.3. Protecting health and well-being	0	0%
	4.4. Protecting the environment	0	0%
5. Problem solving	5.1. Solving technical problems	4	15%
	5.2. Identifying needs and technological responses	1	4%
	5.3. Creatively using digital technologies	5	19%
	5.4. Identifying digital competence gaps	0	0%

Source. Authors' own work.

In area (1), Information and data literacy, contents relating to resources and tools for research such as software and other resources for statistical and documentary analysis (UAM) are particularly evident, as are databases and electronic journals, documentation of evidence of scientific publication quality, accreditation, author workshops, digital repository and open access (UBU). Moreover, they contain interactive digital content and other ICT resources for teaching, such as teaching resources (UVIGO), MOOCS and open educational resources (UNED). They also refer to the ability to evaluate information, data and digital content in university teaching, with tools like Stata (SUAL), to assess the possibilities of Learning and Knowledge Technologies (UPM), to analyse elements that make up the Personal Learning Environment (PLE) and its potential (UDC), and the evaluation of educational resources (UVIGO).

In area (2), Communication and collaboration, there is a greater presence of content related to managing virtual learning environments and ICT resources in the classroom (USAL, ULL), such as training in virtual university teaching and the methodological use of online platforms (UVIGO, UJI-1, UJI-2). Likewise, the inclusion of guidelines for presenting and disseminating teaching, together with other means of disseminating teaching material (UVIGO), is noteworthy. However, emphasis is placed on involving students in using social media (UNIOVI) and tools for educational innovation that encourage student collaboration (ULL). At the same time, they integrate the appropriate and responsible use of ICT in the university environment. In particular, they highlight the creation of collaborative networks at

different universities (UNIOVI) and collaboration through social networks (UNIZAR), both for internationalisation and for online collaboration between students and teaching staff (UdG). Others mention the importance of netiquette (UNIOVI) and compliance with rules and regulations in the use of digital technologies in the academic environment (UJI-2).

Analysis of digital identity management competence reveals several relevant aspects. The importance of PLE is detected (UHU, UDC) in relation to the understanding of the main elements that make up digital identity and how they affect the digital world (UDC), personal branding (UNIOVI), and improving visibility and impact through tools such as the personalised page of the virtual classroom board (UJI-2), as well as strategies to improve digital identity in research (USAL, UV).

In area (3), Digital content creation, the findings reveal that the competence Developing digital content is adopted through different contents, such as the design, creation, management and presentation of audiovisual resources (USAL, UV, UVIG), questionnaire design (USAL) or digital and printed material production (UNED), as well as their evaluation (UJI-1). Moreover, contents on the configuration of the course platform for distance and/or in-person teaching are identified (UJI-2, UDC). Finally, competence in Copyright and licences in the digital environment (USAL, UAM), and management and conditions of use of classroom resources are detected (UVIGO). Information relating to Protecting personal data and privacy, which belongs to the fourth area, is rarely found here.

Finally, Creatively using digital technologies is included in area (5), Problem solving. This competence is related to the development of innovative methodologies (UNIZAR) and the use of various resources for the creation of textual, graphic and audiovisual materials (UDC). In addition, UAM includes the DigComp framework in its initial teacher training on digital competences.

Results related to DigCompEdu

Figure 2 and Table 3 show the results of the analysis based on the DigCompEdu, highlighting the most identified areas: (2) Digital Resources (n = 37), (3) Teaching and Learning (n = 36) and (1) Professional Engagement (n = 34). The most frequently identified competences are Teaching (n = 22, 81%), Organisational communication (n = 21, 71%) and Selecting digital resources (n = 17, 63%). The areas that are recognised to a lesser extent are (5) Empowering Learners (n = 4) and (6) Facilitating Learners' Digital Competence (n = 4).

