DIGITAL COMPETENCIES OF TEACHERS IN THE COVID-19 PANDEMIC LOCKDOWN IN SPAIN

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ABSTRACT

It is clear that digital technologies are part of our daily lives. However, the situation of strict lockdown due to COVID 19 in Spain (March-June 2020) meant that technologies were the backbone of social, professional and educational relations. In the latter case, the pandemic forced the turn from face-to-face teaching to emergency remote teaching. In this context, the digital knowledge of the teaching staff was key to respond to this supervening situation. The literature prior to this juncture highlighted the existence of differences in digital competence among education professionals. In this regard, it is necessary to address the impact that this change has had on the educational environment and, therefore, the aim of this study is to explore the level of application of digital competence during this period at all educational levels (Early Childhood and Primary Education, Secondary and Baccalaureate, Vocational Training and Higher Education). An ad hoc questionnaire was used to measure the level of digital competence of teachers at all educational levels in Spain (n=1350) acquired during the COVID -19 confinement period according to gender, teaching experience and school ownership (private, public or subsidized). A descriptive and relational analysis between variables was performed. The results show that teachers have a medium level of digital competence. It is also shown that female teachers have a higher level of digital competence compared to their male counterparts, that teachers with less professional experience have higher levels of digital competence and that teachers in private schools are more skilled in this area.Despite the efforts made to improve this area, it is still necessary to continue offering training adapted to the teaching profile, since educational models that are not linked to digital technologies continue to be perpetuated.

INTRODUCTION

The technological advances in our daily lives seem unstoppable and the need to generate digital literacies that respond to the needs of all citizens is becoming increasingly important. As some authors have indicated, modern society is characterized by a high volume of information in digital format from multiple channels, an immediacy in the satisfaction of human needs, the blurring of space-time barriers and, among others, a trend towards the automation of tasks currently performed by human beings (Harari, 2017; Toffler, 1980; Masuda, 1984). It seems necessary, therefore, to develop digital skills to interact in this new society. In this sense, the educational field is a key sector for the achievement of this objective. Along the same lines, various institutions with international influence emphasize the importance of digital literacy as an essential challenge of our time. This idea became a reality in 2007 with the signing of the Lisbon commitment by the members of the European Union, in which they pledged to promote a society based on knowledge and digitization in order to establish the EU member states as the leading nations in the

world. Thus, the member countries' education systems had to be transformed to be able to develop the academic knowledge that was already being taught to students, along with a series of practical competencies. As a result of this proposal, eight key competences that students should acquire in order to achieve comprehensive development were described. Among them was the need for students to develop skills to master digital technologies in different areas of life. More recently, the Digital Agency for Europe 2030 (European Commission, 2021), the Horizon Report (Becker, Brown, Dahlstrom, Davis, DePaul, & Pomerantz, 2018) and the Sustainable Development Goals (SDGs) in the area of Quality Education (United Nations, n.d.) insist on this same idea. Specifically, they stress the need to train in digital competence in order to educate critical citizens and ensure a free and democratic society, to facilitate and improve certain tasks in our daily lives, to enable access to jobs with higher qualifications, to increase productivity in an increasingly globalized world and to reduce vulnerabilities that derive from the digital divide (Sacristán, 2014; Rodríguez-García, Martínez Heredia & Raso, 2017). In recent years, a wide range of research has been published with the aim of measuring teachers' level of digital competence at different

educational stages in order to find out their training deficiencies and thus be able to offer them the necessary continuous training to develop and transfer this competence to students (Casillas, Cabezas & García Peñalvo, 2019; De-Juanas, Martín del Pozo &Pesquero, 2016; Lores-Gómez, Sánchez-Thevenet & García-Bellido, 2019; Falcó, 2017; Sánchez-Antolín, Ramos-Pardo & Sánchez-Santamaría, 2014; Pozos & Tejada, 2018). It is important to remember that this concern for training in digital competence is also due to the influence and commercial interests that some companies and large corporations have in the field of education (Fernández, García & Galindo, 2018). Although this influence of the productive system has been harshly criticized, it is worth mentioning that one of the functions of the modern school is the intellectual, moral, political, social and civic training of young people, as well as the professional training of individuals (Gimeno, 2005).

