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Assessment of Digital Teaching Competence in Non-University Education

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Abstract: The enormous influence that Information and Communication Technologies have in society, as well as the pandemic caused by COVID-19, have caused teachers to need to adapt to new educational contexts in recent years, in addition to evidencing the enormous deficiencies in the use of technologies. The quarantine situation made it necessary to organize the educational system so that students could continue their training away from the classroom. This article aims to assess whether teachers' perceptions about their level of digital competence have changed after quarantine in non-university education teachers in Spain. For this, a nonexperimental quantitative method was applied using descriptive statistical techniques. The sample is made up of 168 teachers, and for data collection, a questionnaire was used covering different areas established by the DigCompEdu framework. The results show that the perception teachers have about their digital competence is that it has improved due to free training, which implies the necessary training of teachers in new technologies. These data encourage the design of a training plan from universities to comply with the resolution of 4 May 2022, of the General Directorate for Territorial Evaluation and Cooperation on updating the reference framework of digital teaching competence.

Keywords: digital competence; teacher training; education

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1. Introduction

At present, technology has become indispensable in people's lives. The digital and technological advancement in the area of information technology, known as Information and Communication Technology (ICT), has caused a true revolution in today's society. These technologies are considered true engines of development and progress and have not stopped growing and advancing in recent decades [1].

The development of new technologies in the field of computing has led to a change in the educational system. In fact, in 2006, in Brussels, the European Commission presented the European Framework for key competences for Lifelong Learning [2] in order to improve the quality of training for all students. The document reflects eight basic competences that have led to a significant change in education in both the way of understanding it and in the way of developing the entire training methodology [3].

Right after, in Spain, the adaptation of the curriculum was carried out based on the Organic Law 2/2006 of Education (LOE) of 3 May, in which the basic competences are discussed for the first time, among which is digital competence [4]. For this reason, students must acquire a broad combination of knowledge, abilities, competences, and attitudes in the advanced use of computer and communication tools, which will allow them to become competent in multiple contexts of their social life and digital environment [5].

However, the reality of the classroom invites us to think that this change in the educational system has not been able to keep up with the advancement of ICT, to a large extent also due to the Digital Teaching Competence (TDC), which requires that teachers not

only acquire a satisfactory level of digital competence but also effectively and efficiently integrate the use of ICT in their work as teachers [6].

The quarantine measures in 2020 caused all homes to become compulsory educational spaces, and ICTs allowed for didactic interaction between teachers and distance learners. This situation of radical change, from face-to-face teaching to online teaching, raises numerous questions for educational research due to the numerous effects it has had, which are still unknown today and must be studied [7]. In addition, new challenges for educational research are emerging [8].

In order for students to acquire digital competence and information processing, teachers must train and develop their own digital competence as teachers. Therefore, the inclusion of new technologies in education requires the adaptation and development of new teaching competences [9].

This is due to the fact that the teaching profession is continuously subjected to highly changing social demands, and teachers require an ever greater and more complex set of competences [10]. In particular, the ubiquity of digital devices and the duty to help students become digitally competent requires educators to develop their own digital competence [11].

The European Framework for the Digital Competence of Educators (DigCompEdu)

Digital teaching competence (TDC) not only implies having technical knowledge but also pedagogical and student empowerment knowledge [12]. On the other hand, in order to take advantage of the potential of digital tools in training processes, as well as to manage new learning situations enriched with ICTs, it is necessary for teachers to have an adequate TDC [12].

At the international level, a series of frameworks, self-assessment tools, and training programs have been developed to describe all the aspects related to TDC with the purpose of assessing their digital competence, identifying their learning needs, and offering quality teaching using ICT [13].

DigCompEdu is a document that presents firm scientific solidity and specifies what it means for teachers to be digitally competent. It is the general reference framework to support the development of specific digital competences of educators in Europe [14].

At the national level, the Common Framework for Digital Teaching Competence was developed in 2017 by the National Institute of Educational Technologies and Teacher Training (INTEF), an organization belonging to the Ministry of Education, Culture and Sports of the Government of Spain [15].

In the same year, the INTEF published a report entitled "Five years of evolution of the Digital Teaching Competence". It reflects on how digital competence among teachers evolved from 2012 to 2017, what real needs the education system has, and how the process of acquiring digital competence can be made more relevant.

On the other hand, in Spain, the National Digital Competences Plan has been developed and integrated into the Digital Spain 2025 Agenda. This plan defines a series of axes and lines of action. One of the axes is the digital transformation of education marked with a clear line of action: the digitization of education and the development of digital competences for learning in education. The goal of this line is to guarantee that all students in the educational system acquire the digital competences necessary for their full social integration and professional development [16].

Of the proposed measures, the Plan for Digitization and Digital Competencies of the Educational System stands out, with a key factor for success being the inclusion of teacher training in its TDC [16].

The framework of the Digital Education Action Plan (2021–2027) indicates that it is an initiative of the European Union to support a sustainable and effective adaptation of the education and training systems of its Member States to the digital age. It tries to address the challenges and opportunities of the COVID-19 pandemic by presenting opportunities for the educational and training community (teachers and students), among others [17].

On the other hand, just after the quarantine in July 2020, the Agreement of the Education Sectoral Conference on the reference framework of the TDC was published in the Official State Gazette. The framework is a tool for the diagnosis and development of teachers' digital competences, which are defined as competences that all teachers in the 21st century need to have in order to improve their educational practice and for continuous professional development [18].