Figure 2

Absolute frequency of areas of the DigCompEdu model identified
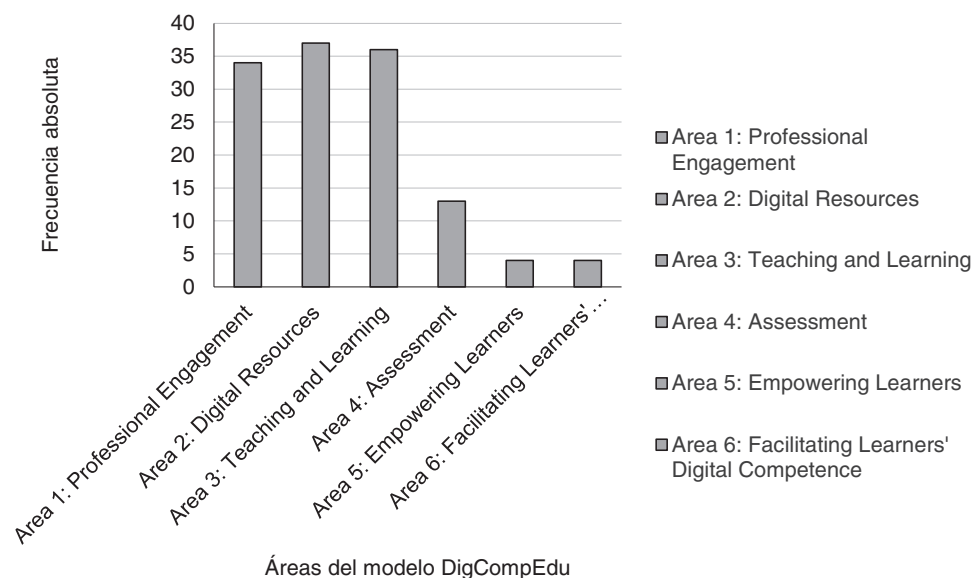
Source. Authors' own work.

Table 3

Results DigCompEdu Model (RQ.3)

Area	Competences	n_i	$f_i\%$
Educators' professional competences			
1. Professional Engagement	1.1. Organisational communication	21	78%
	1.2. Professional collaboration	4	15%
	1.3. Reflective practice	2	7%
	1.4. Digital continuing professional development	7	26%
Educators' pedagogic competences			
2. Digital Resources	2.1. Selecting digital resources	17	63%
	2.2. Creating and modifying digital content	15	56%
	2.3. Managing, protecting and sharing digital resources	5	19%

Area	Competences	n_i	$f_i\%$
3. Teaching and Learning	3.1. Teaching	22	81%
	3.2. Guidance	4	15%
	3.3. Collaborative learning	4	15%
	3.4. Self-regulated learning	6	22%
4. Assessment	4.1. Analysing evidence	12	44%
	4.2. Learning analytics	1	4%
	4.3. Feedback and planning	0	0%
5. Empowering Learners	5.1. Accessibility and inclusion	1	4%
	5.2. Differentiation and personalisation	2	7%
	5.3. Actively engaging learners	1	4%
Learners' competences			
6. Facilitating Learners' Digital Competence	6.1. Information and media literacy	2	7%
	6.2. Digital communication and collaboration	1	4%
	6.3. Digital content creation	1	4%
	6.4. Responsible use	0	0%
	6.5. Digital problem solving	0	0%

Source. Authors' own work.

Regarding area (1), Professional Engagement, Organisational communication competence covers content related to procedures and applications through the virtual campus (UNICAN), as well as guidelines for planning training actions in virtual learning environments (USAL, UPM) and the use of teaching management platforms (UBU, UV, UVIGO). Reflective practice is addressed through e-portfolios (UPF), together with content on the PLE itself, and its reflection and learning in virtual environments (UDC) that contribute to digital continuing professional development. Few training courses offer a more global approach to the digital competence of teachers. However, some, such as UNICAN, focus on the use of digital technologies in the classroom, as well as on ethical elements and aspects related to teacher professional development as part of continuing professional development.

As for area (2), Digital Content, the focus is more on Selecting digital resources, including tools for innovative communication mediated by ICT (UNIOVI, UNICAN), open educational resources (USAL) and the knowledge, use and management of support resources for research (UNED, USAL), such as repositories, databases or journals. At the same time, the competence Creating and modifying digital content, such as the design of teaching resources (UVIGO), is frequently incorporated. Courses

on the creation of podcasts (UAL), the design of interactive activities or the creation of digital exams (UGR) are included, as are the creation and editing of web pages and videos for teaching, or presentation and collaboration tools in the classroom (UNICAN, UNED). However, issues such as intellectual property and plagiarism (UNICAN) in Managing, protecting and sharing digital resources are seldom detected. In short, this area highlights the integration of ICT as digital resources to stimulate, digitalise and/or enrich teaching through the use of and interaction with digital devices, applications or platforms (UAH, UJI-1, UNED, UVIGO, UPM).