But before delving into the specific situation of teachers in the face of digital technologies, it is worth defining what is meant by Digital Competence (DC). Authors such as Ferrari (2012) define it as:

> "is the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment." (p. 3-4).

Similarly, Digital Teaching Competence (DTC) unifies all aspects of DC and adds the pedagogical-didactic criteria to effectively integrate these elements in the teaching and learning process (Krumsvik, 2011; Gisbert & Esteve, 2011; Larraz, 2013; Durán, Gutiérrez Porlán& Prendes, 2016). In the Spanish context, the most widespread model used to describe the DTC is the Common Framework of Digital Teaching Competence (INTEF, 2017) developed by the Ministry of Education, Culture and Sport based on the DIGCOMPEDU model (Punie & Redecker, 2017). The DTC includes five interrelated areas:

- The area of Information Literacy, which encompasses the search, selection, evaluation and storage of information.
- The area of Communication and Collaboration, which covers the way in which teachers communicate through the Web, share resources, collaborate and interact with others through Digital Technologies.
- The area of Digital Content Creation, which refers to the development of digital material, its integration in the educational environment and the use of licenses and copyrights.
- The Safety area that relates to the protection of people, technological devices and the environment.
- The area of Problem Solving, which includes the resolution of technical and educational problems through technologies in an innovative and creative way, and the detection of training needs.

State of the Art: As indicated above, there is a digital divide in the use of technologies that also extends to the professional teaching field and affects the teaching staff as a whole. In this regard, recent scientific literature has shown significant differences between the skill levels of male and female teachers. Globally, female teachers generallyhave higher levels of digital competence than their male counterparts (Moreno-Guerrero, Fernández Mora & Alonso García, 2019; Pozo, López Belmonte, Fernández Cruz & López Nuñez, 2020; Casal, Barreira, Mariño & García Antelo, 2021). However, when the focus is placed on the different areas that comprise these competencies, there is no consensus in the results obtained in previous research. On the other hand, it has been found that teaching experience is a key element to assess the level of integration of digital technologies in the classroom. Previous evidence indicates that more experienced teachers have lower levels of DTC compared to younger and less experienced teachers (Cabanillas, Lungo & Torres, 2020;

Cabero-Almenara, Barroso-Osuna, Rodríguez-Gallego & Palacios-Rodríguez, 2020). Regarding the type of center ownership, scientific evidence is not conclusive on whether the type of educational center has a direct impact on the teacher's level of digital competence (Escardíbul & Mediavilla, 2016; Falcó, 2017). However, they point out that this characteristic can be fundamental when interpreting it. The sudden arrival of COVID-19 led European countries to impose different restrictions in all areas of daily life, and consequently, in the field of education, face-to-face classes were no longer taught. In the Spanish context, there was a transition from face-to-face teaching in the classroom to 100% home-based teaching due to the strict limitations imposed because of the health emergency. Although this type of teaching has been termed "online", some authors such as Hodges, Moore, Lockee, Trust & Bond (2020) indicate that the most appropriate term to refer to this situation is Emergency Remote Teaching (ERDE), since there is a sudden change from instructional models to alternative ones in response to a crisis situation. In this sense, the main objective of this shift is to provide temporary access to instruction in a way that is quick and easy to configure.