In this resolution, the use of the reference framework of the TDC, established by the INTEF in 2017 as an instrument for the design of educational policies, was agreed upon in order to improve the digital competence of teachers [19].

In addition, TDC certification procedures that are based on the use of the TDC reference framework, including a correspondence scheme with the framework to facilitate recognition and certification processes between administrations that converge with the various frameworks used, are recognized [19].

However, in May 2022, the agreement of 30 March 2022, of the Education Sectoral Conference on updating the reference framework of the TDC was published in the Official State Gazette. To implement this update, a working group was set up under the Learning Technologies Working Group (GTTA) made up of representatives of all educational administrations [18].

The resolution echoes the rapid change experienced by digital technologies and their wide extension of use as a direct consequence of the COVID-19 pandemic, which has required an in-depth review to adapt it to a new context marked by increasing digitization [20].

Based on DigCompEdu, an adaptation to the Spanish educational context was carried out, and the criteria to establish the levels of the European framework were modified in order to adopt one that adjusted to the phases of professional teacher development, from their initial training and their incorporation into the profession, to an expert, reflective, creative, and critical exercise of teaching, in which digital technologies are not an end but one more means for all students to improve their learning [18].

In this new model, a comparative analysis was made based on DigCompEdu (2017), prepared by the Joint Research Center (JRC) and published by the European Commission, and a series of investigations and self-reflection tools on digital competence, such as SELFIE (reflection on effective learning by promoting innovation through educational technologies), also developed by the European Commission [21].

According to the Order EDU/247/2023 of February 2023, which regulates the procedures for the accreditation, certification, and registration of the TDC for the teaching university educational centers supported by public funds from the Community of Castilla y León, which is based on what was established in the Framework of Reference of the TDC with 23 competences grouped into six areas, as shown in Table 1, a progression model was established that is structured in three stages, each of which includes two levels: Access (Levels A1 and A2), Experience (Levels B1 and B2), and Innovation (Levels C1 and C2) [21].

Table 1. Updated common framework for digital teaching competence.

Areas of Competence	Competences
Area 1: Professional commitment	1.1. Organizational communication 1.2. Participation, collaboration, and professional coordination 1.3. Reflective practice 1.4. Continuous digital professional development 1.5. Protection of personal data, privacy, security, and digital wellbeing
Area 2: Digital content	2.1. Search and selection of digital content 2.2. Creation and modification of digital content 2.3. Protection, management, and sharing of digital content
Area 3: Teaching and learning	3.1.Teaching 3.2. Guidance and support in learning 3.3. Peer learning 3.4. Self-regulated learning

Table 1. *Cont.*

Areas of Competence	Competences
Area 4: Evaluation and feedback	4.1. Assessment strategies 4.2. Analytics and evidence of learning 4.3. Feedback and decision making
Area 5: Student empowerment	5.1. Accessibility and inclusion 5.2. Attention to personal differences in learning 5.3. Active engagement of students with their own learning
Area 6: Development of digital competence of students	6.1. Media literacy and information and data processing 6.2. Communication, collaboration, and digital citizenship 6.3. Digital content creation 6.4. Responsible use and digital wellbeing 6.5. Troubleshooting

Source: authors' own elaboration based on [20,21].

For the analysis of the competences of the areas proposed in the framework, the TPACK model (Figure 1) elaborated by [22] has been taken as a theoretical model for its development, which defends the need for the true integration and interaction of the three types of knowledge—technical, pedagogical, and disciplinary—in which the educational context in which it is applied is taken into account so that the teaching action is effective [22].

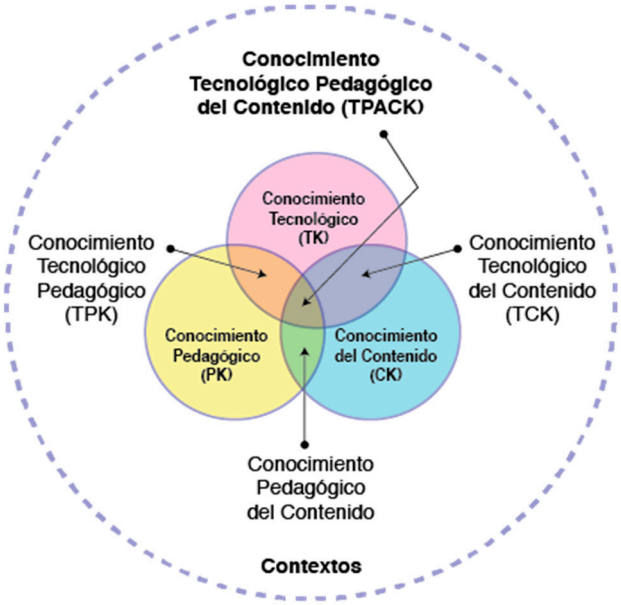

Figure 1. TPACK model. Source: [22].

According to the TPACK model, a competent teacher must be able to integrate knowledge about the content of the subject, pedagogy, and technology together in such a way that the combination of all of them leads to a successful training experience [23].

Regarding the definition of TDC, in this new framework it is defined as the integration of knowledge, competences, abilities, and attitudes that must be simultaneously put into play to perform their functions by implementing digital technologies, and to solve problems and unforeseen events that could present themselves in a specific unique situation as education professionals [21].

On the other hand, in order to adequately specify a competence and make it easier for teachers to identify the level they are at, specific descriptors of the stages and levels are established for each competence, as well as a series of achievement indicators, statements about performance, and examples [20,21].