In area (3), Teaching and Learning, Teaching competence is prominent in most universities, including the UAL, which deals with gamification, creation of digital content, active methodologies or ICT tools for educational innovation. For its part, the UHU promotes the use of social networks, videoconferencing and other distance communication systems, while the USAL includes methodologies and the selection of interactive teaching media. In addition, there is a strong link between teaching contents (assessment, management of the teaching–learning process and creation of teaching materials) and technical ICT contents linked to the use of online platforms, from a techno-pedagogical approach (UJI-2). Regarding the competence of Guidance, the UNED highlights support materials and interaction forums, while at the UDC students are encouraged to work on their PLE. The UPM focuses on applying criteria for teaching aid selection, according to expressive needs (UPM). Finally, the UAL proposes ICT as a self-regulation tool, while other universities also use it to promote self-regulated learning through the inverted classroom (ULL, UNICAN, UdG, UV).

For Assessment strategies competence in area (4), Assessment, several universities have proposed various techniques, such as the use of digital rubrics for formative and quality assessment (UNICAN), questionnaire design (UPC) or the selection of tools for each type of assessment (UPM).

Regarding area (5), Empowering learners, the UAL stands out for offering a course on the protection of LGTBI rights and the fight against discrimination, while the UGR proposes content on sustainable and inclusive design. In relation to Differentiation and personalisation, the UDC proposes a digital group portfolio to support cooperative learning, which is related to area (6), Facilitating Learners' Digital Competence, which is also addressed through the use of social networks for learning (UNIOVI) and the students' PLE as a starting point for didactic design and improvement (UDC), leading to the active engagement of students in their own learning.

DISCUSSION

Novice teacher training in the Spanish university environment presents several challenges, including the need to consider the development of competences

that allow teachers to perform adequately in increasingly digital educational environments (Buils et al., 2023; Gairín et al., 2023). This research seeks to analyze the current state of affairs of the integration of content that promotes digital competence in training courses for new teachers at Spanish universities.

One of the first points to be highlighted in this analysis is the diversity and lack of homogeneity of the training proposals offered by Spanish universities—each institution follows its own line in terms of content. The outcome is a teaching staff whose training background is highly varied, which has repercussions on subsequent professional development. Moreover, it may have implications for issues such as the assessment and certification of competences, as well as mobility between universities, among others (Betancur and García, 2022; Castañeda et al., 2023a; Crue, 2022).

Accrediting digital competence in teaching has become particularly important in recent years (Durán et al., 2019). At university level, worth noting is the Unidigital Plan, promoted in Axis 03 of the Digital Spain 2026 agenda, published by the Ministry of Economic Affairs and Digital Transformation, which is aligned with the Digital Competences of Educators (DigCompEdu) project. The DigCompEdu FyA (training and accreditation) project, which seeks to create resources for training university teachers in digital teaching competences and to establish a model for a European certificate for digital competence in teaching, arises in this context. Also proposed is the accreditation of the digital competence of university institutions. This accreditation process builds on the Framework for Digital Competence in University Teaching (MDTCU) recently developed by Castañeda et al. (2023b). At pre-university level, it is worth highlighting the Ministry of Education and Vocational Training's resolution (2022) on the certification, accreditation and recognition of digital competence in teaching, which has led to different regional developments (Marrón and Martínez-Anar, 2023).

In the Spanish context, DigCompEdu has proven to be a valuable tool. It serves as a framework that transcends the instrumental perspective in the digital transformation of education and helps institutions plan, design and organise digitisation. However, different territories cater to different visions of this transformation (Castañeda et al., 2023c).

With regard to the first research question, analysis of the specific induction plans revealed that only 59% of the proposals identified content related to teachers' digital competence. This coincides with the need to reinforce and improve policies for novice teacher education in general and digital competence in particular, highlighting the requirement for further development (Crue, 2022).

For the second research question regarding the most frequently identified areas of the DigComp framework, analysis revealed the following areas: (1) Information and Data Literacy and (2) Communication and Collaboration. In these areas, priority is mainly given to the most basic aspects required for teacher management: the

search for information and communication using digital media. The contents identified sought to promote skills associated with effective communication and access to information in the university context. This becomes clear through a comparison of the aspects that teaching staff tend to identify as best developed in their digital competence (Pérez-López and Yuste, 2023).