Until that moment, the level of digital competence among teachers who taught face-to-face in the classroom was characterized by training directed especially towards the use of digital tools and a high availability of digital technologies in the classroom. Undoubtedly, the pandemic situation has forced teachers to use technologies to continue offering their classes, but these circumstances haverevealed the benefits and shortcomings of these skills in teacher training. It has also highlighted the level of knowledge transfer that these teachers have achieved, due to the training received prior to this period. Studies on DTC prior to the pandemic indicate that teachers in Spain had a medium-low level of thesecompetencies (Lores-Gómez *et al*., 2019; Falcó, 2017; Sánchez-Antolín *et al*., 2014; Pérez-Escoda & Rodríguez-Conde, 2016). Diverse authors already pointed to some needs in teacher training, specifically, cross-cutting training in each of the aspects that make up the DTC. Among others, we find the study by Álvarez and Gisbert-Cervera (2015) where they show serious training shortcomings in the evaluation, management and transformation of information by Secondary Education teachers.Moreover, in the work of Pozo *et al*. (2020) the authors point toteachers' educational deficiencies in areas such as Digital Content Creation, Safety and Technological Problem-Solving. Research studies after the time of strict confinement (March-July 2020) have described the ways in which teachers have coped with this abrupt change in their teaching. For instance, research has dealt with the challenge of ERDE teaching (Paudel, 2021; Safta-Zacheria, Stefaniga, Negru & Virag, 2020), others analyze teachers' attitudes and self-perceptions of teaching in this situation (Portillo, Garay, Tejada & Bilbao, 2020; Howard, Tondeur, Siddiq & Scherer, 2020). Some have focused on teachers' training needs to adequately integrate technologies in their classes (Scully, Lehane & Scully, 2021; Carrillo & Flores, 2020) or, the level of integration of digital technologies according to the country and educational context (Gudmundsdottir & Hathaway, 2020; Ewing & Cooper, 2021; González-Fernández, 2021). Undoubtedly, this situation has highlighted the need for digital literacy to respond to both the professional performance of teachers and the transfer of digital skills among students. Arguably, after this turning point, technologies have become even more fundamental in education. Therefore, it seems necessary to explore the level of application of DTC-related knowledge at the time of ERDE teaching by teachers at different educational levels in Spain.

MATERIAL AND METHODS

Design and sample: This ex post facto study was carried out using an ad hoc survey for a sample of teachers in Spain from all educational levels. The theoretical calculation of this sample was carried out to obtain a representative sample with a confidence level of <95% and a sampling error of ± 3%, obtaining a sample size of 1066 teachers from all over the country. During the fieldwork, a total of 1350 surveys were obtained from the 19 autonomous communities or cities of Spain. By gender, it was found that 63.4% were female and 33.6%

were male, while the mean age was 46.56 years (± 9.99). With regard to the teachers' experience, a mean of 17.58 years (± 10.72) was obtained and, in addition, 32.3% had experience of less than 10 years, 27.7% had experience between 11 and 20 years, 28.35% had experience between 21 and 30 years, 11% had experience between 31 and 40 years and 0.7% had teaching experience of more than 40 years. Regarding the type of ownership of the educational center (public, private or subsidized), 83.7% of the teachers taught in public centers, 9.2% in subsidized centers and 7.1% in private centers. In terms of educational level, 3.8% of the teachers surveyed were in the early childhood stage, 22.1% in primary education, 32.1% in secondary education or baccalaureate, 10.7% in vocational training and 31.3% in universities.

Instrument: For data collection, a specific questionnaire was developed for this study based on previous studies (Cabero-Almenara *et al.*, 2020; Alarcón, del Pilar & de Vicente-Yagüe, 2020; INTEF, 2017). This questionnaire was developed following a validation process based on previous studies (Gómez-Gonzalvo, Devís-Devís& Molina-Alventosa, 2020). A first draft of the questionnaire was prepared and sent to 10 experts, both men and women, to critically assess the questionnaire. A rubric was sent to the panel of experts to indicate relevance, importance and univocity. The criteria of relevance and univocity were measured by means of yes/no responses and question importance was measured by means of a five-point Likert scale in which evaluators had to indicate their degree of agreement or disagreement (1 strongly disagree; 5 strongly agree) according to the importance of the information collected by each of the questions. Seven out of the ten experts consulted responded to the rubric. There was consensus among the experts on most of the questions in the questionnaire. However, the experts' assessment indicated that there were considerable problems of univocality in 7 questions, which were rewritten and corrected in response to the comments made. The relevance and importance of the questions in the questionnaire did not present considerable problems (relevance <85.71% of the evaluators; average importance of 4.85 out of 5).

