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Use of Information and Communication Technologies (ICTs) in Communication and Collaboration: A Comparative Study between University Students from Spain and Italy

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Abstract: The aim of this study is to determine the level of competence that university students from Spain and Italy have in the use of Information and Communication Technologies (ICTs) for communication and collaboration purposes. We also intend to identify possible differences and similarities between both countries, as well as factors associated with their competence that may lead to a digital gap. In order to fulfil these objectives, we performed a positivist exploratory study based on a quantitative methodology supported by a descriptive method with a survey design. The data collection is performed with a questionnaire, the data from which are analyzed through two statistical studies: a descriptive one and a causal one. The results show good competence from the students in this area, being somewhat higher in Italian students. We identified some of the factors associated with competence, such as Internet access or having a tablet. In conclusion, it is clear that politics on a global, national and local level are essential to the acquisition of digital competence, especially regarding the digital gap caused by access to resources. In this sense, governments must guarantee free and universal access to technology to all their citizens in order to diminish the digital gap between them.

Keywords: ICT; digital competence; higher education; Spain; Italy; university; communication; collaboration

1. Introduction

Information and Communication Technologies (ICTs) are present in almost all fields of society. These tools have generated important changes and advances that have been introduced to our daily routines, slowly integrating into our everyday lives until, in some situations, we have come to depend on their use [1,2]. In this technological context, being able to function successfully in the digital field or develop digital competence is essential [3,4].

For a few decades, many experts have made different efforts to conceptualize digital competence [5,6]. They started with global politics, which tried to delimit the concept and was initially quite confusing [7]. Most definitions of this kind of competence were partial and simplified the concept, reducing it to a list of knowledge about tools or to network browsing skills, without a strong theoretical foundation to support it [8]. In the same way, the search for a common international framework, especially when it comes to language and the unification of concepts, is one of the biggest difficulties encountered [9].

Currently, there is more cohesion in conceptualization of the term. Most of the time, digital competence is associated with aspects related to information and media literacy [10] and the technical mastery of digital tools. To a lesser extent, it is also related to communicative, cognitive, ethical and

legal aspects [11]. In this vein, the review study carried out by Ilomäki et al. [12], in which they analyze 76 articles on digital competence, focusing on its definitions, is interesting. As a conclusion, they highlight four fields regarding the definition of the term: technical competence; the ability to use digital technologies in a meaningful way for working, studying and in everyday life; the ability to evaluate digital technologies critically; and the motivation to participate in and commit to digital culture [12] (p. 1).

1.1. Digital Competence at the University Level

Training for appropriate use of ICTs is fundamental at all educational stages. By this logic, university students, on the one hand, must already have a solid knowledge of this topic and be digitally competent; on the other hand, they must keep receiving training at this educational level [13,14]. However, in the different studies that analyze digital competence in universities, training limitations in this context are quite clear among teachers and students alike [15].

Specifically, students are more likely to be consumers than prosumers in digital environments [16]. That is, they search and handle resources in order to obtain what they want, but they are not used to creating their own digital products and content [17]. In addition, at the highest levels of higher education there are no great advances in terms of digital competence [18]. Finally, regarding the digital gap in terms of gender, it is worth mentioning that the conclusions of the studies show some diversity. Some claim the existence of a gap between men and women [19–21], while others do not observe significant differences [15,18].

The findings of the mentioned studies are quite noteworthy, as today's society requires citizens to be able to function competently using technological and digital media [22,23]. As a result, various authors demand further training in digital competence at universities, oriented both to professional improvement and the development of skills relating to lifelong learning [19–26].