The educational administrations will be responsible for issuing the TDC accreditations, and various data will be collected in these, such as the name of the accreditation, the TDC

level, the educational administration that issues them, the data of the applicant, and the date of issue, among others [24].

As this publication is recent, it is also specified that the educational administrations have 1 year from the publication in the Official State Gazette to prepare and approve the regulations that regulate the TDC in terms of the published agreement [24].

2. Materials and Methods

This study was carried out under the postulates of a quantitative methodology. It is a cross-sectional study of a nonexperimental design [25] and a descriptive–correlational nature that aims to investigate the level of digital competence of non-university teachers using the questionnaire technique.

This questionnaire is the result of an adaptation of the self-reflection tool for non-university teachers based on DigCompEdu, "SELFIEforTEACHERS" [26]. This tool allows teachers to self-assess across all DigCompEdu competency areas and identify their strengths, as well as areas where they need to improve their digital learning. It is available online in 29 languages, including all official languages of the European Union [26].

This questionnaire contains a total of 32 self-reflection elements for the 6 competency areas. As initial information, it requests data on the country, specialization, and professional category of teachers, as well as an initial evaluation of their digital competence as a teacher. For the professional engagement area, it proposes 9 questions; for the digital content area, it proposes 5 questions; for the teaching and learning area, it proposes 5 questions; for the evaluation and feedback area, it proposes 3 questions; for the student empowerment area, it proposes 4 questions; and for the area of the development of students' digital competence, it proposes 6 questions [26].

Finally, the questionnaire asks some sociodemographic questions such as sex, age, teaching area, number of years working as a teacher, length of time using technology in classes, tools used for learning, ages of students, what is taught, and a profile of the students, among others [26].

When teachers have completed the questionnaire, they can see general information about how the results obtained can be interpreted with a scoring system, which allows a maximum of 192 points to be obtained (6 points for each of the 32 questions). Based on the points obtained, a competency level is assigned from A1 to C2, where A1 is the lowest and C2 is the highest [26].

To conduct this study, the following research question was formulated:

What is the current level of digital competence of non-university teachers in Spain in the six areas analyzed based on sex, age, and years of experience?

2.1. General Objective

The objective, from this date to 2024, is to accredit and certify the digital competences of at least 80% of 700,000 non-university teachers, (Ministry of Education and Vocational Training, 2022b) a commitment acquired by Spain before the European Commission, which is reflected in the Recovery, Transformation, and Resilience Plan.

2.2. Specific Objectives

Objective 1. To evaluate the teacher's perception of their level of digital competence in the 6 areas studied: (1) professional commitment, (2) digital content, (3) teaching–learning, (4) evaluation and feedback, (5) empowerment of students, and (6) development of students' digital competence [14].

Objective 2. To analyze and assess whether there are differences between the perception of the level of digital competence reached in each of the 6 areas based on sex, age, and years of experience.

2.3. Hypotheses

The study puts forth various hypotheses:

Initially, a comparison between the sexes by areas of competence was conducted with the following assumption:

H1. *There is no significant difference in the acquisition of digital teaching competence between females and males.*

Also, a comparison was conducted between the ages of the subjects by areas of competence with the following hypothesis:

H2. *The age of the subjects affects the level of teaching digital competence.*

Moreover, the teaching experience of the subjects was analyzed by areas of competence. The hypothesis to be tested was the following:

H3. *There is a significant difference in the level of teaching digital competence between teachers with different levels of experience.*

2.4. Population and Sample

The population under study included teachers at non-university levels, ranging from the most elementary levels to those of high school and Vocational Education and Training without distinction between public and private ownership. The sample comprised a total of 168 teachers, with a distribution of 20.8% male, 78.6% female, and 0.6% who did not want to reveal their sex. Likewise, the sociodemographic results that defined the sample varied from among those chosen to carry out this study, in terms of sex, age, and years of teaching experience. The information revealed in this article was obtained from the analysis of these data.

Regarding age, the majority of participants were between 40 and 49 years of age, with responses from teachers of all established age ranges, as shown in Table 2.

Table 2. Age of surveyed participants.

Age Range	Number of Answers	Percentage
30 years or younger	16	9.5%
Between 31 and 39 years	40	23.8%
Between 40 and 49 years	66	39.3%
Between 50 and 59 years	43	25.6%
60 years and older	3	1.8%

In relation to the years of teaching dedication, Table 3 shows that the ranges between 6 and 15 years and between 16 and 25 years had a higher percentage, with 33.9% and 28.6%, respectively.

Table 3. Years of teaching dedication of the participants.

Years Dedicated to Teaching	Number of Answers	Percentage
5 years or fewer	29	17.3%
Between 6 and 15 years	57	33.9%
Between 16 and 25 years	48	28.6%
At least 26 years	29	17.3%
Only curricular internship	5	3.0%

Given the difficulty in obtaining a random sample that faithfully represented the entire population, an incidental non-probabilistic sampling was carried out, like those carried out in other studies [27].

In compliance with the Law on Protection of Personal Data and the guarantee of digital rights [28], special care was taken to always safeguard anonymity.

