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Communicating and Collaborating with Others through Digital Competence: A Self-Perception Study Based on Teacher Trainees' Gender †

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Abstract: Digital competence in teaching can be understood as the set of skills, attitudes and abilities to use technologies critically and creatively, both in the personal and professional environment. Likewise, it is one of the eight key competencies for lifelong learning. In this paper, in line with the Common Digital Competence Framework (DigComp), we analyze the self-perception of teacher trainees' digital competence to communicate and collaborate with other people. Additionally, we state the existence of statistically significant differences from a gender perspective (women/men). In this sense, we have carried out non-experimental quantitative research that has a descriptive nature. To this end, we used a questionnaire as an instrument for collecting information, with a total sample of 698 pre-service teachers in Andalusia (Spain). The results show that teacher trainees have an intermediate level in terms of their abilities to communicate and collaborate with other people through digital technologies. At the same time, significant differences are highlighted regarding participants' gender, which implies that gender can still be considered a limitation in the use of ICTs, thereby decreasing participants' digital competence. Finally, this study sheds light on the need to improve future teachers' digital competence.

Keywords: digital competence; digital gender gap; DigComp; pre-service teachers; digital literacy; digital skills; teacher training

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1. Introduction

In today's world, advances in Information and Communication Technologies (ICTs, henceforward) have provided a positive environment for the development of new approaches on research and innovation in higher education, promoting new forms of management among future teachers [1]. In the university context, according to recent studies, it is crucial that future teachers acquire an adequate digital competence, so it is necessary to focus on its development during their training period [2–4].

Despite this, current researchers have pointed out factors that can limit the use of ICTs in higher education, gender being one of the most studied variables [5,6]. According to different experts, there is a gender digital gap, which refers to the difference men and women experience with respect to the use of ICTs, distinguishing between access and use, as well as exploitation of these resources [7,8].

In developed countries, the access to technologies does not seem to have or maintain differences concerning gender, but this does not imply equality, since the gap remains

dependent on the activities performed [9]. In this sense, the previous research referenced confirms that the gender digital gap still exists, whose shape is the perpetuation of stereotypes as well as the social roles assigned to men and women regarding their relationship with technologies and mass media, such as the case of videogames (associated with boys) and narrative creation (associated with girls). It is clear that gender inequalities also arise in the digital field, as it is stated by different reports [10] that indicate that over the past six years, there has been a digital gap reduction between men and women within the European context. Nevertheless, it is underlined that there is still a blatant gap in personal use, specific digital skills or online. In this sense, it occurs with research developed in the university context where notable differences are evident in the basic knowledge necessary to implement ICTs in the teaching praxis, as well as the need to improve teachers' digital competence [3,5,6,11].

In line with what is remarked by diverse experts [12–14], teaching digital competence implies a set of skills and attitudes that lynchpin the use of technologies critically and creatively, in both the personal and professional spheres. On top of that, digital competence is not only part of the eight key competencies for lifelong learning addressed by the European Commission [15], but it is also essential for any citizen of the "knowledge society" [16]. Furthermore, Ilomäki et al. [17] claimed that digital competence contemplates skills related to technological proficiency, information technology mastery, 21st century skills, information literacy, digital literacy and digital expertise.

All of this has led different countries to develop referential frameworks that promote the improvement of digital competence for teachers and citizens, such as the British framework for digital education; the Krumsvik model of Norway; the framework of ICT competencies and standards for the teaching profession of the Government of Chile; the UNESCO International ICT Competency Framework for Teachers; and the Digital Competency Framework for educators and students of the International Society for Technology in Education (ISTE), among others [18]. In the European context, the DigComp Project [19] and DigCompEdu [20] are highlighted, the former being focused on citizens and the latter on teachers. However, the European framework has been criticized because of the general perspective that it encompasses, as it does not explicitly address specific teaching issues. In this sense, other researchers [21] have developed specific frameworks for pre-service teachers bearing in mind the four technology-related dimensions of the TPACK framework (Technological and Pedagogical Content Knowledge) and three levels of performance (Name, Describe, Use/Apply). Notwithstanding the above, this is a reliable tool that has been widely used in previous works [16,22].