On the other hand, one of the least identified areas of the DigComp framework is (4) Safety. Considering the challenges of today's digital environment (such as the advance of artificial intelligence), this is an area that needs to be strengthened. Moreover, other research shows that it is one of the competences that tends to score lower in teacher evaluations (Gallego-Arrufat et al., 2019). In this sense, the civic dimension of digital competence is particularly important. However, digital competence should not be reduced to mere technical skills in the safe use of technology, but should also encompass attitudes and values, including critical thinking and ethical considerations to combat misinformation and hate speech (Gutiérrez-Martín and Tyner, 2012; Sábada and Salaverría, 2023). Media literacy to foster active and responsible citizenship is essential to develop critical thinking skills in an informed citizenry (Pérez-Rodríguez and Delgado-Ponce, 2012).

For the third research question, referring to the DigCompEdu framework, analysis revealed that the competences in which most related content is detected are Teaching, Organisational Communication and Selecting digital resources. One competence that is linked, though apparently not central to the training, is Professional Collaboration. However, it seems to be key to better teaching practice. Several studies (Kunnari et al., 2018; Liesa-Orús et al., 2020) suggest that closer teaching collaboration generates significant transformations in both teaching practice and student learning.

As regards area (2), Digital Resources, the competence Selecting digital resources is the most present, which could point to teachers requiring access to external content because they may not have the ability to create their own (Basilotta-Gómez-Pablos et al., 2022). In line with previous research, improving teachers' digital competence calls for further training in digital content creation (Jiménez-Hernández et al., 2020).

With regard to pedagogical competences, some universities include specific subjects on virtual environments and ICT resources in the classroom, digital teaching models, blended and online teaching, as well as teaching functions and tasks in digital teaching. Digital competence is also integrated across the board in the teaching of active methodologies and educational innovation. This implies a substantial improvement in the training approach, as the digital perspective is given value within the other equally important areas of teacher professional development.

The results reflect a greater interest in the development of digital competence from a techno-pedagogical perspective which does not focus only on instrumental

aspects but seeks to improve teaching and learning processes (Basilotta-Gómez-Pablos et al., 2022; Inamorato dos Santos et al., 2023). However, it would be interesting to delve deeper into training and content, to corroborate whether they are indeed aimed at improving pedagogical competences or whether they focus on the use of digital tools or methodologies without greater context (Pérez-López and Yuste, 2023).

In contrast, a review of training courses on the competence Assessment Strategies reveals that many adopt an instrumentalist perspective on digital technologies, as they focus, for example, on designing assessment questionnaires. This suggests that they may be focusing less on personalizing student learning and on encouraging active engagement with their own learning at the point of assessment. Aspects such as strengthening learners' critical digital competence and implementing formative assessment in digital environments, beyond mere marking by means of questionnaires, are also identified to a lesser extent.

Training in competences related to student empowerment and the development of students' digital competence are the least frequent, which coincides with other research that indicates the need to respond to diversity and promote inclusion (Moreira et al., 2023). This is not surprising considering the lack of agreement on the role of teachers in these aspects. These competences present a challenge in transforming the role of educators from mere transmitters of information to that of facilitators of learning and the development of competences in their students (Deumal-Guitert, 2015; Liesa-Orús et al., 2020).

CONCLUSIONS

In the light of the findings, the following conclusions specify the practical implications of this work. One of the outstanding contributions is the evaluation of training activities, both from the DigComp (originally created for citizenship competence) and DigCompEdu (specific for educators) frameworks. Certain aspects of digital citizenship competence are not explicit in DigCompEdu, namely, the handling of security in digital media. However, they are relevant for effective teaching performance. Therefore, this civic dimension should be considered in training plans, with special attention to critical thinking and ethical implications (Gallego-Arrufat et al., 2019).

Analysis of training course contents also detected the absence of artificial intelligence, which was foreseeable, given that it did not fully emerge until 2023. As this is a topic of current interest, it would be advisable to review the contents to offer pedagogical training during the introduction to university teaching in the knowledge, use and awareness of artificial intelligence and its impact on education. The challenge of transforming teaching based on student competency-based

evidence to address the influence of artificial intelligence on academic performance is certainly being examined.

In this respect, strengthening training for the development of students' critical digital competence and their active engagement is recommended. Furthermore, training in formative and formative assessment strategies in digital environments is advisable in order to promote more participatory and learner-centered education in an increasingly digitalized environment. At the same time, more emphasis on personalization of student learning and the design of inclusive environments is pertinent.

