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Author's address:

Doctoral Programme in Innovation in Teacher Training: Analysis of Educational Practice and ICT in Education (R010). Department of Education Sciences. Universidad de Extremadura. Campus Universitario. Avda. de la Universidad s/n, 10003, Cáceres (Spain)

E-mail / ORCID

mahidalgopu@gmail.com

 <https://orcid.org/0000-0002-9438-9787>

ARTICLE / ARTÍCULO

Analysis of the concept of Digital Teaching Competence: a systematic literature review

Análisis del concepto de Competencia Digital Docente: una revisión sistemática de la literatura

Mario Hidalgo

Abstract: The technological revolution experienced in today's society has led educational organisations to assume the responsibility of training skills and abilities for this new context. Despite the high degree of complexity within technology-mediated ecosystems, the scientific literature seems to agree that the development of teachers' digital competence is identified to be a key variable of success. The definition of digital competence is however not clearly delineated. Moreover, direct and indirect interactions within this technology-mediated teaching and learning process are not clearly identified. The objective of this study is to define the concept of Digital Teaching Competence through a Systematic Literature Review published between 2017 and 2022, using the Scopus and Dialnet databases. A total of 316 references in English and Spanish were identified, of which 32 were selected for the final analysis, following the PRISMA protocol guidelines. The results confirm the existence of a high degree of conceptual fragmentation, as well as the lack of agreement on the terminology to be used. There is a need to reach a consensus on a taxonomy that facilitates, on one hand, the analysis of the elements that make up Digital Teaching Competence, and on the other hand, the improvement of the capacity to analyse specific contextual variables that contribute to enhancing technology-mediated teaching and learning processes.

Keywords: Educational Technology, Inservice Teacher Training, Information and Communication Technologies, Digital Teaching Competence, Digital Literacy.

Resumen: La revolución tecnológica que experimenta la sociedad actual ha favorecido que los sistemas educativos de todo el mundo asuman la responsabilidad de formar individuos con capacidades y destrezas suficientes para desenvolverse de manera exitosa en este nuevo escenario. A pesar del alto grado de complejidad de las interacciones generadas en ecosistemas mediados por tecnologías, la literatura científica parece coincidir en que el desarrollo de la competencia digital docente se articula como una variable de éxito en dichos procesos. Sin embargo, no parece estar claramente establecido cómo se define la competencia digital docente y qué agentes interactúan con ella de forma directa o indirecta en los procesos de enseñanza-aprendizaje mediados por tecnologías. El objetivo de este estudio es definir el concepto Competencia Digital Docente a través de una revisión sistemática de la literatura publicada entre los años 2017 y 2022, usando las bases de datos Scopus y Dialnet. Se identificaron 316 referencias en inglés y español de las cuales 32 fueron seleccionadas para el análisis final, siguiendo las directrices del protocolo PRISMA. Los resultados confirman el alto grado de fragmentación conceptual existente, así como la falta de acuerdo en la terminología a utilizar. Se evidencia la necesidad de consensuar una taxonomía que facilite, por un lado, el análisis de los elementos que conforman la Competencia Digital Docente, y por otro, la mejora en la capacidad de análisis de las variables contextuales específicas que contribuyen a mejorar los procesos de enseñanza-aprendizaje mediados por tecnologías.

Palabras-Clave: Tecnología educativa, Formación Permanente del Profesorado, Tecnologías de la Información y la Comunicación, Competencia Digital Docente, Alfabetización digital.

1. Introduction

From its earliest manifestations, technology has conditioned the evolution of civilisations in the modern world. This constant has been maintained over centuries, establishing an inseparable binomial between the concepts of technology and progress. However, it is only in recent decades that we have witnessed an unprecedented revolution that began at the end of the last century with the birth of the digital era, the emergence of consumer computing and the spread of the Internet, and which extends to the present day with the rise of mobile technologies, social networks, as well as emerging technologies such as artificial intelligence, robotics, quantum computing and extended reality (Giron Escudero et al., 2019; Brown et al., 2020; Lindfors et al., 2021). We are witnessing a Fourth Industrial Revolution (Schwab, 2016) that will mark a turning point in the way we experience leisure, learning, culture, and human interactions at all levels (Cabero Almenara et al., 2020; UNESCO, 2023).