1.2. European Digital Competence Framework For Citizens

In 2013, given the ambiguity of the definition and precision of digital competence that we mentioned earlier, the European Commission presented the European Digital Competence Framework for Citizens, known as DigComp [9]. This document presents a European digital framework, with the aim of improving the digital competence of citizens [27]. This framework was formulated in 2016, resulting in the creation of DigComp 2.0. The following year, a new scenario was generated: DigComp 2.1., which is currently valid, uses the same key dimensions for the development of digital competence as its predecessors. These dimensions are as follows [28]:

- Information and data literacy. This dimension is related to the search for information, the development of a critical mind when regarding it, as well as the management and organization of the data found.
- Communication and collaboration. This dimension includes aspects associated with interaction in the digital world through public and private services, managing the digital reputation and identity of users.
- Digital content creation. This dimension reflects matters regarding the creation and edition of digital content, including awareness of the different licenses for re-edition and re-use of content.
- Safety. This dimension includes aspects related to network security, especially regarding the protection of personal data, devices and privacy, as well as the physical and psychological damage that misuse of technology can cause. In addition, it includes references to the environmental damage that this technology generates.
- Problem solving. This dimension refers to the detection of problems and needs in digital environments, such as being up to date with digital updates and improving both processes and products.

Both in Spain [29] and Italy [30], this European framework regarding digital competence has been translated into different initiatives whose objectives revolve around dimensions proposed by the European Commission. In this sense, this work focuses on the analysis of one of these dimensions with regards to Spanish and Italian students in higher education. Italy and Spain have similar cultural and social elements. Thus, in the field of education, both countries share important common aspects regarding their historical-educational heritage [31]. In this sense, the present study compares the digital competence of both countries, searching for a symbiosis that will enrich the actions taken to improve competence in this area.

As a result, the research question is: what level of digital competence do Spanish and Italian university students have when it comes to communication and collaboration? Starting from this research problem, a series of general objectives arise, to which this study responds. On the one hand, this study intends to analyze the digital competence of university students in Spain and Italy, focusing on the use of ICTs for communication and collaboration and identifying possible differences and similarities between both countries. On the other hand, we also performed a contrast study that focused on identifying factors associated with digital competence in the communication and collaboration of university students from both countries, checking if there are significant differences due to factors that may lead to a digital gap.

2. Materials and Methods

Based on the presented objectives, we carried out a positivist exploratory study. This study was based on a quantitative methodology supported by a descriptive method, with a survey or questionnaire design. The target population of the study was made up of students from two European universities: a Spanish university, the Universidad de Jaén; and an Italian university, the Università degli studi di Macerata. The sample was created using nonprobability purposive sampling, and the final sample reached 686 students: 314 from the Spanish university and 372 from the Italian university.

The instrument used in the data collection was the COBADI (Basic Digital Competences 2.0 in University Students/Registered Mark: 2970648) questionnaire. This questionnaire is composed using different dimensions of study. At the beginning, some identification data, such as the age of the students or the degree they are studying (among others that we mentioned before), are required. Next, the dimensions of study are posed, which are: competence in the knowledge and use of ICTs for social communication and collaborative learning, competence in the use of ICTs for searching and processing information, and interpersonal competence in the use of ICTs in a university context.

Among these dimensions, this study analyzes competence in the knowledge and use of ICTs for social communication and collaborative learning. The quality of the mentioned questionnaire has been verified in several investigations [21,32,33], and the values of validity and reliability were verified to corroborate the quality of the instrument. On the one hand, the Cronbach's Alpha coefficient reached a value of 0.85, which represents a high reliability [34]. On the other hand, the construct validity of the scale was studied through factor analysis, in which there was a unique factor that explained the 36.54% of the variance. This way, the quality of the instrument used was guaranteed.

Regarding data analysis, two statistical studies were carried out: a descriptive study and a causal study. The descriptive study is associated with the first objective of this work, analyzing the data for each country using descriptive statistics. The causal study is associated with the second objective, identifying possible differentiating factors related to the competence under study through hypothesis testing that is specific to inferential statistics. These analyses were performed using the statistical program SPSS, version 26. Using this program, we carried out statistical analysis including the following aspects: descriptive statistics (mean and standard deviation) and inferential statistics (ANOVA, Student's t-test, and Kruskal–Wallis H test).

After checking that the sampling distribution complied with the normality criteria through the Kolmogórov-Smirnov statistic and the test of homoscedasticity, the contrast studies were, in most cases, carried out using parametric statistics. Specifically, we used the Student's t statistic and the ANOVA

test, depending on the number of groups to compare. We used the Kruskal–Wallis H statistic with the two elements that did not meet the normality of the sample.