2.5. Instrument

To obtain the information, a questionnaire was prepared to measure the self-perception that teachers have about their own digital teaching competences through the competence indicators of the DigCompEdu European Framework, which establishes six different areas that demonstrate the digital competence of teachers. In turn, a total of twenty-two competences distributed in the six main areas are determined. Areas 2 to 5 are the fundamental pillars that explain the digital pedagogical competence of educators; that is, the digital competences that teachers need to be able to adopt efficient, inclusive, and innovative teaching–learning strategies [14]. It also shows a progression model that helps teachers to know what their strengths and weaknesses are through a series of levels of digital competency development. These stages are linked to the six aptitude levels used by the Common European Framework of Reference (CEFR) for Languages that move from A1 to C2, as shown by [29] in their study.

In addition, a role is established for each level: novice (A1), explorer (A2), integrator (B1), expert (B2), leader (C1), and pioneer (C2). In turn, each level has its descriptor, related to the role: awareness (A1), exploration (A2), integration (B1), expert knowledge (B2), leadership (C1), and innovation (C2). The purpose of the roles and descriptors is to encourage teachers to appreciate their achievements in a positive way and to want to extend them with new knowledge.

The questionnaire used consists of three clearly differentiated parts: The first gathers sociodemographic data through questions about the educational stage in which they practice, area in which they teach, years dedicated to teaching, etc. The second collects the perception of the change in their own TDC before and after the COVID-19 pandemic, and in the third part, the areas of competence are assessed through various measurable items. The response options of this questionnaire are a Likert-type scale that allows for the collection of the opinions of teachers about their TDC. In the responses, statements are made in which teachers valuate their behavior across five and seven items, both favorable and unfavorable, that make up the scale. With this type of questionnaire, more precise results are obtained, and the opinion of the respondents is accurately measured.

The design of the questionnaire was previously validated since it was already based on the statements that appeared in [18,26]. The research was distributed during the second quarter of 2023, obtaining a total of 168 responses.

2.6. Data Collection and Analysis Procedure

The questionnaire was carried out with the Google Forms tool since it allowed for its distribution in a simple and quick way. We disseminated it through different channels, from email to social networks, in which it was sent to groups of teachers in an online version (https://forms.gle/FRWhZQdkoU3V2QLS9).

Data collection is simplified with the use of this tool since it was available in a computerized form, which facilitated its subsequent analysis.

IBM SPSS Statistics 25 was used for the analysis of the data. First, it was necessary to prepare the data extracted from the responses. Then, with the SPSS software, we calculated the descriptive statistics that gave measures of centralization and dispersion, as well as tests to verify that the data obtained followed a normal distribution.

The median was chosen as the centralization statistic, since the mean can be affected by the existence of extreme values [30]. Regarding the statistics that show the dispersion, the standard deviation was used since it indicates quite accurately the dispersion of the data.

The normality of the variables was analyzed using the Kolmogorov–Smirnov test. The hypotheses of normality (p-values KS < 0.128) were accepted for five of the areas evaluated. In addition, Friedman tests were applied to compare the distributions in related samples to detect the differences between the distributions in the area of the development

of the digital competence of the students, in which normality was rejected. Post hoc tests adjusted by Bonferroni, together with effect size estimators, aided in the interpretation of the results. The criteria for classifying the magnitude of the effect with Cohen's d [31] was small (d = 0.2–0.4), medium (d = 0.5–0.8), and large (d = greater than 0.8). The level of significance used in the analyses was 5% ($\alpha = 0.05$).

3. Results

In the comparison of the level of Digital Teaching Competence by the sex of teachers in each area, Table 4 shows that the critical value of U (2407.65) was higher than that of all areas, which means that there was sufficient evidence to reject the null hypothesis (H1) and conclude that there was no statistically significant difference between male (M) and female (F), with a low effect size (d < 0.2).

Table 4. Differences between the sexes by areas of competence.

Area	Sex	No	Average	Standard Deviation	Standard Error	Median (RI)	*p*-Value	D Cohen
A1	F	35	3.492	0.972	0.007	3 (3.4)	0.440	−0.079
	M	132	3.657	1.064	0.030	4 (3.5)		
A2	F	35	3.412	1.084	0.008	3 (3.4)	0.438	−0.072
	M	132	3.571	1.106	0.031	4 (3.4)		
A3	F	35	3.204	1.090	0.008	3 (2.4)	0.375	−0.097
	M	132	3.418	1.115	0.031	4 (3.4)		
A4	F	35	2.861	1.097	0.008	3 (2.4)	0.372	−0.152
	M	132	3.200	1.121	0.031	3 (2.4)		
A5	F	35	3.314	1.115	0.008	3 (3.4)	0.409	−0.039
	M	132	3.583	0.952	0.026	4 (3.4)		
A6	F	35	2.784	1.187	0.009	3 (2.4)	0.293	−0.097
	M	132	3.383	1.121	0.031	3 (3.4)		

Note: 1. Interquartile range (25th percentile, 75th percentile); 2. Mann–Whitney test; 3. Effect size estimator: small (d = 0.2–0.4), medium (d = 0.5–0.8), and large (d = greater than 0.8).

Regarding the analysis of the ages of the subjects, it can be seen in Table 5 that except for the Competence Area of Professional Commitment (A), there was a statistically significant difference between the groups with a confidence level of 95%. In the rest of the areas, there was not enough evidence to reject the null hypothesis (H2) and conclude that there was a significant difference between the groups. Therefore, it was established that the age of the subjects does not affect the level of competence.

Table 5. Differences between the ages of the subjects by areas of competence.