In Spain, taking the aforementioned European Frameworks as reference, the Common Framework of Digital Teaching Competence was elaborated in 2017 by the National Institute of Educational Technologies and Teacher Training (Spanish Ministry of Education and Vocational Training) [23], being this the Spanish contextual framework for assessing digital competence as well as for suggesting formative measures and its improvements. This frame establishes five competency areas: (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) safety and (5) problem solving, plus 21 competencies that need to be developed for the enhancement of educational practice and lifelong learning.

Our study focuses on the area of communication and collaboration, that is, skills related to communication and collaboration in digital environments, cooperation and sharing documents and resources through online tools, collaborating with others through these media, as well as participating in scientific communities, forums and spaces for interaction. This area has six dimensions:

1. Interacting through digital technologies: Interacting through the employment of digital devices and applications; understanding how to deliver, present and handle digital communication; the appropriate use of different communicative digital media formats; and the adaption to diverse types and communication strategies.

2. Sharing through digital technologies: Sharing data location and digital content; being able to share knowledge, resources, content, as well as being proactive in the dissemination of news; and knowing citation systems and referencing practices while integrating new information.
3. Engaging in citizenship through digital technologies: Getting social agents involved throughout online participation, seeking technological opportunities and being aware of the potential of technology in citizenship participation.
4. Collaboration through digital technologies: Making use of technology for teamwork and collaborative tasks.
5. Netiquette: The rules of behavior on the network, protection against possible online dangers and development of strategies to identify inappropriate behavior.
6. Managing digital identity: Creating, adapting and managing digital identities and being able to protect one's digital reputation and deal with the data generated throughout the diverse accounts and applications used.

Once we have showcased the theoretical foundations of this work, the general objective of this research is to analyze future teachers' self-perception of their digital competence to communicate and collaborate with other people. Additionally, this work aims at analyzing the existence of statistically significant differences from a gender perspective.

2. Materials and Methods

In order to achieve the objective described above, we used a non-experimental quantitative research design that has a descriptive nature, due to the characteristics of the research we are presenting. We considered the following hypotheses:

Hypothesis 1. *Future teachers show different levels in their digital competence in communicating and collaborating with others.*

Hypothesis 2. *Future teachers display different levels in their digital competence in communicating and collaborating with others based on gender.*

2.1. Sample

For the selection of the participants, we followed a stratified random sampling technique, selecting students who were in the final year of the Degree in Primary Education at public universities of the Autonomous Community of Andalusia (Spain) during the 2018–2019 academic year.

The total population consists of 2996 students distributed among the different regions of Andalusia (south of Spain). To ensure the representativeness of the sample and the reliability of the data obtained, we calculated the minimum response rate that we had to obtain through the sampling formula for large finite populations [24]. Finally, we exceeded the minimum number of responses required for this purpose, obtaining a total sample of 698 students (Table 1).

Table 1. Research sample.

University	Population	%	Required Sample	%	Final Sample	%
Almeria	204	6.81	24	6.83	62	8.9
Cadiz	202	6.74	24	6.83	108	15.5
Cordoba	202	6.74	24	6.83	176	25.2
Granada	442	14.75	52	14.81	112	16
Huelva	542	18.09	63	17.94	65	9.3
Jaen	295	9.85	35	9.97	38	5.4
Malaga	308	10.28	36	10.25	37	5.3
Seville	801	26.74	93	26.49	100	14.3
Total	2996	-	351	-	698	-

Regarding their gender, 187 were men (26.8%) and 511 women (73.2%). Taking into consideration their age range, most of them belonged to the 18–21 age group (71.1%), followed by those aged 22–25 years (22.8%); only 6.2% were 26 years or older.