Finally, the questionnaire had a total of 32 questions divided into 8 blocks. The first block was aimed at obtaining sociodemographic data; the second block was focused on the training received by the teachers related to their digital competence; the third, fourth and fifth blocks were aimed at determining the evaluation system used before and during the confinement period; the sixth block was aimed at delving into the way classes were taught during emergency online teaching; the seventh block was aimed at determining the digital platforms that had been used; and the last block was aimed at ascertaining the teachers' satisfaction with this type of teaching. The questionnaire had four types of questions, namely, multiple choice questions, dichotomous questions (yes/no), 5-point Likert scale questions to measure the degree of agreement or disagreement with respect to a series of items (1 - strongly disagree; 2- disagree; 3- indifferent; 4- agree; 5 strongly agree) and, finally, open questions where the respondent had to write the answer. For the assessment of digital competence, the Likert scale sums of the items related to each of the areas of the DTC were calculated. Thus, the areas of Content Creation, Information Literacy and Communication and Collaboration were calculated on a scale of 10. The area of Problem Solving was calculated using items that were rated both positively and negatively so that this score subtracted from the area of competence and was calculated as a score with a range of -7 to 5. The calculation for the Safety area was not performed since the emergency teaching situation would have distorted this area and the DTC calculation. The questionnaire was administered using Google Forms and the link to the questionnaire was distributed via e-mail and social networks. The questionnaire is available at the following link: https://bit.ly/32DobuO

Procedure: Data collection was carried out between December 2020 and February 2021. The questionnaire was distributed through email, Facebook, Twitter and WhatsApp using snowball sampling because at the time of the fieldwork there were serious limitations to mobility due to the health emergency. According to Handcock & Gile (2011),

this type of sampling has limitations regarding the heterogeneity of the sample and its representativeness. To mitigate these possible limitations, access the authors accessed the public databases of Spanish universities and the education departments of the autonomous communities in order to obtain the e-mail addresses for teachers and schools, respectively. Thus, the questionnaire was sent to the directors of early childhood, primary, secondary and baccalaureate educational centers on the one hand, and to university professors on the other.

Analysis: Prior to the statistical analysis, the researchers filtered and coded the data. SPSS software (v.27, IBM Corp) was used for the analyses, with a significance level of α p<0.05. The authors performed a descriptive analysis to show frequencies, percentages, means and standard deviation of the variables of interest. Normality tests were performed and the authors found that many values did not meet the criteria for normality so the data were transformed by calculating the square root. For continuous variables, the authors assessed the possible significant differences according to gender and type of educational center for digital competence and its component areas by means of a t-Student test of independence. To determine the differences between teaching experience for digital competence and its areas, the Pearson correlation test was used and, in addition, a continuation ANOVA was performed to establish possible inter-group differences according to teaching experience (<10 years; 10-20 years; 20-30 years; >30 years). To study possible differences between the type of prior training received (self-training; formal training; informal training; no prior training) for digital competence, the research team performed an ANOVA. Bonferroni post hoc tests were used to establish these differences.

RESULTS

During the ERDE period, we found that the vast majority of teachers (95.4%) taught in virtual format due to the suspension of social and productive activities that took place between March and June 2020. A large number of teachers (55.1%) indicated that they had no prior knowledge of online teaching before this health emergency situation, while an equally large group indicated that they did have prior knowledge of online teaching (44.9%). Among the teachers who had received training, 28.1% indicated that this training had been self-training through video tutorials on general platforms such as YouTube and Vimeo, or through colleagues and friends who had helped in the training. Meanwhile, 21.9% indicated that they had received official certified training through postgraduate courses or specific training accredited by official training centers, while 5.2% said they had received unofficial training through non-regulated courses. At this point, it should be noted that a considerable part of the teaching staff had received their training through various sources, among which self-training and official training stood out with 21.5%, while remaining training options included in the questionnaire, namely, self-training and unofficial courses; official and unofficial training; and self-training, official and unofficial training were less common and, respectively, obtained 7.5%, 2.1% and 8.7%. However, analyzing the training obtained from various sources, we found that 40.4% of teachers opted for training in various fields. ANOVA was performed between the type of digital competence training and significant differences were found (F_7=2.621; p=0.011; $\mu2$=0.032). Post hoc tests indicated that these differences (p=0.037) were found between teachers who had received all three types of training (M=33.34, ±7.771) in and those who had received non-official courses (M=28.07, ±7.625). In this regard, it should be noted that most teachers (80.4%) indicated that they had never taught online, neither as teachers nor as students. Of the teachers who had ever taught online (19.6%), the mean experience amounted to 4.54 courses (± 4.791). Regarding the digital competence of teachers, both the total values and the different areas of digital competence according to skill level can be seen in Table 1. It shows the values of digital competence grouped by levels.