3. Results

The students in the sample were of a wide age range, ranging from 18 to 59 years old, with the majority of them in the range between 18 and 26 years old (87%). The students from Italy were older (18 to 59) than the Spanish students (18 to 27). The degrees they were studying varied as well, covering technical and social sciences, humanities and health. In addition, their academic year of study was very diverse, ranging from the initial years to the final years of their degree. Approximately half of the students received training on the use of Web 2.0 (44.9%), compared to the students who did not receive any kind of training in this respect (55.1%). Most of them had a computer (99%) and Internet at home (98.5%), and the percentage of students that owned a tablet (53.6%) was considerably lower. Lastly, it is interesting that 58.6% of the students connect to the Internet more than 9 h per week, 33.6% of them connect between 4 and 9 h, and only 7.7% use it between 1 and 3 h per week.

Below, we present the results pertaining to the objectives of the study. First, we perform a descriptive comparison of the data regarding digital competence in communication and collaboration collected from Spain and Italy. Second, we identify the factors associated with competence in both countries.

3.1. Digital Competence in Communication and Collaboration

Figure 1 shows the data obtained in each category, observing the differences between the competence of the Spanish and Italian students. The scale varies between values 1 and 4, 1 being not competent and 4 being completely competent.

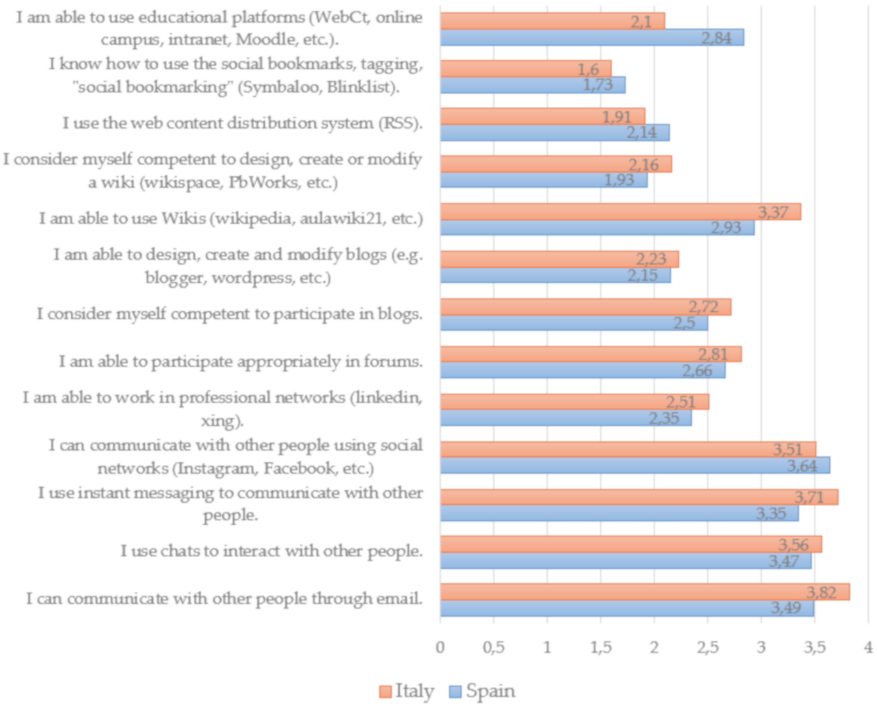

Figure 1. Means of digital competence in communication and collaboration in each country.

As observed in Figure 1, in Italy, students show better competence in categories related to email, instant messaging, chats, social media, and the use of wikis. On the contrary, the results reveal lower competence in the use of markers, web content distribution systems and educational platforms, as well as the design, creation and modification of wikis and blogs.

Regarding Spanish students, the results indicate better competence in items associated with social media, email, chat, instant messaging, and the use of wikis and educational platforms. Analyzing the values, the lowest skills in Spain are found in the means of categories related to the use of markers; the design, creation and modification of Wikis; the use of web content distribution systems; and the design, creation and modification of blogs.

There are certain similarities in the values of categories in both countries, although there are also some differences. In general, the means of Italian students are higher than those of Spanish students, with the exception of some categories related to social media, as well as web content distribution systems, markers and virtual platforms. In the rest of the categories, Italy shows higher values, highlighting the difference in categories associated with the use of wikis and email.