2.2. Instruments

For data collection, we administered a self-report questionnaire [12] in which, together with the sociodemographic variables, the digital competence scale is presented. The questionnaire is based on the European Digital Competence Framework (DigComp) and is structured in five dimensions (information and data literacy, communication and collaboration, digital content creation, safety, problem solving). It is composed of a total of 75 items (7 sociodemographic items and 68 digital competence variables) and is distributed as a Likert scale with 4 response levels: (1) null level, (2) basic level, (3) intermediate level and (4) advanced level.

The instrument has an overall reliability index, calculated through Cronbach's alpha, of 0.977 for the 68 items that analyze digital competence. Additionally, we calculated the KMO and Bartlett test, obtaining a reliability index of 0.919. Thus, following the approaches of Abad and Vargas [25] and Sánchez [26], we can affirm that the data collection instrument has a high level of internal consistency. These values give the data collected a high level of reliability for the elaboration of conclusions.

In addition, due to the objective of this research, the reliability obtained for the dimension under study (that is, communication and collaboration) was also calculated, with a Cronbach's alpha of 0.922 for the 19 items that comprise it (dependent variables) (Table 2).

Table 2. Dependent variables.

Area	Code	Description
Interacting through digital technologies	B1	Exchange of information through different digital media.
	B2	Use of digital technologies to communicate, interact and collaborate with others in order to suit my needs.
	B3	Participate in social networks and/or online communities (blogs, forums, academic portals . . .) where knowledge, information and/or resources related to my personal and professional needs are shared and transferred.
Sharing through digital technologies	B4	Use of different communication tools to share with third parties the digital content you make or to access and/or store on your devices.
	B5	Use tools from the cloud (We Transfer, Dropbox, Scribd, SlideShare, Scoop It, Pinterest, Google Drive . . .) to share information, knowledge and/or resources with others.
	B6	Create and manage your own website, blog, portal or similar to share digital content with others.
Engaging in citizenship through digital technologies	B7	Access websites and/or online services of state and/or private organizations to consult information of interest.
	B8	Use ICTs to participate in citizenship actions (lobbying, petitions, complaints, social mobilizations and alike).
	B9	Communicate with any state or private organization through the Internet to give your opinion on current topics, social or political issues and/or contribute with your own ideas.
Collaboration through digital technologies	B10	Make use of collaborative tools for projects management in which you participate and/or for the introduction, planning and follow-up of shared tasks that do not require a previous meeting.
	B11	Utilize web conferencing systems to communicate with other people in real time.
	B12	Use of software collaboration features packages and web-based collaboration services (track changes in a document, commenting on a digital resource, tagging, contributing to wikis, etc.).
Netiquette	B13	Employ the "code of good conduct" that is socially accepted in the network (do not use capital letters, refer to others through their nicknames or forenames, use emoticons for reinforcement, etc.).
	B14	Participate in the network with education and respect, avoiding offensive expressions from the points of view of culture, religion, race, politics or sexuality.
	B15	Show flexibility and personal adaptation to different digital communication cultures, accepting and appreciating diversity.

Table 2. *Cont.*

Area	Code	Description
Managing digital identity	B16	Manage a public profile (personal and/or professional) online adjusted to your personal needs, assessing the advantages and risks involved.
	B17	Handle multiple digital identities depending on the goal, context and targeted audience in a way that protects your digital reputation.
	B18	Control the information and data you produce when using the network by tracking your own digital footprint.
Overall	B19	In general, your level of digital competence to communicate and collaborate with others is . . .

2.3. Procedure

For the selection of the cohort, we followed a stratified convenience sampling. Firstly, once the participating centers of this research had been selected, that is, state universities that offer the bachelor's degree in Primary Education in Andalusia (south of Spain), we checked the total amount of students enrolled in the senior year of the bachelor degree during the 2018–2019 academic year. Then, we reached out to professors who taught each group of students from the universities under study during the survey period, seeking their collaboration for the implementation of the questionnaire. Next, these teachers gave the questionnaire to each group of students through their teaching aid online platform. All the students enrolled in the last year of the bachelor degree were invited to fill in the questionnaire. Finally, the students who were willing to participate in our study had from December 2018 (when the survey was opened) to June 2019 (when the survey closed) to complete it.