Despite the above, today's technological landscape is not a recent development. It is the result of a long process that began several decades ago. Many studies have supported the attractiveness of technologies for learning (Caena and Redecker, 2019), but it took several years for this to become a feasible reality. The initial cost of the technology was exorbitant, the equipment was not intuitive to operate, and there was no software designed for teaching purposes, which is recognised in the current literature as a variable of success (Aagaard et al., 2022).

While some of these barriers were overcome, governments around the world embarked on a technological race marked by highly instrumental policies. One generalised challenge has been to achieve 1 to 1 connected classroom (One Laptop Per Child (OLPC)). On the other hand, it was essential to train teachers in the use of this technology and the progressive creation of resource banks that would allow the didactic implementation of these new tools. After years of effort, the long-awaited pedagogical revolution, as well as the improvement of the quality of the teaching-learning processes, did not take place.

Research from around the world has reached similar conclusions, namely that the adoption of technologies does not guarantee improved results or a revolution in teaching-learning processes, and that many aspects related to their organisation and practice need to be rethought (Barajas and Rossi, 2018; Silva Quiroz et al., 2019; Caena and Redecker, 2019; Cabero and Palacios, 2020). The publication of the report *Technology in education: a tool on whose terms?* (GEM Report UNESCO, 2023) shows that the way in which technologies have been incorporated in education obeys more to corporate interests than to the analysis of the reality of each educational context. Similarly, it shows that their true potential lies in their adaptability as a resource for generating different approaches in different contexts for different students (Castañeda et al., 2018).

1.1. Digital Teaching Competence in the knowledge society

The relationship between technology and society has followed a very different path than the evolution experienced in the academic sphere. Evidence from the literature shows a high level of citizens' exposure to technologies (UNESCO, 2023). A study by Almås et al. (2021) mentions that 97% of Norwegian aged 9 to 18 year have their own

mobile phone. This is in line with usage levels experienced in Spain, where 94.5% of the population aged 16 to 74 have recently used the Internet in 2022 (Instituto Nacional de Estadística, 2022). As technology has become simpler to use and more socially widespread in use, educational research has shifted the focus to the role that teachers and future teachers-in-training should play in integrating technology into teaching. In other words, it is no longer just about using technology, but about how it will be adapted and integrated into teaching and learning processes, as well as the consequences of these (McDonagh et al., 2021; Yoon, 2022).

Educational research indicates that teachers must develop their Digital Competence to carry out successful integrations that promote quality learning in their students. This facilitates a transfer that fosters their development and empowerment (Marín Suelves et al., 2019; Pozo Sánchez et al., 2020; Jiménez Hernández, 2021; Aagaard et al., 2022). However, when analysing the most recent literature, it is observed that although there are systematic literature reviews on the study of Digital Competence in Teaching from different perspectives, the conceptual analysis of Digital Competence has not been specifically addressed (Pettersson, 2018; Starkey, 2020; Falloon, 2020; Jiménez et al., 2021).

It is therefore of importance to analyse the concepts surrounding the Digital Competence in Teaching and, above all, to open the door to rethinking current models of technological integration. This will allow us to evolve towards a holistic conception that considers the complexity of technology-mediated ecosystems, with the goal of improving teaching-learning processes.

2. Method

The present study was carried out by means of a Systematic Literature Review (SLR). The PRISMA protocol was used for the identification of sources, strategies for approaching the search, as well as in the process and analysis of the resulting data.

