

**Qwerty Journal**

**ONLINE FIRST**

# Digital Competence in University Students: A Comparison between Spain and Italy

*Mercedes Llorent-Vaquero<sup>a</sup>, Miriam Ágreda-Montoro<sup>b</sup>, Susana Tallón-Rosales<sup>c</sup>*

## Abstract

Digital competence today is one of the key competences for the development of people in society and a special relevance in Higher Education. This study presents a comparison between university students from Spain and Italy on the level of competence in the use of ICT and the Internet to search and process information. A quantitative methodology was used, through which university students from Italy and Spain were asked to fill in a questionnaire on digital competence (n = 686). The results confirm that students have a digital competence that allows them to use ICT in its elementary dimensions, however they have a low digital competence for the design and creation of content, so they have a consumer role compared to that of a prosumer. The last part of the study discussed possible explanations for the study's findings and suggestions for improving the education of college students.

**Keywords:** Digital Competence, Digital Literacy, Higher Education, Spain, Italy

<sup>a</sup> Universidad de Jaén, Spain, ORCID: <https://orcid.org/0000-0002-1379-4749>

<sup>b</sup> Universidad de Jaén, Spain, ORCID: <https://orcid.org/0000-0002-0940-6504>

<sup>c</sup> Universidad Internacional de Valencia-VIU, Spain, ORCID: <https://orcid.org/0000-0002-0885-0873>

Corresponding author: [susana.tallon@professor.universidadviu.com](mailto:susana.tallon@professor.universidadviu.com)

## Introduction

Recent years have seen significant and disruptive changes due to the rapid growth of ICTs, impacting how we access and process vast amounts of information and how communication occurs, as well as how we store information. While this information is crucial for the Knowledge Society, it can also pose challenges, such as infoxication and the digital gap (Bustamante et al., 2019). The NMC Horizon Report 2020 highlights the pressing need to enhance information and digital literacy in university students, aligning with the challenge posed in the 2017 report on Higher Education (Brown et al., 2020). Beyond the NMC Horizon Reports and UNESCO, the Council of Europe emphasizes digital education as a means to empower young citizens, enabling them to acquire competences for learning in a digital society (Council of Europe, 2015).

Ovcharuk (2020) highlights the importance of students acquiring digital competence to exercise their internet rights, protect data and values, foster critical thinking, and analyse reality through reflective positions. Several studies show that students feel confident in navigating, searching, filtering, storing, and retrieving information; however, their ability to assess information is evaluated differently (Lopez-Gil & Sevillano-Garcia, 2020). While students proficiently use search engines, accessing information in digital databases and libraries presents a challenge (Guillen-Gamez & Mayorga-Fernandez, 2020).

Students exhibit proficiency in using 2.0 digital tools, particularly Gsuite, perceiving high competence (Lopez-Meneses et al., 2020). However, their ICT use remains largely instrumental, focusing on basic tasks. Deficits emerge in more complex metacognitive knowledge-building tasks (Ascencio-Ojeda et al., 2019). Challenges persist in discerning accurate content, leading to difficulties in distinguishing verified information from misinformation (Rodriguez-Garcia et al., 2019). These shortcomings improve over the course of university studies, with higher-level students demonstrating greater efficiency (Senkbeil et al., 2019).

The acquisition of digital competence in students is closely linked to that of teachers. Despite a decade of research on its importance in educational contexts, there is difficulty in precisely defining the term, resulting in a discrepancy between the generic and educational concepts. This discrepancy arises from the complexity inherent in teaching-learning processes and the involved actors (Pettersson, 2018). Regarding teachers, the concept of Pedagogical Digital Competence (From, 2017) is endorsed, focusing on their ability to use ICTs in teaching practice. PDC encompasses three levels of interaction: Micro-level (student-centered pedagogy), meso-level (course design and educational infrastructure), and macro-level (educational management and organization, emphasizing leadership as a vital aspect). Pettersson (2018) attributes the challenge of specifying digital competence in education to a lack of initiative within school organizations.