Area	Age	No	Average	Standard Deviation	Standard Error	Median (RI)	ANOVA between Groups
A1	30 years or younger	16	3.203	0.928	0.058	3 (3.4)	0.014
	Between 31 and 39 years	40	3.819	0.951	0.024	4 (3.5)	
	Between 40 and 49 years	66	3.464	0.970	0.015	3 (3.4)	
	Between 50 and 59 years	43	3.604	0.994	0.023	3 (3.4)	
	60 years or older	3	2.500	0.522	0.174	2 (2.3)	
A2	30 years or younger	16	3.234	1.003	0.063	3 (3.4)	0.106
	Between 31 and 39 years	40	3.663	0.996	0.025	4 (3.4)	
	Between 40 and 49 years	66	3.457	1.095	0.017	3 (3.4)	
	Between 50 and 59 years	43	3.418	1.133	0.026	3 (3.4)	
	60 years or older	3	2.500	0.674	0.225	3 (2.3)	
A3	30 years or younger	16	3.055	0.964	0.060	3 (2.4)	0.101
	Between 31 and 39 years	40	3.506	1.122	0.028	3 (3.4)	
	Between 40 and 49 years	66	3.235	1.119	0.017	3 (3.4)	
	Between 50 and 59 years	43	3.317	1.028	0.024	3 (3.4)	
	60 years or older	3	2.235	0.562	0.187	3 (2.3)	
A4	30 years or younger	16	3.062	0.885	0.055	3 (2.3)	0.209
	Between 31 and 39 years	40	3.117	1.154	0.029	3 (2.4)	
	Between 40 and 49 years	66	2.980	1.028	0.016	3 (2.4)	
	Between 50 and 59 years	43	2.852	1.153	0.027	3 (2.4)	
	60 years or older	3	1.777	0.666	0.222	2 (1.2)	

Table 5. *Cont.*

Area	Age	No	Average	Standard Deviation	Standard Error	Median (RI)	ANOVA between Groups
A5	30 years or younger	16	3.294	1.045	0.065	3 (3.4)	0.181
	Between 31 and 39 years	40	3.661	1.076	0.027	4 (3.5)	
	Between 40 and 49 years	66	3.546	0.942	0.014	3 (3.4)	
	Between 50 and 59 years	43	3.355	1.108	0.026	3 (2.4)	
	60 years or older	3	2.714	0.956	0.319	2 (2.3)	
A6	30 years or younger	16	3.046	0.894	0.056	3 (2.4)	0.332
	Between 31 and 39 years	40	3.131	1.325	0.033	3 (2.4)	
	Between 40 and 49 years	66	3.028	1.116	0.017	3 (2.4)	
	Between 50 and 59 years	43	2.888	1.267	0.029	3 (2.4)	
	60 years or older	3	2.217	0.902	0.301	2 (2.3)	

Note: 1. Interquartile Range (25th percentile, 75th percentile); 2. Mann–Whitney test; 3. Effect size estimator: small(d = 0.2–0.4), medium(d = 0.5–0.8) and large (d = greater than 0.8).

Finally, when analyzing (H3) to determine to whether there were differences between the years of educational experience, it is shown in Table 6 that the area (A6) showed a value of (0.03), which means that there was a real and significant difference between age groups in terms of their level of TDC, and this difference was not simply due to chance or sampling error.

Table 6. Differences between teaching experience by areas of competence.

Area	Age	No	Average	Standard Deviation	Standard Error	Median (RI)	ANOVA between Groups
A1	Curricular practices	5	3.850	1.136	0.227	4 (3.5)	0.090
	5 years or younger	29	3.370	1.000	0.034	3 (3.4)	
	Between 6 and 15 years	57	3.750	0.949	0.017	4 (3.5)	
	Between 16 and 25 years	48	3.473	1.012	0.021	3 (3.4)	
	26 years or older	29	3.275	0.909	0.031	3 (3.4)	
A2	Curricular practices	5	3.700	1.174	0.235	4 (3.5)	0.053
	5 years or younger	29	3.344	1.127	0.039	3 (3.4)	
	Between 6 and 15 years	57	3.649	1.006	0.018	4 (3.5)	
	Between 16 and 25 years	48	3.437	1.156	0.024	3 (3.4)	
	26 years or older	29	3.094	0.986	0.034	3 (3.4)	
A3	Curricular practices	5	3.708	1.458	0.292	4 (3.5)	0.062
	5 years or younger	29	3.166	1.042	0.036	3 (2.4)	
	Between 6 and 15 years	57	3.507	1.049	0.018	4 (3.4)	
	Between 16 and 25 years	48	3.132	1.128	0.024	3 (2.4)	
	26 years or older	29	2.942	1.001	0.035	3 (2.3)	
A4	Curricular practices	15	3.800	1.014	0.203	4 (3.5)	0.118
	5 years or younger	29	3.034	1.039	0.036	3 (2.4)	
	Between 6 and 15 years	57	3.005	1.031	0.018	3 (2.4)	
	Between 16 and 25 years	48	2.881	1.185	0.025	3 (2.4)	
	26 years or older	29	2.609	1.103	0.038	2 (2.3)	
A5	Curricular practices	5	3.600	1.332	0.266	4 (2.5)	0.084
	5 years or younger	29	3.448	0.933	0.032	3 (3.4)	
	Between 6 and 15 years	57	3.591	1.012	0.018	4 (3.4)	
	Between 16 and 25 years	48	3.241	1.171	0.024	3 (3.4)	
	26 years or older	29	3.024	1.064	0.037	3 (2.4)	
A6	Curricular practices	5	3.825	0.984	0.197	4 (3.5)	0.030
	5 years or younger	29	3.163	1.031	0.036	3 (2.4)	
	Between 6 and 15 years	57	3.022	1.193	0.021	3 (2.4)	
	Between 16 and 25 years	48	2.704	1.203	0.025	3 (2.3)	
	26 years or older	29	2.613	1.219	0.042	2 (2.3)	

Note: 1. Interquartile range (25th percentile, 75th percentile). 2. 95% confidence level.