Table 1. Teachers' Digital Competence Level according to their ability in the different areas

	Elementary	Basic	Intermediate	Advanced	Mean
Digital Competence Areas	3.5% (44)	39.2% (500)	51.4% (655)	6% (76)	28.76 (±7.556)
Content Creation	8.3% (106)	35% (446)	22.4% (286)	34.4% (437)	7.25 (±2.168)
Information Literacy	5.5% (70)	14.8% (189)	27.2% (347)	52.5% (669)	8.15 (±1.92)
Communication and Collaboration	43.1% (549)	34.5% (440)	18.7% (239)	3.7% (47)	4.79 (±1.895)
Problem Solving	7.9% (101)	38.4% (489)	43.5% (555)	10.2% (130)	3.82 (±3.628)

Table 2. Relationship between the area of digital competence and its significance according to teaching experience

	gl	F	p	μ^2
Digital Competence	4	8.142	0.000	0.019
Content Creation	4	6.882	0.000	0.016
Information Literacy	4	5.036	0.002	0.012
Communication and Collaboration	4	1.073	0.359	0.003
Problem Solving	4	4.620	0.003	0.011

Digital competence in teaching and gender: A Student's t-test was performed between digital competence and its areas and the gender variable to establish possible differences between them. The test showed significant results for Digital Competence (t_{1273}= 4.663; p<0.001), for Content Creation (t_{1273}= 4.133; p<0.001) and for Information (t_{1273}= 8.587; p<0.001). In the case of Digital Competence, female teachers display a higher level of ability (M=29.54; ± 7.301) than their male counterparts (M=27.51; ± 7.818) when it comes to using technologies for teaching work. Regarding the Content Creation, female teachers (M= 7.44; ± 2.069) also show a higher level of ability compared to male teachers (M=6.92; ± 2.250), while in Information Literacy the results point in the same direction as the previous ones since female respondents show a higher level of skill (M= 8.49; ± 1.764) compared to male respondents (M= 7.56; ± 2.033). For the Communication and Collaboration and Problem-Solving skills, no significant differences were found (t_{1273}= 1.568; p=0.117 and t_{1273}= 1.121; p=0.262 respectively), so the level of skill in these two domains of digital competence is similar for male and female teachers.

Teachers' digital competence and teaching experience: To determine the possible relationship between teaching experience and digital competence, a correlation between the two variables was performed, which resulted in an inversely proportional relationship (r_p= -0.129; p<0.001). In addition, using the same test the authors analyzed the different digital competence skills according to the same independent variable to determine possible differences. Significant differences were found for Content Creation (r_p= -0.132; p<0.001), for Information Literacy (r_p= -0.108; p<0.001) and for Problem Solving (r_p= -0.094; p<0.001). The relationships found between the variables point in the same direction, that is, digital competence and the skills that compose it indicate that those with less teaching experience reflect higher digital competence and those with more teaching experience have lower levels of digital competence. No significant differences were found in the subcategory of Communication and Collaboration (r_p= -0.036; p=0.169) so that teachers, regardless of their teaching experience, have a similar level of ability in this variable. To examine this relationship further, an ANOVA was performed between digital competence, its areas and teaching experience distributed by categories, so that 4 groups of teaching experience were established: less than 10 years; between 10 and 20 years; between 20 and 30 years; and finally, more than 30 years. This test confirmed what was indicated by the previous correlation tests, finding significant differences for digital competence and for the same areas of digital competence, as can be seen in Table 2. Bonferroni post hoc tests indicated that there were significant differences for digital competence between the group with less than 10 years of experience and the groups with 20 to 30 years of experience (p=0.02) and with the group with more than 30 years of experience (p<0.001). Significant differences were also observed between the group with 10 to 20 years of experience with respect to the group with 20 to 30 years (p=0.46) and with the group with more than 30 years (p<0.001).