In addition, all the participants gave their informed consent to participate in this research. We complied with the ethical standards required in research involving human subjects established in the Declaration of Helsinki [27] and its subsequent updates.

The questionnaire was administered online using a Google form from October to December 2018 and from February to May 2019.

2.4. Data Analysis

In order to carry out the pertinent analyses of this research, we calculated, on the one hand, a descriptive statistic for two independent samples (men/women). On the other hand, in order to respond to the specific objective, an inferential analysis was carried out using the Mann–Whitney U test and Wilcoxon's W test. These are non-parametric tests applied to two independent samples and whose objective is to assess the existence of significant differences between both groups.

To verify the data collected, we performed the T-test and Levene's test to determine if there is a significant difference between the means of two groups (men and women). The T-test compares the means of two groups of cases and Levene's test is an inferential statistical test used to assess the equality of variances for a variable calculated for two or more groups. Thus, if the p-value resulting from Levene's test is less than a certain level of significance ($p < 0.05$), it is unlikely that the differences obtained in the variations of the sample were produced on the basis of random sampling from a population with equal variances. Therefore, the null hypothesis of equality of variances is rejected and it is concluded that there is a difference between the variations in the population. Moreover, for the analysis of the quantitative information collected, we used the data analysis program IBM SPSS Statistics, Version 25 (Armonk, New York, NY, USA).

3. Results

First, we performed a descriptive analysis of the response percentages obtained for each of the dependent variables (B1–B19). These responses were catalogued using the following scale according to their competence levels: null (total absence of knowledge/skill); basic (basic knowledge/skill); intermediate (significant knowledge/skill); advanced (mas-

tery of knowledge/skill) (Figure 1). From this test, we can notice that most future teachers claim to have an advanced level on items B14 and B15. In addition, an intermediate level of competence stands out on items B1, B2, B3, B4, B5, B7, B13, B16 and B19.