The PRISMA protocol was published in 2009 with the aim of facilitating research and establishing clear and rigorous methodological foundations for this type of research. It has recently undergone a series of updates in its 2020 version (Valverde-Berrocoso et al., 2022). Accordingly, the phases that have been addressed in the study are as follows:

- *Phase 1: Development of the research questions.* This research is based on the resolution of a main research question: How is the concept of Digital Competence in Teaching defined through the literature review? Following on from the main question, other specific questions arise (see Table 1).
- *Phase 2: Eligibility criteria.* The present research includes the selection of articles that have been published in scientific journals published in English or Spanish, between January 2017 and December 2022. Filters linked to the social sciences were applied and limited to article and review. We selected those that addressed the terms "digital competence", "digital literacy" and "teacher education", as well as their translations into Spanish, both in their title and/or in their abstract. The exclusion criteria were manuscripts that do not consist of educational evidence linked to the development of digital

competence for teachers, digital literacy for teachers or teacher education. Exclusions were classed in three categories: (1) The manuscript does not answer the research questions; (2) the manuscripts deviate from the content stated in the title and abstract; and (3) the manuscript is of an informative nature or lacks method and rigour in its approach to the research.

Table 1. Research questions.

Item	Question	Coding
Q1.1	What are the concepts used in the selected literature to define the teacher-technology relationship?	Digital and Media Literacy (DML) Digital Competence in Education (DCE) Digital Professional Competence (DPC)
Q1.2	Do the authors of the selected manuscripts provide a definition of the concept that defines the teacher-technology relationship?	Own definition Definition of third parties
Q1.3	What are the competency "frameworks" or "models" identified in the selected literature to define the teacher-technology relationship?	No prior coding
Q1.4	Do the authors of the selected papers provide a definition of the concept that defines the teacher-technology relationship within a competency "framework" or "model"?	Own model Third-party model

- *Phase 3 Search.* The Scopus and Dialnet databases were used for the development of this research. Considering the limitations of each platform's search engine, the keywords have been limited and the search has been narrowed down as much as possible according to the aforementioned criteria. The date range is from January 2017 to December 2022. The full search syntax is detailed in [Annex I](#).
- *Phase 4 Selection.* The selection phase was carried out in two sequential screens: (a) First screen (initial search): the initial search yielded a total of 316 results with 4 duplicate articles. Subsequent exclusions were performed based on the titles and abstracts, enabling a total of 196 articles to be excluded from the initial 312 articles, including 116 for this initial search. (b) Second screening (detailed reading): a thorough reading of the manuscript was conducted, and the exclusion criteria was applied. The "snowball" method was used to identify additional references of relevance to the study. Two articles were considered as candidates for inclusion by this method. After analysis and consensus, 1 article is added to the list, resulting in the final inclusion of 32 manuscripts for the conduction of this systematic literature review.

- *Phase 5 Data coding.* The management of all references is carried out with the Zotero bibliographic manager. For the detailed extraction of relevant information, a spreadsheet was developed including a total of 29 categories. Of the total of 32 references analyzed, 17 (53.12%) are obtained from the Dialnet database and 14 (43.75%) from Scopus. The additional manuscript added by Snowball method represents 3.12% of the total references identified.