Therefore, training programmes that view digital technologies in a broader sense, taking into account the technical, praxeological, methodological, epistemological and socio-emotional components, together with an adequate management of teaching roles in the virtual world, could be developed (Deroncele-Acosta et al., 2023). Furthermore, fostering a broader and more effective integration of digital technologies in teaching practice should be a priority.

In general, different universities approach the multiple competences of the two models analyzed in different ways, which could be explained by the absence of a reference framework of competences, particularly in induction training. It is therefore likely that *ad hoc* approaches have been developed.

These differences highlight the importance of strengthening digital skills training during the induction period at all universities, providing a more homogeneous training offer and thus contributing to equal opportunities throughout the Spanish university system. At the same time, it would be beneficial to design training that contemplated the different areas of the European DigComp and, especially, the DigCompEdu frameworks.

Furthermore, that novice teachers will not necessarily be novice in their digital skills and may have extensive experience in the use of digital technologies should be a consideration (Fernández-Morante et al., 2023). However, it is highly likely that they lack the training and experience in pedagogical aspects to apply such technology in a critical way for the improvement of educational processes. Hence, it is essential to facilitate the critical pedagogical integration of technology.

However, training plans present challenges in terms of the different levels of techno-pedagogy that teachers may master. It would be appropriate to find a balance to ensure that those with more basic knowledge can keep up, and those with more advanced competences find content of interest (Crue, 2022; Kallunki et al., 2023). In this sense, analysis and evaluation of teachers' competence levels to adjust training or provide personalized itineraries is key and in line with other studies (Pérez-López and Yuste, 2023).

Therefore, initial diagnostic assessments based on competency frameworks are necessary if training is to be adapted to institutional needs and the current

demands of higher education. In any case, based on the results and regardless of teachers' level of competence, collaborative practices among teachers in digital environments should be encouraged for collegial professional growth and the ensuing improvement in their students' education.

Finally, it is essential that teacher training be aligned with institutional strategy. It is therefore the responsibility of universities to establish their own framework of professional competences and to design training plans that include training their teaching staff in a digital world (Buils et al., 2022; Sánchez Caballé et al., 2023).

The results presented can provide useful information for creating training plans for novice university teaching staff that include different areas of digital competence and digital competence in teaching, thus ultimately contributing to enhancing the quality of higher education in Spain. Likewise, it is important to continue researching and sharing good practices in this area to improve university teacher education and ensure sound professional development of teachers at the induction stage.

In summary, we present the practical implications of our research in the following diagram (Figure 3).

Figure 3

Practical implications of the study for the digital competence training of novice university teachers
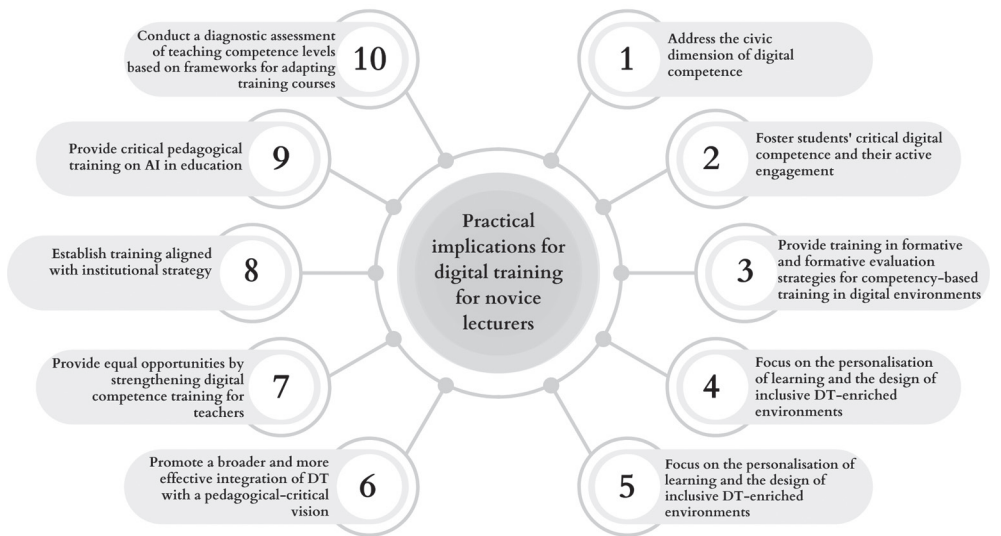
Source. Authors' own work.