The study of the means of these groups indicates that the group of teachers with less than 10 years of experience (M=29.63 ± 7.208) has greater digital competence than their counterparts with 20 to 30 years of experience (M=28.04; ±7.920) and those with more than 30 years of experience (M=26.67; ±7.496). For its part, the comparison of the means for the group of teachers with a 10 to 20 year experience (M=29.54 ± 7.356) indicates that the levels of competence are also higher compared to the teachers with 20 to 30 years of experience (M=28.04; ±7.920) and those with more than 30 years of experience (M=26.67; ±7.496). Regarding Content Creation, the post hoc tests and the means analysis indicate that teachers with less than 10 years of experience have greater ability in the Digital Content Creation for teaching than those with 20 to 30 years of experience (p=0.013) and those with more than 30 years of experience (p<0.001). The group with less experience has a mean of 7.5 (±2.082) while the groups with more experience have a mean of 7.02 (±2.221), for the group between 20 and 30 years, and a mean of 6.73 (±2.210) for the group with more experience. Along these lines, the teachers with between 10 and 20 years of experience also show a significant difference with the group with more than 30 years of experience (p=0.006), so that the Content Creation area is higher for teachers with less experience (M=7.41 ±2.135) than for the group with more than 30 years of experience (M=6.73 ±2.210). For Information Literacy, teachers with more than 30 years of experience show significant differences for this skill compared to the groups with less than 10 years (p=0.010) and to the group with 10 to 20 years of experience (p=0.003). This skill follows a similar pattern as the previous skills analyzed, i.e., faculty with more experience present lower skill levels (M=7.69 ±2.210) than faculty with less than 10 years of experience (M=8.26 ±1.891) and those with 10 to 20 years of experience (M= 8.34 ±1.760). Finally, post hoc tests point to the existence of significant differences between the group with more than 30 years of teaching experience and teachers with less than 10 years (p=0.011) and between 10 and 20 years of experience (p=0.044) for problem solving. The study of means suggests results similar to those already shown, whereby teachers with more experience have lower ability (M=3.10 ±3.517) than teachers with less experience, and those with 10 to 20 years of experience (M=4.18 ±3.537 and M=4.05 ±3.742, respectively).

Teachers' digital competence and type of institution: To test for possible differences in the levels of digital competence of the teaching staff according to the type of ownership (private, public and subsidized), a Student's t-test was performed. This test showed a significant difference for digital competence according to center ownership (t_{1273}= 4.113; p<0.001). The study of the means showed that teachers who belong to a private or subsidized center have greater digital competence (M= 30.77; ± 7.071) than their colleagues in public centers (M= 28.41; ± 7.591). Regarding the areas of digital competence, the same test was performed, and significant differences were found for Communication and Collaboration skills (t_{1273}= 4.246; p<0.001) and for Problem Solving (t_{1273}= 2.760; p=0.006). No significant differences were found for either Digital Content Creation (t_{1273}= 0.812; p=0.417) or Information Literacy (t_{1273}= 1.721;

p=0.071) meaning that teachers have a similar level of ability for Digital Content Creation and Information Literacy regardless of the type of educational center. The means analysis for Communication and Collaboration skills indicates that teachers in private or subsidized centers have a higher level of proficiency in this skill (M= 5.29; ± 1.861) than their colleagues in public centers (M= 4.69; ± 1.886). For the problem-solving skill, the analysis of means indicates results along the same lines, since we can see that teachers in private or subsidized centers have a higher level of competence (M= 4.46; ± 3.554) than their colleagues in public centers (M= 3.70; ± 3.631).