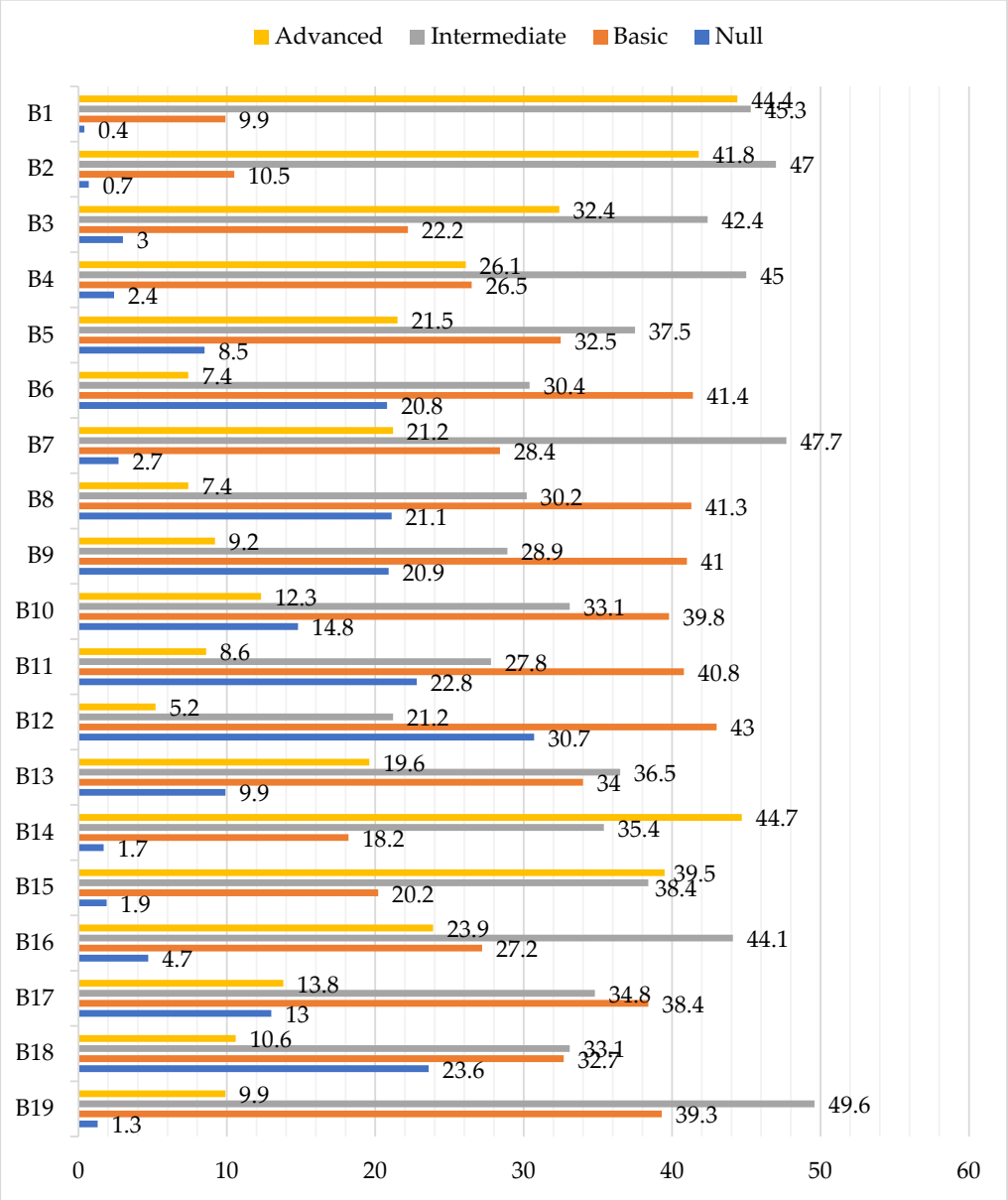

Figure 1. Competence levels: percentage analysis.

In relation to the lowest levels, we can observe that most of the responses are concentrated at a basic competency level on items B6, B8, B9, B10, B11, B12 and B17. Finally, it should be noted that no item stands out for its low level of competence in comparison with the rest of the levels. Despite this, the values obtained in variables B6, B8, B11, B12 and B18 are noteworthy, as more than 20% of the sample claims to have little knowledge of this matter.

To check the differences between the two samples, we compared means according to gender for each of the dependent variables studied. In this way, significant differences in the majority of the items involved arose. When it comes to the responses of the male sample, they have a higher level of competence in items B5, B6, B8, B9, B10, B11, B12, B13, B16, B17, B18 and B19, whereas the female sample obtains better results in the rest (B1, B2, B3, B4, B7, B14 and B15) (Table 3).

Table 3. Comparative averages between men and women.

Variable	Men		Women	
	X	Standard Dev.	X	Standard Dev.
B1	3.21	0.667	3.38 *	0.644
B2	3.19	0.684	3.34 *	0.675
B3	3.02	0.820	3.05 *	0.815
B4	2.94	0.730	2.95 *	0.809
B5	2.83 *	0.812	2.68	0.921
B6	2.32 *	0.900	2.22	0.853
B7	2.86	0.720	2.88 *	0.785
B8	2.35 *	0.845	2.20	0.874
B9	2.46 *	0.837	2.19	0.902
B10	2.59 *	0.889	2.37	0.880
B11	2.32 *	0.869	2.19	0.903
B12	2.26 *	0.897	1.92	0.817
B13	2.75 *	0.877	2.63	0.911
B14	3.12	0.801	3.27 *	0.801
B15	3.09	0.815	3.18 *	0.801
B16	2.88 *	0.770	2.87	0.849
B17	2.60 *	0.876	2.45	0.888
B18	2.47 *	0.876	2.25	0.967
B19	2.78 *	0.682	2.65	0.655

* Female sample obtains better results.