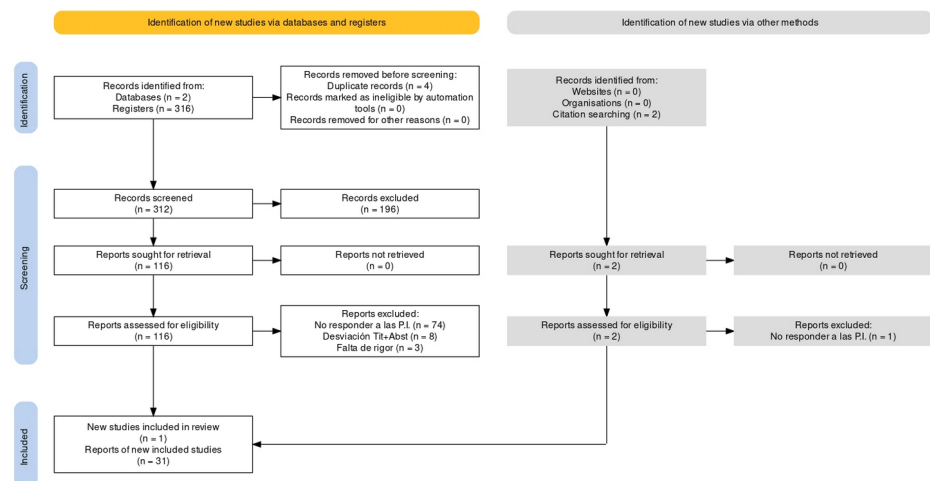


Figura 1. Systematic Literature Review Flowchart - Document Selection Process. Source: Prepared by the author based on app (Haddaway et al. 2022).

3. Results

The results are presented below in response to each of the research questions posed as objectives of the study.

3.1. Q1.1 What are the concepts used in the selected literature to define the teacher-technology relationship?

Three fundamental concepts have been identified in the definition of the teacher-technology relationship in the documents analysed: (1) Digital and Media Literacy (DL); (2) Digital Competence in Teaching (DTC) and (3) Digital Professional Competence (DPC).

Digital and Media Literacy

The term "Digital Literacy" is first defined as "the ability to use and evaluate digital resources, tools and services appropriately and apply them to lifelong learning processes" (Gilster, 1997, p. 220). The social nature of the concept is broadened by the incorporation of technology in the classroom. Although an attempt is made to delimit the needs that are considered essential for adequate professional development, the term remains imbued with an instrumental nature that has marked its evolution over

the years. Along these lines, Ng (2012, p. 1067) provides the following definition: "technical and operational skills for using Information and Communication Technologies (ICT) in learning and everyday activities".

The rapid evolution of technology requires its conceptualisation to constantly be updated. This leads to the emergence of new definitions that consider more complex dimensions. Hobbs et al. (2011) defines digital literacy as "a constellation of life skills" (Hobbs et al., 2011, p.7). In the same vein, further research argues for the complexity of the term by noting the interconnectedness of multiple media literacies (Botturi, 2019; List et al., 2020). Evidence shows that some definitions consider digital literacy to be at the intersection of different types of linked competences: technical, cognitive and socio emotional.

With respect to teacher training, the use of the concept of Digital Literacy has been related to the development of technical skills and training in the use of digital media. Some educational research has supported that these skills have been considered sufficient to favour the transfer of knowledge for pedagogical application. Many authors have however criticized this definition as being detrimental to the quality of the training offered, as being deficient and limited, and relying on an excessively technified vision (Aagaard et al., 2022).

The literature seems to agree that the term Digital Literacy has gone through two evolutionary stages. The first stage encompasses definitions that allude to a series of eminently technical skills and capabilities (Botturi, 2019). The second stage tends to value the complexity of the educational ecosystem, considering other dimensions such as security, ethics, etc. (Yoon, 2022).

However, this categorisation is far from definitive. Similarly, the persistence of the concept is compromised by those who define new conceptualisations such as 'Digital Competence in Teaching', which better describes the reality of technology-mediated ecosystems (Janssen et al., 2013, p.480). Authors such as Srnicek (2017) argue that it is not only about adapting to the new media that appear, but also about assessing with a more holistic prism a reality that affects many more elements, apart from the functional ones.

Digital Teaching Competence

The concept of "Digital Competence in Education" has emerged from research in the Nordic countries, especially Norway. Great efforts have been made to analyse this terminology and the challenges associated with it, but there seems to be no consensus on its definition. Several definitions conceptualising Digital Competence in Education were identified in the reviewed literature.

The first group of definitions is characterised by a highly instrumental focus, for example, Krumsvik (2009) understands Digital Teaching Competence to be related to the use of ICT for teaching and learning with didactic criteria. Another definition describes it as "a teaching competence for the digital world" (Castañeda et al., 2018, p. 14).