On the other hand, in the other areas that were analyzed, no statistically significant differences were found between the age groups based on the ranges of experience. This indicates that in these areas, the level of educational experience did not have a significant impact on the measures being analyzed. Those teachers who have not taught professionally and have only carried out curricular internships during their university training, which last two years, were taken into account.

4. Discussion

Taking into account our research question, "what is the current perception of digital competence among non-university teachers in Spain across six analyzed areas based on sex, age, and years of experience?", this topic holds significant importance, as highlighted

in various studies such as [32–34]. These studies have explored correlations between sex and the digital competencies of teachers across different educational stages and countries. However, it is worth noting that the results of these studies remain inconclusive, lacking unanimity in their conclusions.

For instance, the findings of [35] illustrate statistically significant differences in areas like Communication and Collaboration, Creation of Digital Content, and Problem Solving, indicating a sex gap, where men tend to exhibit a higher perception of their digital teaching competence. This aligns with the assertions made by [36], further emphasizing a disparity in digital teaching competencies favoring men. Conversely, authors such as [37,38] report no significant differences in participants' perception of their digital competence, which is in line with the outcomes observed in this study.

Concerning the age variable, our study did not identify statistically significant differences among the groups under analysis. However, contrary findings are evident in the research of [39], which suggests a relationship between age and the perception of digital competence in specific areas like A1 and A3.

Regarding years of experience, it is notable that [40] asserts a direct correlation between this variable and teachers' perception of digital competence. This view is corroborated by other authors like [41,42]. However, these findings contrast with those of authors such as [43], which do not support the conclusions drawn in our study.

5. Conclusions

The study carried out shows the need to train teachers to achieve the overall objective proposed by the Ministry of Education of Spain, to equip them with the knowledge, skills, and attitudes required to effectively integrate technological resources into their professional development and classroom instruction. Teachers play a crucial role in incorporating ICT to enhance the teaching–learning process, acting as facilitators. Notably, no significant sex gap was observed in the six areas analyzed, suggesting that sex may not need to be considered when designing training plans for these competencies.

One significant conclusion is the need to establish a reliable mechanism to recognize TDC in Spain. Additionally, there is a demand for regulations supporting TDC and the creation of training plans for educators, which should cater to all age groups due to the minimal differences observed between digital natives and other age groups.

The text also highlights the impact of the COVID-19 pandemic on education, which has accelerated the integration of ICT into educational centers. The analysis indicates that years of educational experience do not significantly affect most competence areas evaluated, except for the development of students' digital competence. This suggests that prior experience in traditional teaching may not be a determining factor in adapting to technological tools for teaching, although it may influence the ability to develop specific digital competences in students. Further research is needed to understand how experience and training can influence adaptation to technological changes in education.

The main limitation of this study is the relatively small sample size. Future research could focus on assessing the level of the digital teaching competence of university professors to inform educational policies aimed at reducing inequalities and advancing Sustainable Development Goal number 10 of the United Nations.

In conclusion, a detailed analysis of each competence area is necessary to identify the training contents required for effective training actions targeting teachers in the university environment.

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Data Availability Statement: Use of anonymized data: All data used in our research has been previously anonymized, and there is no possibility of identifying individuals within the data sets used. These data were obtained from public sources or databases that guarantee the confidentiality and privacy of the information of the original participants. Analysis of aggregate information: Our research methodology focuses solely on the statistical analysis of aggregate information at the population level or large samples. No inferences are made at the individual level and no personal information of the original participants is identified. Therefore, there is no possibility that the results of our study could affect the privacy, autonomy or well-being of specific individuals. Compliance with data protection regulations: Our studio strictly adheres to local and international regulations and standards regarding the protection of personal data. We have ensured that the process of data collection, anonymization and use is in full compliance with these regulations to ensure the privacy and confidentiality of the information. Based on these considerations, we maintain that our research, by using anonymized data and performing only statistical analyzes of aggregated information, poses no ethical risks to participants and is therefore exempt from review by the ethics committee. To support this statement we have consulted with the regulations of various ethics committees on investigations exempt from this procedure, concluding that it was not necessary when they consists in an anonymous questionnaire.