Continuing with the analysis, and to verify the existence of statistically significant differences between both genders, we performed the Mann–Whitney U test and the Wilcoxon W test (Table 4). The test showed significant data for variables B1, B2, B5, B8, B9, B10, B12, B14, B17, B18 and B19 ($p < 0.05$ *).

Table 4. Comparative averages between men and women.

	U of Mann–Whitney	W of Wilcoxon	Z	Asymptotic Sig. (Bilateral)
B1	40,901.500	58,479.500	−3.222	0.001 *
B2	42,209.000	59,787.000	−2.604	0.009 *
B3	46,562.000	64,140.000	−0.550	0.582
B4	46,738.500	64,316.500	−0.472	0.637
B5	43,754.500	174,570.500	−1.796	0.073
B6	45,072.500	175,888.500	−1.215	0.224
B7	46,766.000	64,344.000	−0.463	0.643
B8	42,967.500	173,783.500	−2.159	0.031 *
B9	39,757.500	170,573.500	−3.590	0.000 *
B10	41,554.000	172,370.000	−2.788	0.005 *
B11	43,605.500	174,421.500	−1.867	0.062
B12	37,785.500	168,601.500	−4.510	0.000 *
B13	44,380.000	175,196.000	−1.515	0.130
B14	42,477.000	60,055.000	−2.423	0.015 *
B15	44,940.500	62,518.500	−1.287	0.198
B16	47,744.000	178,560.000	−0.016	0.988
B17	43,393.000	174,209.000	−1.963	0.050 *
B18	41,398.500	172,214.500	−2.828	0.005 *
B19	43,015.000	173,831,.00	−2.234	0.025 *

In order to corroborate the previous data, we performed Levene's test and the T-test for the two independent samples (Table 5). Thus, there are significant differences in items B1, B2, B5, B8, B9, B10, B12, B14, B17, B18 and B19 (* $p < 0.05$). Therefore, we assume that there are no gender differences in items B3, B4, B6, B7, B11, B13, B15 and B16 ($p > 0.05$).

Table 5. T-test for independent samples.

Variable		Levene's Test		T-Test		
		F	**Sig.**	**t**	**gl**	**Sig. (Bilateral)**
B1	Equal variances are assumed	3.509	0.061	−3.080	696	0.002 *
	Equal variances are not assumed			−3.072	329.339	0.002 *
B2	Equal variances are assumed	2.680	0.102	−2.522	696	0.012 *
	Equal variances are not assumed			−2.506	327.007	0.013 *
B3	Equal variances are assumed	0.000	0.991	−0.499	696	0.618
	Equal variances are not assumed			−0.498	329.199	0.619
B4	Equal variances are assumed	2.016	0.156	−0.226	696	0.821
	Equal variances are not assumed			−0.237	363.751	0.813
B5	Equal variances are assumed	10.367	0.001	1.936	696	0.053
	Equal variances are not assumed			2.054	372.608	0.041 *
B6	Equal variances are assumed	1.756	0.186	1.401	696	0.162
	Equal variances are not assumed			1.366	315.788	0.173
B7	Equal variances are assumed	1.210	0.272	−0.270	696	0.788
	Equal variances are not assumed			−0.281	358.469	0.779
B8	Equal variances are assumed	0.021	0.885	2.071	696	0.039 *
	Equal variances are not assumed			2.104	341.226	0.036 *
B9	Equal variances are assumed	0.149	0.700	3.543	696	0.000 *
	Equal variances are not assumed			3.668	354.275	0.000 *
B10	Equal variances are assumed	0.211	0.646	2.966	696	0.003 *
	Equal variances are not assumed			2.951	327.874	0.003 *
B11	Equal variances are assumed	0.022	0.883	1.670	696	0.095
	Equal variances are not assumed			1.701	342.655	0.090
B12	Equal variances are assumed	7.509	0.006	4.724	696	0.000 *
	Equal variances are not assumed			4.524	305.826	0.000 *
B13	Equal variances are assumed	1.337	0.248	1.588	696	0.113
	Equal variances are not assumed			1.616	342.410	0.107
B14	Equal variances are assumed	2.225	0.136	−2.255	696	0.024 *
	Equal variances are not assumed			−2.254	330.779	0.025 *
B15	Equal variances are assumed	0.698	0.404	−1.296	696	0.196
	Equal variances are not assumed			−1.286	326.087	0.199
B16	Equal variances are assumed	4.928	0.027	0.087	696	0.931
	Equal variances are not assumed			0.091	362.279	0.927
B17	Equal variances are assumed	0.102	0.749	2.012	696	0.045 *
	Equal variances are not assumed			2.026	335.090	0.044 *
B18	Equal variances are assumed	3.142	0.077	2.778	696	0.006 *
	Equal variances are not assumed			2.909	362.766	0.004 *
B19	Equal variances are assumed	0.406	0.524	2.289	696	0.022 *
	Equal variances are not assumed			2.246	319.453	0.025 *