Digital competence is crucial for functioning in a technology-driven world, encompassing tasks from accessing, processing, to transforming information (Grande-De-Prado et al., 2018). It highlights the significance of assessing students' ICT skills, particularly in information retrieval and processing, and creating educational environments that facilitate digital proficiency (Erlangga, 2022). During the Covid-19 pandemic, essential digital tools played a crucial role in reshaping the dynamic between teachers and students, fostering a connected learning environment (Galuppo et al., 2022). This shift highlights the significance of technologies like connected identities in adapting to global challenges.

This article aims to examine the digital competence of university students within the standardized European framework (DIGICOMP). Despite this common framework, national policy implementation varies. The study focuses on assessing the competence disparity between culturally,

economically, and educationally similar European countries, Italy and Spain, which also face high levels of misinformation (Tobías, 2020). The study has two main objectives: To analyse ICT proficiency in information search and processing among Spanish and Italian university students, and to identify factors influencing this competence, investigating potential differentiating factors.

## Material and method

To meet the stated objectives, a descriptive survey design is employed, utilizing a quantitative methodology. University students are administered the COBADI survey (University Students' Basic Digital Competences 2.0, registered at the Spanish Patent and Trademark Office, No. 2970648) to assess their digital competence in this domain. The survey encompasses four scales, outlined as follows:

- Socio-demographic data (7 items).
- Technology consumption data (8 items).
- Scale 1: Competencies in the knowledge and use of ICT in social communication and collaborative learning (13 items).
- Scale 2: Competencies in the use of ICT for information search and processing (11 items).
- Scale 3: Interpersonal competencies in the use of ICT in the university context (4 items).
- Scale 4: Virtual tools and social communication at the University (4 items).

This study is part of a broader and more extensive research conducted among Spanish and Italian university students. Specifically, this article focuses on the study of Scale 2, which pertains to competence in the use of ICT for information search and processing. The Cronbach's Alpha values and Factor Analysis results for each scale are detailed in Table 1. Additional findings pertaining to Scale 1 can be found in Llorent-Vaquero et al. (2020). The scale employed in this study demonstrates high reliability, as indicated by the Cronbach's Alpha coefficient of 0.85 (Bisquerra, 2016). The construct validity is confirmed by a factor analysis, revealing a single factor explaining 40.48% of the variance. This attests to the quality of the instrument utilized.

**Table 1.**

*Reliability and validity of the scales.*

	No. items	Answer range	Cronbach's alpha	Total % of explained variance
Scale 1	13	1-4	,847	36,54%
Scale 2	11	1-4	,851	40,48 %
Scale 3	4	1-4	,861	47,87 %
Scale 4	4	1-4	,853	43,21 %

Data analyses were conducted using SPSS software (v. 26). Firstly, a descriptive analysis was developed to consolidate the main statistical measures, including means and standard deviations, for each of the items that constitute the analysed scale. This aimed to discern significant relationships or disparities in information retrieval and processing competence among Spanish and Italian students.

A multivariate analysis of variance (MANOVA) was employed for this purpose, which is grounded in the general linear model. The analysis considered variables such as age, enrolled course, type of received training, time spent on internet browsing, and the location from which browsing occurred,

with the country of origin as a covariate. Bonferroni tests were applied for contrasts, and the Levene test assessed homoscedasticity and normality assumptions.

An inferential analysis of the scale as a whole is also carried out, using a variable created from the mean of the scale items. ANOVA and Student's t-tests were used in this analysis.

Finally, multiple regression models (stepwise) are carried out, with the aim of contrasting the differences detected in the inferential analysis and predicting which variables have a greater explanatory capacity in the competence of use of ICT for information search and processing.

## Participants

The data-producing sample comprises a total of 686 students. Regarding the country of origin, 45.8% are Spanish students, while 54.2% are Italian. The participant identification data are shown by country in Tables 2 and 3.