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References

1. Almerich, G.; Suárez-Rodríguez, J.; Díaz-García, I.; Orellana, N. Estructura de las competencias del siglo XXI en alumnado del ámbito educativo. Factores personales influyentes. *Educ. XX1* **2020**, *23*, 45–74. [CrossRef]
2. Comisión de las Comunidades Europeas. Recomendaciones del Parlamento Europeo y del Consejo de Europa sobre las competencias clave para el aprendizaje permanente. *D. Of. Unión Eur.* **2006**, *394*, 10–18.
3. Martínez-Piñeiro, E.; Gewerc, A.; Rodríguez-Groba, A. Nivel de competencia digital del alumnado de educación primaria en Galicia. La influencia sociofamiliar. *Rev. Educ. Distancia* **2019**, *19*, 1. [CrossRef]
4. Ordóñez, G.; Karvounidou, M.; Della Monica, G. Competencias clave a nivel europeo. *Rev. Digit. Educ. Form. Profr.* **2020**, *17*, 1–14.
5. OECD. The Future of Education and Competences: Education 2030. OECD Education Working Papers, 23. 2018. Available online: http://www.oecd.org/education/2030/E2030 (accessed on 8 November 2023).
6. Carneiro, R.; Toscano, J.C.; Díaz, T. Los desafíos de las TIC para el cambio educativo. In *Metas Educativas 2021*; Fundación Santillana: Madrid, Spain, 2011.
7. Kemet, S.; Paul, D.W. La educación en tiempos de la pandemia de COVID-19. *Acad. Med.* **2021**, *96*, 1085. [CrossRef]
8. Olmos-Migueláñez, S.; Frutos-Esteban, F.J.; José García-Peñalvo, F.; José Rodríguez-Conde, M.; Ramón Bartolomé, A.; Salinas, J. Libro de actas de la II Conferencia Internacional de Investigación en Educación 2021. In *Retos de la Educación Post-Pandemia*; University of Salamanca: Salamanca, Spain, 2020; pp. 1–175. Available online: https://gredos.usal.es/bitstream/handle/10366/147495/IRED21.pdf?sequence=1&isAllowed=y (accessed on 26 October 2023).
9. López, C.; Benedito, V.; León, M.J. El enfoque de competencias en la formación universitaria y su impacto en la evaluación. La perspectiva de un grupo de profesionales expertos en pedagogía. *Form. Univ.* **2016**, *9*, 11–22. [CrossRef]
10. Imbernón, F. La profesión docente ante los desafíos del presente y del futuro. *Rev. Int. Form. Profr.* **2016**, *18*, 1–18.
11. Ministerio de Educación y Formación Profesional. (21 July de 2023). Marco Europeo para la Competencia Digital de los Educadores. DigCompEdu—Publicaciones. Available online: https://sede.educacion.gob.es/publiventa/marco-europeo-para-la-competencia-digital-de-los-educadores-digcompedu/competencia-digital/24685 (accessed on 6 September 2023).
12. Viñoles-Cosentino, V.; Esteve-Mon, F.M.; Llopis-Nebot, M.Á.; Adell-Segura, J. Validación de una plataforma de evaluación formativa de la Competencia Digital Docente en tiempos de COVID-19. *RIED Rev. Iberoam. Educ. Distancia* **2021**, *24*, 87–106. [CrossRef]
13. Gisbert, M. Competencia digital docente: Una revisión del concepto. *Educ. XX1* **2017**, *20*, 47–68.
14. Redecker, C. Marco Europeo para la Competencia Digital de los Educadores: DigCompEdu. En Secretaría General Técnica del Ministerio de Educación y Formación Profesional de España (Original Publicado en 2017). 2020. Available online: https://sede.educacion.gob.es/publiventa/d/24685/19/0 (accessed on 8 November 2023).
15. INTEF, (Instituto Nacional de Tecnologías Educativas y Formación del Profesorado). *Marco Común de Competencia Digital Docente*; INTEF: Madrid, Spain, 2017; Available online: https://aprende.intef.es/sites/default/files/2018-05/2017_1020_Marco-Com%C3%BAn-de-Competencia-Digital-Docente.pdf (accessed on 18 November 2023).