Note: * $p < 0.05$.

4. Discussion and Conclusions

Since the beginning of this millennium, a true digital revolution has been taking place. In this sense, society's development and the evolution of the use of technologies have changed how we live and acquire knowledge. Furthermore, this has become more conspicuous after the global pandemic caused by the SARS-CoV-2 disease [16], in which more attention has been paid to the need for acquiring appropriate digital skills [28]. In fact, we have witnessed a digital revolution in which various educational institutions are continuously changing their teaching methods and social responsibilities in order to fit into this new era [29].

In this context, the higher educational system must be prepared to respond to current and future digital needs, which implies a persistent adaptation to social changes that ought to be extended to teacher training programs [4,30–32]. That is the reason why research focused on teachers' digital competence is increasing [13,14].

Regarding the objective of this research, firstly, we have pinpointed a general intermediate level in relation to the digital competence of future elementary teachers to communicate and collaborate with others through technologies, as other research on this matter has stated [16]. Therefore, our H1 is ratified, as future teachers display different digital competence levels to communicate and collaborate with others regarding the task to be carried out. This work showcases a higher qualification to use the socially accepted codes of good conduct on the Internet. Among the most noteworthy skills, highlighted within our data are the ability to participate in the network with education and respect, avoiding offensive expressions from the points of view of culture, religion, race, politics or sexuality, as well as accepting and learning diversity, in agreement with other studies [33,34]. Consequently, these findings shed light on the need to continue working towards the improvement of teachers' digital education [18].

In line with some experts, we are currently dealing with generations who were born and nurtured under the impact of the Internet [1]. Nonetheless, as we have shown, there is a lack of training regarding future teachers' digital skills. Specifically, these low levels of competence are more evident in the following skills:

- Sharing through digital technologies, in particular with the creation and/or management of websites, portals or similar (B6).
- Collaboration through digital technologies, in abilities such as using collaborative tools for the management of online projects (B10), utilizing web conferencing systems to communicate with other people (B11) or using web-based collaboration functions (track changes in a document, commenting on a digital resource, tags, contribution to wikis, etc.) (B12).
- Engaging in citizenship through digital technologies, in actions such as the use of ICTs to participate in citizen actions (lobbying, petitions, complaints, social mobilizations and the like) (B8), as well as the fact of communicating with a state or private organization through the Internet to give their opinion on current topics, social or political issues and/or contribute with their own ideas (B9).
- In managing digital identity, there is a competence gap in terms of digital identity protection, especially in terms of handling several digital identities depending on the goal, context and targeted audience in a way that protects their digital reputation (B17).