Specifically, Lázaro-Cantabrana et al. (2019) determined that there are capacities, skills and attitudes related to technology and education. According to

Insteford and Munthe (2017), digital competence is articulated as essential to achieve pedagogical effectiveness. This selection of definitions represents a first category focused on the possession of skills and abilities, mainly technical, linked to the efficiency of teaching practice and professional development (Insteford and Munthe, 2017; Lázaro-Cantabrana et al., 2019; Colás Bravo et al., 2019).

In a second set of definitions, some authors argue that the digital competence in teaching involves a much more complex set of skills compared to the digital competences needed in other areas of society (NMC, 2017; Håkansson and Petterson, 2019). McDonagh et al., for instance, states that "digital competence is not limited to a narrow set of technical skills but encompasses a much broader range of knowledge and attitudes" (McDonagh et al., 2021, p.6). This conceptualisation recognises the complexity of educational contexts, which represent a broader set of interactions than initially conceived (Krumsvik, 2008; From, 2017). The evolution of technology and the simplification of its management have led to a focus on the transfer of knowledge to learners. Following this line of thought, Tourón et al. (2018) propose the following definition for Digital Teaching Competence:

"The set of skills and abilities that lead us to incorporate and properly use ICT as a methodological resource, becoming Technologies for Learning and Knowledge (TAC) with a clear didactic implication" (Tourón et al., 2018, p.28).

Other studies agree with this idea (Gisbert Cervera and Lázaro Cantabrana, 2014; Falcó Boudet, 2017; Girón Escudero et al., 2019; Massoumi, 2021). Therefore, we are faced with a conceptualisation with a more holistic approach, where digital Teaching Competence goes beyond individual and educational dimensions (Domingo Coscolla et al., 2020). For example, some research focuses on a contextual dimension (Petterson, 2018; Silva Quiroz et al., 2019), while others advocate the analysis of interactions with social practices, political, environmental, and economic factors (McDonagh et al., 2021).

In a third group of definitions, as was the case for Digital and Media Literacy, there is an emphasis on the rapid technological evolution and the complex interactions that are generated in educational ecosystems. This makes it very difficult to establish a cross-cutting definition that encompasses all possible technology-mediated scenarios.

Despite the conceptual evolution described over the years, as well as the efforts invested in defining Digital Teaching Competence, a stream of studies using a more critical approach has begun to emerge. The term Digital Competence in Education is viewed as being framed with a deterministic approach and the need to rethink this type of competence is emphasised. using an instrumental perspective at the micro level and, in parallel, promotes a deterministic conception at the macro level (Castañeda et al., 2018).

A final point of consideration for the findings presented above are the the disparity of approaches among the definitions of Digital Competence in Education. The degree of differences between the different conceptualisation emphasises a possibility of fundamental weakness that make it impossible to conceptualise.

Van de Oudeweetering and Voogt (2018) argue that a great deal of inconsistency underlies the definitions, interpretations, terminologies, and dimensions

of 21st century competences. This ambiguity is evident in the difficulty of translating them into didactic objectives, as there is a constant evolution of the term. It is a dynamic concept that is linked to the context and the variability of digital technologies. An example of this is the paradigm shift in relation to teacher competence development standards.

Professional Digital Competence

In 2012, the Norwegian Centre for Information and Communication Technologies in Education coined the term 'Professional Digital Competence' (Kelentrić et al., 2017). This term arises due to the discrepancies experienced by students in teaching education. The challenges faced by students in developing teaching practice may not be addressed by initial academic training (McDonagh et al., 2021).