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REFERENCES

Amhag, L., Hellström, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education*, *35*, 203-220. https://doi.org/10.1080/21532974.2019.1646169

Buils, S., Arroyo-Ainsa, P., Sánchez-Tarazaga, L., & Esteve-Mon, F. M. (2023). Competencias docentes para el desarrollo profesional en la universidad actual. *Journal of Supranational Policies of Education*, *17*, 76-102. https://doi.org/10.15366/jospoe2023.17.005

Buils, S., Esteve-Mon, F. M., Sánchez-Tarazaga, L., & Arroyo-Ainsa, P. (2022). Análisis de la perspectiva digital en los marcos de competencias docentes en educación superior en España. *Revista Iberoamericana de Educación a Distancia*, *25(*2), 133–152. https://doi.org/10.5944/ried.25.2.32349

Bardin, L. (1996). *Análisis de contenido.* Akal Ediciones.

Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L. A., & Otto, A. (2022). Teachers' digital competencies in higher education: a systematic literature review. *International Journal of Educational Technology in Higher Education*, *19*, Artículo 8. https://doi.org/10.1186/s41239-021-00312-8

Betancur Chicué, V., & García-Valcárcel, A. (2022). Necesidades de formación y referentes de evaluación en torno a la competencia digital docente: revisión sistemática. *Fonseca, Journal of Communication*, (25), 133–147. https://doi.org/10.14201/fjc.29603

Castañeda, L., Esteve-Mon, F., & Adell, J. (2023a). La universidad digital: aproximación a un análisis crítico de los planes de transformación digital de las universidades públicas españolas. *Profesorado, Revista de Currículum y Formación del Profesorado*, *27*(1), 175–198. https://doi.org/10.30827/profesorado.v27i1.23870

Castañeda, L., Vanaclocha, N., Velasco, J. R., Ruiz, P., Hartillo, M .I., Pereira, E., & Ruiz, A. (2023b). *Marco de competencia digital docente universitario. Creación y validación. Proyecto UNIDIGITAL DigCompEdu-FYA.* https://bit.ly/49oQhdk

Castañeda, L., Viñoles-Cosentino, V., Postigo-Fuentes, A. Y., Herrero, C., & Cachia, R. (2023c). *Strategic approaches to regional transformation of digital education.* Publications Office of the European Union.

Comisión Europea. (2018). *Modernización de la educación superior en Europa: personal académico — 2017. Eurydice Report*. Publications Office of the European Union. https://doi.org/10.2797/9642

Comisión Europea. (2020a). *Plan de Acción de Educación Digital (2021-2027).* https://bit.ly/2HVhkUc

Comisión Europea. (2020b). *Plan de recuperación para Europa.* https://bit.ly/3U6O2G7

Comisión Europea. (2020c). *Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones relativa a la consecución del Espacio Europeo de Educación de aquí a 2025*. https://bit.ly/4cLXMOd

Crue Universidades Españolas. (2022). *Competencias digitales del profesorado universitario en España. Un estudio basado en los marcos europeos DigCompEdu y OpenEdu*. Publications Office of the European Union. http://doi.org/10.2760/448078

Deroncele-Acosta, A., Carhuancho-Mendoza, I. M., Nolazco-Labajos, F. A., Molina-Quiñones, H., Torres-Obleas, J. E., Paredes-Díaz, S. E., & Mena, J. (2023). Digital competence, educational innovation with ICT and burnout in tertiary education Latin American professors. In F. J., García-Peñalvo, & A. García-Holgado (Eds.)*, Proceedings TEEM 2022: Tenth International Conference on Technological Ecosystems for Enhancing Multiculturality.* Springer. https://doi.org/10.1007/978-981-99-0942-1_106

Deumal, G., & Guitert, M. (2015). Digital competence in design education. Case study of BAU Design College of Barcelona (UVic). *Revista Latinoamericana de Tecnología Educativa*, *14*(2), 51-65. https://doi.org/10.17398/1695-288X.14.2.51

Durán Cuartero, M., Prendes Espinosa, M. P., & Gutiérrez Porlán, I. (2019). Certificación de la competencia digital docente: propuesta para el profesorado universitario. *Revista Iberoamericana de Educación a Distancia*, *2*2(1), 187–205. https://doi.org/10.5944/ried.22.1.22069

Duţă, N., & Rafailă, E. (2014). Importance of the lifelong learning for professional development of university teachers–needs and practical implications. *Procedia-Social and Behavioral Sciences*, *127*, 801-806. https://doi.org/10.1016/j.sbspro.2014.03.358