There are four categories that stand out for their high means in both countries, with values over 3 both in Italy and in Spain. In Italy, the category with the highest value is the one related to the use of email, while in Spain, it is the value associated with social media. In contrast, there is unanimity in the category associated with the use of markers, which obtains a value lower than 1 in both countries. Also, Spanish students value the category related to wikis to a lesser extent, while Italians place less value on the category related to the web content distribution system.

3.2. Factors Associated with Digital Competence in Communication and Collaboration

Table 1 shows the results of the contrast analysis performed on Spanish students. It can be observed how the null hypothesis (H0) of the equality of means is rejected, with a level of confidence of 99% in two factors. Therefore, there are two elements associated with digital competence in communication and collaboration. These factors are owning a tablet and having time to surf the Internet.

Table 1. Contrast results for variable digital competence in communication and collaboration in Spanish students.

	Digital Competence in Communication and Collaboration (Spain)
Age	0.993 [1]
Year of study at the moment	0.592 [1]
Have you received training on Web 2.0?	0.119 [2]
Do you own a computer?	0.504 [2]
Do you own a tablet?	0.003 [2]
Do you have Internet at home?	0.133 [2]
From where do you normally connect to the Internet?	0.637 [1]
How much time do you dedicate to surfing the Internet?	0.020 [1]

[1] The ANOVA statistic was used. [2] The Student's t statistic was used.

Regarding the factor of owning a tablet, when observing the means, it is shown that the mean is higher in the value Yes (mean = 2.77: SD = 0.60) than in the value No (mean = 2.55; SD = 0.55). That is, students who own a tablet have greater digital competence in communication and collaboration than those who do not own this device. Regarding the element related to the amount of time they dedicate to surfing the Internet, Table 2 shows in detail where the differences between groups are found. In this case, students who dedicate more than 9 h per week to surfing the Internet have more competence in communication and collaboration than those who surf the Internet for between 4 and 9 h per week.

Regarding Italian students, Table 3 shows the results of the contrast studies performed. As observed in the table, the null hypothesis (H0) of the equality of means is rejected, with a level of confidence of 95% in four variables. As such, there are four factors relating to digital competence in communication and collaboration among Italian students. These factors are: receiving training on Web 2.0; owning a tablet, where they usually connect to the Internet; and the time they dedicate to surfing the Internet.

Table 2. Scheffé test on the differences in each group after carrying out the ANOVA for the variable "How much time do you dedicate to surf the Internet?" on Spanish students.

	(I) How Much Time Do You Dedicate to Surfing the Internet?	(J) How Much Time Do You Dedicate to Surfing the Internet?	Mean Difference (I-J)	Dev. Error	Sig.
Digital competence in communication and collaboration	1 to 3 h per week	4 to 9 h per week	0.00718	0.15971	0.999
		More than 9 h per week	−0.20960	0.15268	0.391
	4 to 9 h per week	1 to 3 h per week	−0.00718	0.15971	0.999
		More than 9 h per week	−0.21678	0.08113	0.030
	More than 9 h per week	1 to 3 h per week	0.20960	0.15268	0.391
		4 to 9 h per week	0.21678	0.08113	0.030

Table 3. Contrast results for the variable digital competence in communication and collaboration in Italian students.

	Digital Competence in Communication and Collaboration (Italy)
Age	0.090 [1]
Year of study at the moment	0.363 [1]
Have you received training on Web 2.0?	0.002 [2]
Do you own a computer?	0.520 [2]
Do you own a tablet?	0.007 [2]
Do you have Internet at home?	0.056 [2]
From where do you normally connect to the Internet?	0.014 [3]
How much time do you dedicate to surfing the Internet?	0.006 [3]

[1] The ANOVA statistic was used. [2] The Student's t statistic was used. [3] The Kruskal–Wallis H statistic was used.

Both factors—having received training on Web 2.0 and owning a tablet—present a higher mean in the value Yes than the value No (Table 4). Specifically, in terms of training on Web 2.0, the value Yes obtains a mean of 2.63 (SD = 0.44), and the value No obtains a mean of 2.49 (SD = 0.40). In addition, owning a tablet reaches a mean of 2.60 (SD = 0.43), while not owning a tablet has a mean of 2.48 (SD = 0.41). Consequently, students who received training on Web 2.0 or own a tablet present a higher level of digital competence in communication and collaboration.