Ketil Engen's study on the conceptual evolution of Professional Digital Competence shows that many practitioners have noted limitations related to the concepts of Digital Competence and Digital Literacy (Ketil Engen, 2019). The main problem lies in trying to make general categorisations. Over time, these shortcomings become evident through a "dialectical process". The author proposes as a solution to use concrete situations to determine different types of digital competences, that are defined by the nature of the context and the situation. Lund et al. (2014) argue for the need to have two types of competences, generic ones that are valid for all situations, and others that are specific to the teaching profession.

Starkey (2020), however, seeks a deeper understanding of Digital Competence in education. The main challenge lies in defining not only generic instrumental skills but also to consider context-sensitive skills (Almås et al., 2021). Lund and Aagaard (2020, p. 68) qualify this conceptual application of Professional Digital Competence through the term "transformative digital agency", which refers to the ability of identifying difficult educational situations and address them using appropriate digital resources, thus turning a difficult situation into a learning opportunity. It is interesting to mention that the term Digital Professional Competence shows some similarity with the widely known TPACK model (Mishra and Koehler, 2006), as it includes technical skills in the use of technology as well as pedagogical skills.

In line with Ketil Engen (2019), work such as that of Lindfors et al. (2021) advocates "moving away from understanding digital competence as a set of generic skills applicable to all situations". A broader understanding is sought that encompasses generic and teaching-specific skills.

Andreasen et al. (2022) point out that while there has been an evolution from terms related to the use of digital devices to broader conceptualisations such as Digital Competence and Digital Literacy, the nature of Professional Digital Competence is broader, encompassing cognitive, emotional, and sociological knowledge. Of particular interest is that Professional Digital Competence seeks not only appropriation from the perspective of the teacher, but also transfer and appropriation by the learner (Lindfors et al., 2021).

The concept of Digital Professional Competence has had a great impact on the Norwegian educational environment. The success of this initiative has materialised in subsequent years through the Norwegian Comprehensive Framework for Teachers'

Professional Digital Competence (Kelentrić et al., 2017). The literature however emphasizes that the concept of Professional Digital Competence is under construction, emerging from the contributions of researchers, policy makers, trainers, and students (Almås et al., 2021), and can still further evolve (Aagaard et al., 2022).

3.2. Q1.2 Do authors from the included manuscripts provide a definition of the concept that defines the teacher-technology relationship?

As previously mentioned, the line of research related to the conceptual definition of the terms "Digital Competence in Teaching", "Digital and Media Literacy" and "Professional Digital Competence" is highly productive. Both "Digital and Media Literacy" and "Digital Teaching Competence" have generated a large amount of literature, depending on the orientation of the researchers. In the case of "Professional Digital Competence", this is a relatively new term that is beginning to be widely accepted by the scientific community, although its use is mainly localised in Nordic countries.

However, this systematic literature review reveals an interesting fact. Of the 32 references analysed, only four have provided their own definitions of the concepts reviewed, which means that 87.5% of the manuscripts do not provide any new developments to the study concepts.

Of the four references mentioned, three provide their own definition of the term "Digital Competence in Education" and one for "Professional Digital Competence". With regards to the definition of "Digital Competence in Teaching", no new contribution can be observed differing from the synthesis above. All of them have a strong instrumental character, except the definition provided by Cabero-Almenara and Palacios-Rodríguez (2020):

"Such competencies, coined as Digital Competencies, can be defined as the ability to consistently apply the attitudes, knowledge and skills required to plan, manage, evaluate and continuously review ICT-supported instruction, based on theory, current research and proven experience" (Cabero-Almenara and Palacios-Rodríguez, 2020).

Nagel defines (2021, p.107) however Professional Digital Competence with an emphasis on the importance to the transfer of knowledge to learners: "PDC is understood as a twofold process, in which teachers continuously develop their own and their students' digital competence".

Given the results obtained, it is worth questioning the idea put forward by Botturi (2019), which warns of the possibility of a terminological collapse. Also, the very nature of the concepts, especially the concepts of Digital Literacy and Digital Competence in Teaching, makes them more susceptible to change due to their dependence on technological evolution (Buckingham, 2019).