Fernández-Batanero, J. M., 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), 689. https://doi.org/10.3390/educsci11110689

Fernández-Morante, C., Cebreiro López, B., Casal Otero, L., & Mareque León, F. (2023). Teachers' digital competence. The case of the university system of Galicia. *Journal of New Appraches 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://bit.ly/3TKjeL6

Gairín, J., Domingo-Coscollola, M., Prats, M. À., & Simón, J. (2023). El e-portafolio profesional docente como instrumento formativo para la adquisición de la Competencia Digital Docente. *Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport*, *41*(1), 15-26. http://doi.org/10.51698/aloma.2023.41.1.15-26

Gallego-Arrufat, M. J., Torres-Hernández, N., & Pessoa, T. (2019). Competencia de futuros docentes en el área de seguridad digital. *Comunicar*, *27*(61), 57-67. https://doi.org/10.3916/C61-2019-05

García Vargas, S. M., Martínez Sánchez, I., & Ballesteros, B. (2019). Preguntas y respuestas: cuestionarios. In B. Ballesteros (Ed.), *Investigación social desde la práctica educativa.* Editorial UNED.

Gast, I., Neelen, M., Delnoij, L., Menten, M., Mihai, A., & Grohnert, T. (2022). Supporting the well-being of new university teachers through teacher professional development. *Frontiers in Psychology*, *13*, Artículo 866000. https://doi.org/10.3389%2Ffpsyg.2022.866000

Gibbs, G. (2012). *El análisis de datos cualitativos en investigación cualitativa.* Morata.

Gutiérrez-Martín, A., & Tyner, K. (2012). Media education, media literacy and digital competence. *Comunicar*, *38*, 31-39. https://doi.org/10.3916/C38-2012-02-03

Heckathorn, J., & Dotger, S. (2023). Snacks, shoulders, and sleep: factors that influence teachers' professional development decision-making. *Professional Development in Education*, 1-15. https://doi.org/10.1080/19415257.2023.2212680

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*, Artículo 9. https://doi.org/10.1186/s41239-022-00376-0

Jiménez-Hernández, D., González-Calatayud, V., Torres-Soto, A., Martínez Mayoral, A., & Morales, J. (2020). Digital competence of future secondary school teachers: differences according to gender, age, and branch of knowledge. *Sustainability*, *12*(22), 9473. https://doi.org/10.3390/su12229473

Kallunki, V., Katajavuori, N., Kinnunen, Anttila, H., Tuononen, T., Haarala-Muhonen, A., Pyörälä, E., & Myyry, L. (2023). Comparison of voluntary and forced digital leaps in higher education – Teachers' experiences of the added value of using digital tools in teaching and learning. *Education and Information Technologies*, *28*, 10005–100030. https://doi.org/10.1007/s10639-022-11559-7

Krippendorff, K. (2018). *Content analysis: an introduction to its methodology.* SAGE.

Kelchtermans, G. (2019). Early career teachers and their need for support: Thinking again. In A.M. Sullivan, B. Johnson, & M. Simons (Eds.), *Attracting and keeping the best teachers: issues and opportunities* (pp. 83-98). Springer.

Kunnari, I., Ilomäki, L., & Toom, A. (2018). Successful teacher teams in change: the role of collective efficacy and resilience. *International Journal of Teaching and Learning in Higher Education*, *30*(1), 111-126. http://hdl.handle.net/10138/235308

Ley Orgánica 2/2023, de 22 de marzo, del Sistema Universitario. *Boletín Oficial del Estado*, *núm. 70*, de 23 de marzo de 2023. https://www.boe.es/eli/es/lo/2023/03/22/2/con

Liesa-Orús, M., Latorre-Cosculluela, C., Vázquez-Toledo, S., & Sierra-Sánchez, V. (2020). The technological challenge facing higher education professors: perceptions of ICT Tools for developing 21st century skills. *Sustainability*, *12*(13), Artículo 5339. https://doi.org/10.3390/su12135339

Lin, L., & Johnson, T. (2021). Shifting to digital: informing the rapid development, deployment, and future of teaching and learning. *Educational Technology Research and Development*, *69*(1), 1–5. https://doi.org/10.1007/s11423-021-09960-z

Marrón, Y., & Martínez-Aznar, M. M. (2023). Características de la acreditación de la competencia digital docente. Relaciones con la competencia digital del alumnado. *Edutec. Revista Electrónica de Tecnología Educativa*, (86), 184-202. https://doi.org/10.21556/edutec.2023.86.2943