As indicated by the studies of Pérez Escoda, Lena Acebo, García-Ruiz and Guillén-Gámez, Mayorga-Fernández [7] and Istefjord [2], there is a significant gender digital gap in the initial mastery of ICT tools or in the degree of qualification achieved by teachers, matching with the results obtained in this research. In this sense, a differential line shown in the study is the greater self-perceived ability of male participants to deal with technical problem solving, reinforcing the results acquired by Calderón [35].

In addition, the data of our research have vindicated that there are significant gender differences, which means that gender can still be considered as a limitation in ICT use as well as in digital competences [36]. On the one hand, the male cohort claims to have a higher level of competence in sharing information and content, especially with regard to the use of tools from the cloud, such as Google Drive or We Transfer, alongside skills for the creation of a website, blog, portal or similar to share knowledge with others (codes B5 and B6, respectively). They also report significant differences in terms of collaboration through digital technologies, in particular, making use of collaborative tools for projects management that do not require a previous meeting (B10), employing web conferencing systems to communicate with others in real time (B11) or using software collaboration features packages and web-based collaboration services (B12).

On the other hand, female participants claim to have a higher digital qualification to interact through digital technologies in skills such as exchanging information through different digital media (code B1); using digital technologies to communicate, interact and collaborate with others (B2); and participating in social networks and/or online communities where knowledge, information and/or resources are shared and transferred (B3). Likewise, women uphold a higher level of competence to participate in the network

with appropriate behavior, with respect and appreciating diversity (culture, religion, race, politics or sexuality) (B14). Thus, our H2 is corroborated as we can affirm that future teachers show different digital competence levels to communicate and collaborate with others based on gender. In this sense, as stated by other researchers [37], gender is a variable that seems to influence the acquisition of digital competence. Nevertheless, according to Hargittai and Shafer [38], men tend to rate themselves higher than women in similar studies.

All the results analyzed so far bring to light the need to offer future teachers more training in digital competences in order to respond to the great technological challenges of today's society [6]. All things considered, training teachers in digital competence should promote improvements in their knowledge, plus in the use of innovative elements that erase barriers generated by the use of ICTs, a pedagogical and a technological integrated orientation during their education thus being necessary [39], especially if we take into consideration that future teachers will be responsible for building digital competence in forthcoming generations [40], given the large gap between the innovation process and the implementation of ICTs [41]. In addition, appropriate training in teaching digital competences allows for the implementation of innovative teaching and learning processes as well as improvements in the interaction with the digital network [42–44]. If higher education systems do not pay attention to the development of educational digital competences in future teachers, their skills will be hindered, leading not only to a lack of digital literacy into new generations, but also shrinking key competencies such as lifelong learning. Regarding the prospective of this research, the results found in this article highlight the need to improve future teachers' training in digital competences. Therefore, in order to grow in the digital society, the role of schools and educational institutions in general should promote adequate training for using ICTs, both critically and creatively, along with safety. Additionally, as pointed out by other researchers, not only we have emphasized technological skills, but also future teachers' pedagogical capacity [38,45,46].

Finally, with respect to the limitations of this paper, it is worth noting that we are dealing with social research that studies the perception of the sample. Consequently, subjectivity plays an important role in this type of inquiry. Likewise, it is worth mentioning the difference of the sample size, as there are more female participants in our study than men due to the greater presence of women in these degrees, which makes it difficult to obtain a balance between both sexes. Moreover, the cohort context and age range ought to be taken into account, which means that data cannot be generalized to the entire country. Another limitation can be observed in the research method employed. In this sense, the use of a mixed research methodology that includes qualitative information collection techniques would help to understand this reality more deeply, as well as to recognize other factors that may affect the achievement of lower or higher levels in participants' digital competence.

As a future line of research, we envisage the realization of another study that focuses on the current era, after SARS-CoV-2 (COVID-19), to discern if there are significant differences between both intervals of time. Simultaneously, we will address the aforementioned limitations.

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