3.3. Q1.3 What are the competency "frameworks" or "models" identified in the selected literature to define the teacher-technology relationship?

The literature has provided evidence on the relevance of teachers' digital competence as a variable of success. This evidence has materialised in various initiatives that systematise, organise, and categorise this competence through conceptual frameworks and models. These frameworks facilitate the design of in-service training by having a

precise categorisation of what digital competence and its dimensions entail. It also helps teachers to be aware of their level of professional development in technology and their training strengths and weaknesses. A study by Padilla-Hernández (2019) has identified three lines of research on digital competence frameworks and models:

1. Weaknesses in approaches to digital competence frameworks: they reflect a limited view of educational ecosystems, the complex interactions that occur within them and the over-instrumentalization of technology (Castañeda et al.
2. Questioning the existence of a single framework for all educational realities and teacher profiles: it is difficult to address the different realities in educational settings in a single framework. Moreover, teacher profiles are complex and influenced by multiple environmental variables (Sosa and Valverde, 2020).
3. Need for a deeper analysis to focus on digital competence in the development of teaching practice: It is essential to carry out a thorough analysis to focus on digital competence in the development of teaching practice. This analysis will identify areas for improvement and opportunities for growth in digital skills for teachers.

The literature has proposed multiple models and frameworks for conceptualising digital competence, aimed at different educational levels and linked to governmental and private initiatives. Among them, two theoretical models stand out:

- The TPACK (Technological, Pedagogical and Content or Disciplinary Knowledge) model: formulated by Mishra and Koehler (2006) from Shulman's (1986) model, it argues that teachers must develop three types of knowledge to achieve successful technology inclusion. Falloon (2020) extends this model to include personal-ethical and personal-professional competencies.
- The model proposed by Krumsvik (2007): stems from the need to understand the nature of digital competence to integrate it efficiently into educational policies. It is based on three levels of competence: basic ICT skills, ICT didactic competence and learning strategies.

In terms of frameworks, two initiatives are the most referenced:

- DigCompEdu (European Commission, 2017). This initiative provides detailed guidance for the development of education policy and capacity building in diverse regional contexts, considering complex scenarios such as non-formal learning. It is based on rigorous research and best practices, providing relevant recommendations and guidelines to improve the quality of education in each region.
- Common Framework of Reference for Professional Digital Competence (Marco Común de Referencia para la Competencia Digital Docente; INTEF, 2017). This initiative, promoted by the Ministry of Education, Culture and Sport (MECD) of the Spanish Government, has gone through several versions since 2012. It has counted on the collaboration of autonomous communities, experts, teachers, consultancies and universities. The framework is organised into 5 areas, 21 competences and 6 levels, and to date represents a solid, consensual, and far-reaching initiative. It has now been replaced by the

Framework of Reference for Digital Competence in Teaching, in its January 2022 version.

In addition to these, there are other relevant frameworks that have been identified, such as the Norwegian Comprehensive Framework for Teacher PDC (Kelentrić et al., 2017), Project Links (SITEAL, 2018) or DigLit (Hall et al., 2014).

3.4. Q1.4 Do the authors of the included manuscripts provide a definition of the concept that defines the teacher-technology relationship within a competency "framework" or "model"?

In response to this research question, the results of the systematic literature review describe a similar picture to the previous question. Out of the 32 references reviewed, only three conceptual models or frameworks of their own character were found that address the topic:

1. Integral Teaching Competence in the Digital World (Castañeda, Esteve and Adell, 2018): this model was born because of the deficiencies found, in the main models reviewed. But they do not start from a teaching action model, ignore the complexity of educational contexts mediated by technologies, and finally, they are generally based on an instrumentalist and deterministic vision. Their scope of application is centred on basic education.
2. Socio-cultural model for the development of digital competence in teaching (Colás et al., 2019). Their proposal stems from the detection of the lack of a pedagogical approach. The model provides a sociocultural vision for the development of digital competence in teaching.
3. McDonagh's PEAT model (McDonagh et al., 2021). This model focuses on capturing the different dimensions of teachers' professional digital competence.