16. Gobierno de España. *Plan Nacional de Competencias Digitales*; Gobierno de España: Madrid, Spain, 2021; pp. 1–72. Available online: https://portal.mineco.gob.es/RecursosArticulo/mineco/ministerio/ficheros/210127_plan_nacional_de_competencias_digitales.pdf (accessed on 26 September 2023).
17. Coughlan, G. Plan de Acción de Educación Digital (2021–2027) | European Education Area. Web Oficial de la Unión Europea. 2021. Available online: https://education.ec.europa.eu/es/focus-topics/digital-education/action-plan (accessed on 6 November 2023).
18. INTEF, (National Institute of Educational Technologies and Teacher Training). *Publication of the Update of the Framework of Reference for Teacher Digital Competence*; INTEF: Madrid, Spain, 2022; Available online: https://intef.es/Noticias/publicada-la-actualizacion-del-marco-de-referencia-de-la-competencia-digital-docente/ (accessed on 9 November 2023).
19. Ministerio de Educación y Formación Profesional. Resolución de 2 de julio de 2020, de la Dirección General de Evaluación y Cooperación Territorial, por la que se publica el Acuerdo de la Conferencia Sectorial de Educación sobre el marco de referencia de la competencia digital docente. *Bol. Of. Estado* **2020**, *191*, 50638–50668. Available online: https://www.boe.es/boe/dias/2020/07/13/pdfs/BOE-A-2020-7775.pdf (accessed on 6 November 2023).
20. Ministerio de Educación y Formación Profesional; Dirección General de Evaluación y Cooperación. Territorial Resolución de 4 de mayo 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 actualización del marco de referencia de la Competencia Digital Docente. *Bol. Of. Estado* **2022**, *116*, 67979–68026. Available online: https://www.boe.es/boe/dias/2022/05/16/pdfs/BOE-A-2022-8042.pdf (accessed on 16 November 2023).
21. INTEF, (National Institute of Educational Technologies and Teacher Training). *Frame of Reference of the Digital Teaching Competence*; INTEF: Madrid, Spain, 2022. Available online: https://intef.es/wp-content/uploads/2022/03/MRTDC_V06B_GTTA.pdf (accessed on 26 October 2023).
22. Mishra, P.; Koehler, M.J. Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teach. Coll. Rec. Voice Scholarsh. Educ.* **2006**, *108*, 1017–1054. [CrossRef]
23. Cejas León, R.; Navío Gámez, A.; Barroso Osuna, J. Las Competencias del profesorado universitario desde el Modelo Tpack (Conocimiento tecnológico y pedagógico del contenido). *Píxel-Bit Rev. Medios Educ.* **2016**, *49*, 105–119. [CrossRef]
24. Ministerio de Educación y Formación Profesional. 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 do. *Bol. Of. Estado* **2022**, *166*, 97982–97986. Available online: https://www.boe.es/boe/dias/2022/07/12/pdfs/BOE-A-2022-11574.pdf (accessed on 26 October 2023).
25. Hernández-Sampieri, R.; Mendoza, C. *Metodología de la InvestigaciónLas Rutas Cuantitativa, Cualitativa Y Mixta*; Editorial McGraw Hill Education: New York, NY, USA, 2018.
26. Economou, A. *SELFIEparaPROFESORES. Diseño y Desarrollo de una Herramienta de Autorreflexión para la Competencia Digital de los Profesores*; EUR 31475 EN; Oficina de Publicaciones de la Unión Europea: Luxemburg, 2023; ISBN 978-92-68-01809-5. [CrossRef]
27. Jariot Garcia, M.; Laborda Molla, C.; González Fernández, H. El perfil competencial laboral de personas con discapacidad intelectual en centros ocupacionales. *Rev. Investig. Educ.* **2020**, *38*, 475–493. [CrossRef]
28. Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y garantía de los derechos digitales. *Bol. Of. Estado* **2018**, *294*, 119788. Available online: https://www.boe.es/boe/dias/2018/12/06/pdfs/BOE-A-2018-16673.pdf (accessed on 24 October 2023).
29. Carretero, S.; Vuorikari, R.; Punie, Y. *DigComp 2.1: The Digital Competence Framework for Citizens with Eight Proficiency Levels and Examples of Use*; European Commission, Joint Research Centre, Institute for Prospective Technological Studies: Seville, Spain, 2017. [CrossRef]
30. Castro, E.M. Bioestadística aplicada en investigación clínica: Conceptos básicos. *Rev. Médica Clín. Condes* **2019**, *30*, 50–65. [CrossRef]
31. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed.; Lawrence Erlbaum Associates, Publishers: Hillsdale, NJ, USA, 1988.
32. Yoo, S.H. Gender and digital competence: Analysis of pre-service teachers' educational needs and its implications. *Int. J. Educ. Res.* **2022**, *114*, 101989. [CrossRef]
33. Ahmad, S.; Rafiq, M.; Ahmad, S. Gender disparities in the use of internet among graduate students of a developing society: A case of Pakistani universities. *Glob. Knowl. Mem. Commun.* **2018**, *67*, 226–243. [CrossRef]
34. Cabezas, M.; Casillas, S.; Pinto, A.M. Percepción de los alumnos de Educación Primaria de la Universidad de Salamanca sobre su competencia digital. *EDUTEC Rev. Electrón. Tecnol. Educ.* **2014**, *48*, a275.
35. Fernández-Sánchez, M.R.; Silva-Quiroz, J. Evaluación de la competencia digital de futuros docentes desde una perspectiva de género. *RIED Rev. Iberoam. Educ. Distancia* **2022**, *25*, 327–342. [CrossRef]
36. Solís, J.D.L.Á.; Jara, V. Competencia digital de docentes de Ciencias de la Salud de una universidad chilena. *Píxel-Bit* **2019**, *56*, 193–211.
37. Grande-de-Prado, M.; Cañón-Rodríguez, R.; García-Martín, S.; Cantón-Mayo, I. Competencia digital: Docentes en formación y resolución de problemas. *Educar* **2021**, *57*, 381–396. [CrossRef]
38. Rodríguez-García, A.M.; Martínez, N.; Raso, F. La formación del pro-fesorado en competencia digital: Clave para la educación del siglo xxi. *Rev. Int. Didáct. Organ. Educ.* **2017**, *3*, 46–65.

39. Méndez, V.G.; Suelves, D.M.; Méndez, C.G.; Mas, J.A.R.L. Future teachers facing the use of technology for inclusion: A view from the digital competence. *Educ. Inf. Technol.* **2023**, *28*, 9305–9323. [CrossRef] [PubMed]
40. Guillén-Gámez, F.D.; Cabero-Almenara, J.; Llorente-Cejudo, C.; Palacios-Rodríguez, A. Differential Analysis of the Years of Experience of Higher Education Teachers, their Digital Competence and use of Digital Resources: Comparative Research Methods. *Technol. Knowl. Learn.* **2022**, *27*, 1193–1213. [CrossRef]
41. Santos, C.; Pedro, N.; Mattar, J. Digital Competence of Higher Education Professors in the European Context: A Scoping Review Study. *Int. J. Emerg. Technol. Learn.* **2022**, *17*, 222–242. [CrossRef]
42. Antonietti, C.; Cattaneo, A.; Amenduni, F. Can teachers' digital competence influence technology acceptance in vocational education? *Comput. Hum. Behav.* **2022**, *132*, 107266. [CrossRef]
43. Dias-Trindade, S.; Albuquerque, C. University Teachers' Digital Competence: A Case Study from Portugal. *Soc. Sci.* **2022**, *11*, 481. [CrossRef]