DISCUSSION

The results of this study show that almost all teachers have continued to teach during the ERDE period despite the fact that most of them had never taught online. In this sense, ERDE teaching made it possible to continue the educational work at the different educational levels despite the lack or scarcity of relevant training, as pointed out by Hodges *et al.* (2020).Our results indicate that the training received by teachers was mostly self-directed through online resources or with the help of colleagues or friends who explained the uses of online platforms or resources, or hybrid situations combining self-training and official training. In this sense, the need to continue training teachers in all the areas that make up digital competence to respond to the current educational reality (Onyema *et al.*, 2020) and the need to integrate technologies, pedagogy and knowledge in a balanced way (Mishra &Khoeler, 2008) is emphasized. Our results also suggest that the transfer between training and DTC level is high, which confirms the findings of similar studies (Onyema *et al.*, 2020; Lores-Gómez *et al.*, 2019). However, differences have only been observed between teachers who have received diverse training and those who have only taken non-official courses. This suggests that previous teacher training is not the only determinant for having adequate DTC. In this sense, Padilla-Hernández, Gámiz-Sánchez & Romero-López (2020) suggest that the development of DTC is a progressive non-linear process that responds to contextual factors and, fundamentally, to the accumulation of teaching experiences developed by teachers themselves in the use of Digital Technology and not always linked to training processes. Therefore, it is worth questioning the suitability of large training plans in digital competence to meet the real needs of teachers, since the results suggest that training is predominantly informal and the teaching experiences developed by teachers are a key element to generate greater DTC. With respect to gender, our results indicate that the level of digital competence differs between men and women. In this sense, female teachers show higher DTC skills than their male peers. These results coincide with the findings presented by Casal *et al.*, (2021) and Pozo *et al.* (2020), in which female respondents show higher levels of digital competence applied to teaching. In contrast, other works indicate that it is men who show higher levels of digital abilities for teaching (Guillén-Gámez, Mayorga-Fernández & Contreras-Rosado, 2021).The differences observed may be due to the educational level at which the DTC is analyzed and the type of tool used to teach, since the use of digital technologies varies depending on the educational level, given that objectives are different and each tool favors different skills. In this sense, the work of Guillén-Gámez *et al.* (2021) is focused on higher education, while other works focus on vocational training (Casal *et al.*, 2021), or on all educational stages as is the case of the research presented by Pozo *et al.* (2020). Similarly, differences have been observed in the type of digital tools used for teaching according to gender (García Martín & García Martín, 2021) in the specific period of the COVID-19 pandemic.

In relation to this, our results show that these differences are not reproduced in the same way in all areas of digital competence. Thus, we found that female teachers have greater ability in the areas of Content Creation and Information Literacy. On the other hand, no significant gender differences were found in the areas of Communication and Collaboration and Problem solving. Ourresults are similar tothosepresentedby Moreno-Guerrero *et al.*, (2019), López Belmonte, Pozo, Fuentes & Romero Rodríguez (2019), Vázquez-

Cano *et al.* (2017) and Flores & Roig (2017), where differences are found in the areas of digital competence according to gender. Thus, they indicate that female teachers have a higher level of competence in areas such as Information Literacy and Content Creation compared to men and that men have a higher level of competence than their female counterparts in Problem Solving (Pozo *et al.*, 2020). These differences between men and women have been addressed from the perspective of the gender gap in technologies (Mayer-Smith, Pedrett& Woodrow, 2000), indicating the existence of different forms of use of digital technologies for men and women. Recent studies indicate that these differences continue to be perpetuated in society due to a structural character in the socialization of men and women since childhood, linked to gender stereotypes and sexism prevailing in many social and professional fields (Prendes-Espinosa, García-Tudela & Solano-Fernández, 2020) despite the efforts made by various entities in terms of equality in education and teaching.