Ministerio de Educación y Formación Profesional. (2022). *Resolución de 1 de julio de 2022, de la Dirección General de Evaluación y Cooperación Territorial, por la que se publica el Acuerdo de la Conferencia Sectorial de Educación sobre la certificación, acreditación y reconocimiento de la competencia digital docente. Boletín Oficial del Estado*, *núm 166*. https://bit.ly/443v5IZ

Moreira, M. A., Rumbo, B., Gómez, G., Bermejo, R., Ruiz Melero, M. J., Brito, N., Aparecida, V., & Almeida, M. E. (2023). Teachers' pedagogical competences in higher education: a systematic literature review. *Journal of University Teaching & Learning Practice*, *20*(1), 90-123. https://doi.org/10.53761/1.20.01.07

Patfield, S., Gore, J., Prieto, E., Fray, L., & Sincock, K. (2022). Towards quality teaching in higher education: pedagogy-focused academic development for enhancing

practice. *International Journal for Academic Development*, *27*(1). https://doi.or
g/10.1080/1360144X.2022.2103561

Pérez-López, E., & Yuste, R. (2023). La competencia digital del profesorado
universitario durante la transición a la enseñanza remota de emergencia. *Revista
de Educación a Distancia*, *7*2(23). http://dx.doi.org/10.6018/red.540121

Pérez-Rodríguez, A., & Delgado-Ponce, Á. (2012). De la competencia digital y
audiovisual a la competencia mediática: dimensiones e indicadores. *Comunicar*,
39, 25-34. https://doi.org/10.3916/C39-2012-02-02

Pöntinen, S., & Räty-Záborszky, S. (2020). Pedagogical aspects to support
students' evolving digital competence at school. *European Early Childhood
Education Research Journal*, *28*, 182 - 196. https://doi.org/10.1080/135029
3X.2020.1735736

Prendes-Espinosa, M. P., & Carvalho, M. A. G. (2022)*. Los retos de la competencia
digital del profesorado iberoamericano de educación superior. Informe 2021.*
MetaRed TIC. https://bit.ly/4cLNSMD

Redecker, C., & Punie, Y. (2017). *European Framework for the Digital Competence of
Educators.* DigCompEdu. JRC Science Hub. European Commission.

Sádaba, C., & Salaverría, R. (2023). Combatir la desinformación con alfabetización
mediática: análisis de las tendencias en la Unión Europea. *Revista Latina de
Comunicación Social*, *81*, 1-17. https://doi.org/10.4185/RLCS-2023-1552

Sánchez Caballé, A., Llopis, M. Á., Buils, S., & Esteve, E. (2023). El desarrollo profesional
docente en un mundo digital: el caso de las universidades valencianas. In L.
Sánchez-Tarazaga, & F. Esteve (Eds.), *El profesorado novel en la universidad.
Oportunidades para su formación inicial y desarrollo profesional docente* (pp.
149-162). Narcea. https://bit.ly/3xyD9F5

Sánchez-Tarazaga, L., Ruiz-Bernardo, P., Viñoles Consentino, V., & Esteve-Mon, F.
M. (2022). University teaching induction programmes. A systematic literature
review. *Professional Development in Education*, *50*(2), 279-295*.* https://doi.org
/10.1080/19415257.2022.2147577

Smestad, B., Hatlevik, O. E., Johannesen, M., & Øgrim, L. (2023). Examining
dimensions of teachers' digital competence: a systematic review pre-and during
COVID-19. *Heliyon*, *9*, Artículo e.16677. https://doi.org/10.1016/j.heliyon.2023.
e16677

Subdirección General de Actividad Universitaria Investigadora de la Secretaría
General de Universidades. (2022). *Datos y cifras del Sistema Universitario
español. Publicación 2021-2022*. Ministerio de Universidades.

Tan, C. Y., & Dimmock, C. (2014). How a 'top-performing' Asian school system
formulates and implements policy: the case of Singapore. *Educational
Management Administration & Leadership*, *42*(5), 743-763.

Tondeur, J., Howard, S., Van Zanten, M., Gorissen, P., Van der Neut, I., Uerz, D., & Kral, M. (2023). The HeDiCom framework: higher education teachers' digital competencies for the future. *Educational Technology Research and Development*, *71*, 33–53. https://doi.org/10.1007/s11423-023-10193-5