These models provide a theoretical basis for understanding and developing teachers' digital competence in the current context. However, more research is needed to comprehensively address this subject area.

4. Conclusions

The main objective of this article is to answer the question of how the concept of Digital Competence in Teaching is defined through a review of the literature. To address this question, four research questions have been posed related to the conceptualisation used by the literature in terms of "Digital and Media literacy", "Digital Competence in Teaching" and "Professional Digital Competence". We have also sought to analyse the extent to which conceptual frameworks and models have been used to answer the main question. Given that the line of research addressed has a high degree of saturation, an attempt has been made to determine new contributions made in the last six years.

The first notable aspect of the findings of this study is the high level of conceptual disintegration. There are many vaguely differentiated concepts, such as "Information Literacy", "Computer Literacy", "Internet Literacy", "Media Literacy" or "Multimodal Literacy", as well as others with a wider scope in the literature, such as

"Digital Media Literacy", "Digital Competence in Teaching" or "Professional Digital Competence".

Beyond the differentiation in nomenclature, the review shows that there is no clear consensus on the dimensions covered by each concept, which leads to indiscriminate and undifferentiated use, making it difficult to establish their precise nature. What does seem to emerge from the literature is that the terms 'Digital Literacy' and 'Digital Competence' have a strong instrumental character, as well as a two-stage evolution: an initial stage focusing on operational and technical aspects, and a more complex conceptualisation later.

It is also noted that this conceptual disintegration is due to linguistic preferences and geographical differences, with the term 'Digital Literacy' being more common in the Anglo-Saxon world and 'Digital Competence in Teaching' in the European context. However, according to McGarr and McDonagh (2021), several authors advocate the use of both terms interchangeably.

The next aspect to consider is the low volume of new contributions to the definition of the concepts mentioned above. Most of the manuscripts reviewed in the SLR use definitions and conceptualisations made by other authors. These results invite reflection on the state of the question, as one one hand, it could also indicate a saturation of the line of research, with few possible new contributions. On the other hand, it could confirm the idea that the line of research, far from being closed, is facing a loss of focus. With the exception of the Norwegian initiative providing the term "Professional Digital Competence", which is already a decade old, no highly relevant contributions can be observed. Conceptual and competence frameworks seem to be a new way to categorise and define digital competence in teaching, but they also face a high volume of contributions with specific aims, approaches, and interests. It is important to bear in mind that, although they may represent a new way of categorising the concept of digital competence in teaching, it is necessary to reflect on the underlying interests, as they may subject the evolution of education to corporate interests that are diverted from the ultimate purpose of education: to provide quality education (GEM Report UNESCO, 2023).

Another conclusion derived from the study is that there is a need for the scientific community to concretise the taxonomy related to technologies in education. Janssen et al. (2013) point to the need to find a "common language". The review of the literature suggests multiple ways in defining and understanding digital competence. This conclusion feeds into a new initiative already underway, in the form of a study being carried out in connection with the main work of this research.

Finally, it is worth mentioning that teacher education seems to be the factor that most influences the development of digital competence in teaching. Both at the entry-level education for teacher university training programmes, and as continuing education, once joining the profession. It is important to design education programmes with a vertical approach to enable more coherent professional development (Petko et al., 2015). It is also important to consider context specificity as a key to more efficient training designs. The connection between entry-level programmes and the reality of the classroom seems to be a factor to consider adapting teaching at university level and achieve greater impact (Aagaard et al., 2022). In this

sense, it agrees with the idea that it is necessary to reformulate and review the subjects related to technology education in university programmes.

These results highlight the importance of being precise when talking about the relationship between teachers and technology. The complex picture described in this review makes it necessary for the scientific community to reach a consensus to establish a starting point for a more holistic and context-specific approach to technologies in educational settings.

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