The results obtained in our research regarding digital competence and teaching experience point to teachers with less professional experience having greater digital competence than their more experienced counterparts. Our results point in the same direction as the studies conducted by Cabanillas *et al.* (2020), Cabero-Almenara *et al.* (2020) and Fernández-Cruz & Fernández-Díaz (2016). These studies show that less teaching experience is related to a higher level of digital competence among teachers at all educational levels. Thus, Cabanillas *et al.* (2020) indicate that the greater the teaching experience, the lower the skill level of teachers in content creation and in communication and collaboration. On the other hand, Hinojo-Lucena, Aznar-Díaz, Cáceres-Reche, Trujillo-Torres & Romero-Rodríguez (2019), indicate that in the areas of Communication and Collaboration and Information Literacy, teachers with less teaching experience have a higher level of skill, while they found no differences in the level of skill in the areas of Content Creation and Problem Solving. In view of all the studies it seems that there is a consensus regarding the relationship between digital competence and teaching experience, so that teachers with more experience have lower digital competence compared to those with less experience. However, in the areas of digital competence there are conflicting and unclear results, making it difficult to establish a clear relationship between these factors due to the wide variety of instruments used to measure teaching skills in each of the areas of digital competence. On the other hand, the results of our study suggest that the level of teachers' digital competence in private or subsidized schools is higher than that of teachers in public schools. In this sense, Falcó (2017) has found results that point in the same direction with regard to the level of digital competence and the center's ownership type (public, private or subsidized). Our results are also in line with those reported by López-Belmonte, Pozo-Sánchez and Fuentes-Cabrera (2019). The latter indicate that teachers in private and subsidized educational centers are more skilled in areas such as Communication and Collaboration and Problem Solving, but do not find significant differences for Content Creation and Information Literacy. Similar to López-Belmonte *et al.* (2019) our results point to significant differences in Communication and Collaboration and Problem Solving, while our results do not show differences between Information Literacy and Content Creation. In this sense, it seems that the trend indicated by previous studies suggesting that thetype of ownership of the educational institution is fundamental for the level of DTC is confirmed.

CONCLUSIONS

Most of the faculty continued to teach during the lockdown period and made a switch to an online format even when a large portion of the faculty had not taught online prior to this situation. Prior training in digital competence is important for developing the level of DTC among faculty regardless of the type of training received. It is observed that gender is a determining variable in establishing the level of DTC, so that female teachers have a higher level of competence compared to their male counterparts, and they show greater ability in the areas of Content Creation and Information Literacy. On the other hand, male respondents have greater ability in

the area of Problem Solving. An inverse relationship was also found between the teaching experience of teachers and the level of DTC, such that teachers with less experience show a higher level of ability and, on the contrary, greater teaching experience indicates lower digital competence. It is noted that teachers in private and subsidized schools have a higher level of DTC compared to their counterparts in public schools, who display a lower level of skill. This relationship confirms what has been suggested by some previous studies, meaning that the type of center is fundamental for DTC and should be included in studies related to the digital competence of teachers and delve deeper into the specific aspects that make teachers in private and subsidized centers have a higher level of DTC. As limitations, we found that in our study we did not measure the area of Safety, considering that in the ERDE period the objective was to continue teaching and that publicly available work tools and videoconferencing were used, especially at the early childhood, primary and secondary levels, so that the measurements of this area could modify teachers' actual level. The possible lack of precision in the data is another concern of the study since the data were self-reported by teachers and the precision may be affected by the participants' recollections. Future studies on the subject seem necessary to deepen the relationship between prior teacher training and teachers' own experiences with the use of technologies focused on the teaching task from approaches that allow reconstructing previous experiences, and the meanings teachers confer to them and the level of teaching competence, as suggested by Padilla-Hernández *et al.* (2020). Finally, this study suggests a series of educational policy actions regarding the role that teachers should play with respect to digital technologies. On the one hand, the importance of continuing to train teachers in the pedagogical integration of digital technologies in education. And, on the other hand, the need to transfer the elements of digital competence within the curricula so that students make a consistent and appropriate use of technologies.

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