Table 4. Differences between groups after carrying out the Student's t-test for the variables "Have you received training on the Web 2.0?" and "Do you own a tablet?" on Italian students.

		Have You Received Training on Web 2.0?		Do You Own a Tablet?	
		Mean	SD	Mean	SD
Digital Competence in Communication and Collaboration	Yes	2.6297	0.44064	2.6048	0.42643
	No	2.4920	0.40316	2.4858	0.41152

Regarding the place where they connect to the Internet and the time they dedicate to surfing it, Table 5 shows the average ranges, allowing us to identify a trend in the differences found. On the one hand, those who can connect to the Internet anywhere because they have this service on their mobile phones (194.45) have greater digital competence in communication and collaboration than those who connect from the university (129.65). On the other hand, it can be observed how those who surf the Internet for more than 9 h per week (199.20) are more digitally competent in communication and collaboration than those who only surf the Internet for between 1 and 3 h per week (148.81).

Lastly, the comparison between Spain and Italy regarding the competence studied is noteworthy. In this sense, it is verified that there are significant differences between both countries, as through the Student's t statistic, the null hypothesis (H0) of quality of means is rejected, with a level of confidence of 95% ($\alpha = 0.03$). The mean of competence reaches the value of 2.82 (SD = 0.53) in Italy, while in Spain

it reaches 2.66 (SD = 0.59). In this way, it is shown that digital competence in communication and collaboration is higher in Italian students than in Spanish students.

Table 5. Differences between groups after carrying out the Kruskal–Wallis H test for the variables "From where do you normally connect to the Internet?" and "How much time do you dedicate to surfing the Internet?" on Italian students.

	From Where Do You Normally Connect to the Internet?	**Average Range**
Digital Competence in Communication and Collaboration	At home	167.23
	From university	129.65
	Anywhere with mobile Internet	194.45
	How Much Time Do You Dedicate to Surfing the Internet?	**Average Range**
	1 to 3 h per week	148.81
	4 to 9 h per week	172.44
	More than 9 h per week	199.20

4. Discussion and Conclusions

In answer to the first objective, which was "to analyze the competence in communication and collaboration of university students in Spain and Italy, identifying possible differences and similarities between both countries," there are similar trends in the results of both countries. However, it is verified that in Italy, students have a higher level of digital competence in this field than in Spain. This difference is shown to a greater extent in their use of wikis and email. This may be due to the fact that there is more of a tradition of using wikis and email at lower educational levels in Italy than in Spain [35–37].

However, there are exceptions where Spanish students are more skilled in the use of certain digital resources. One of these is communication through social media. This may be because the average age of Spanish students is lower than that of Italian students. Young people make greater use of social media, both for communication and for diffusion and collaboration [38–40]. In addition, it stands out that the use and operation of virtual platforms by Spanish students is higher than it is among Italian students. Accordingly, it is worth highlighting the role of Spanish politics in promoting useful platforms in the academic sphere [41–43]. Perhaps this is why competence in the use of this kind of tool has been strengthened.

Regarding the second objective, which was "to identify factors associated with the competence in communication and collaboration of university students from both countries," different elements relating to this competence have been observed. In both Italy and Spain, owning a tablet and surfing the Internet more than 9 h per week are associated with a higher level of digital competence in communication and collaboration. In this sense, the digital gap generated by access to resources is noteworthy. Whether from a tablet device or through Internet connection, access to resources allows students to increase their hours of connectivity. This finding is in accordance with other investigations, in which it is shown that access to digital resources is a determining factor in the development of digital competence [44–47]. In fact, Italian students who can connect to the Internet anywhere because they have this service on their mobile phones also reach a higher level of competence.

As well as this, Italian students show greater competence in this area if they have received training on Web 2.0. Therefore, the Italian government should propose specific learning tracks using Web 2.0, both at university level and at other educational levels, with the aim of developing and improving digital competence in communication and collaboration among their citizens. In this way, it is established that global, national and local politics are essential for proper training in digital competence [48–52].

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