**Table 2.**

*Distribution of participants by gender and country*

Country			Italy	Spain	Total
Sex	Men	Count	178	77	255
		%	25,9%	11,2%	37,2%
	Women	Count	194	237	431
		%	28,3%	34,5%	62,8%
Total		Count	372	314	686
		%	54,2%	45,8%	100,0%

**Table 3.**

*Distribution of participants by age, enrolled course and country*

Distribution of participants by age and country							
			18 to 20	21 to 23	24 to 26	27 or more	Total %
Country	Italy	Count	112	117	62	81	372
		%	16,3%	17,1%	9,0%	11,8%	54,2%
	Spain	Count	174	102	30	8	314
		%	25,4%	14,9%	4,4%	1,2%	45,8%
Total		Count	286	219	92	89	686
		%	41,7%	31,9%	13,4%	13,0%	100,0%
Distribution of participants by enrolled course and country							
			1°	2°	3°	4°	Total
Country	Italy	Count	163	124	55	30	372
		%	23,8%	18,1%	8,0%	4,4%	54,2%
	Spain	Count	242	4	37	31	314
		%	35,3%	0,6%	5,4%	4,5%	45,8%
Total		Count	405	128	92	61	686
		%	59,0%	18,7%	13,4%	8,9%	100,0%

## Results

The results are presented in different sections: Descriptive analyses (Mean, SD), analysis of differences between countries (MANOVA), analysis of factors associated with the scale (T-test and ANOVA), and multiple regression models (stepwise).

Table 4 outlines student frequencies and percentages related to internet use variables and access methods. Approximately half of the students received training for Web 2.0, while the others did not. Notably, the majority of students own a personal computer with internet access at home, exceeding those with access to a Tablet. Specifically, 58.6% of students use the internet for over nine hours weekly, 33.6% for four to nine hours, and only 7.7% for one to three hours weekly.

**Table 4.**

*Distribution of participants according to internet access and technology use variables*

Have you received training on Web 2.0 or social software?		
	Freq.	%
Yes	307	44,8
No	379	55,2
Place where the training was received		
University	217	31,6
Self-Taught	162	23,6
Private Training	23	3,4
Others	284	41,4
Technological resources available to you		
Computer	679	99
Tablet	368	53,6
Internet at home	676	98,5
Internet connection location		
Home	214	31,2
At friends' homes	3	,4
From the university	17	2,5
From anywhere, as I have internet on my mobile phone.	452	65,9
Internet browsing time		
1 to 3 hours per week	53	7,7
4 to 9 hours per week	231	33,7
More than 9 hours per week	402	58,6

Italian and Spanish university students excel in web browsers and search engines (Table 5). Spanish students lead in collaborative document editing, while Italian students specialize in digital cartography software. Both countries show lower proficiency in QR code application. Italian students also score lower in using social software for collaborative content analysis and reading. Despite some distinctions, the responses from both Italian and Spanish students remain largely similar. Spanish students outperform in collaborative document editing and interactive presentation dissemination, while Italian students excel in digital mapping software. Overall, substantial similarities persist in the responses from both countries.

**Table 5.***Descriptive statistics of the scale Competence in the use of ICT for searching and processing information*

<b>Country</b>		<b>Mean</b>	<b>SD</b>	<b>N</b>
I am able to browse the Internet using different web browsers	Italy	3,87	,451	372
	Spain	3,62	,634	314
	Total	3,72	,579	686
I am capable of utilizing various search engines	Italy	3,80	,564	372
	Spain	3,54	,716	314
	Total	3,64	,670	686
I use digital mapping software to search for locations	Italy	3,47	,826	372
	Spain	3,12	,940	314
	Total	3,27	,911	686
I am proficient in using programs to plan my study schedule	Italy	3,19	,976	372
	Spain	2,66	1,131	314
	Total	2,87	1,102	686
I work with documents on the internet	Italy	3,11	1,056	372
	Spain	3,57	,670	314
	Total	3,39	,877	686
I am capable of organizing, analysing, and synthesizing information through the use of concept maps using some social software tool	Italy	2,16	1,073	372
	Spain	2,33	1,151	314
	Total	2,26	1,122	686
I can use software to distribute interactive online presentations	Italy	2,27	1,077	372
	Spain	2,90	,999	314
	Total	2,65	1,076	686
I feel competent in working with social software tools that assist me in analysing and/or navigating content included in blogs	Italy	1,88	,894	372
	Spain	2,24	1,083	314
	Total	2,09	1,024	686
I work with images using tools and/or social software applications	Italy	2,13	1,105	372
	Spain	2,12	1,019	314
	Total	2,12	1,053	686
I am capable of using podcasting and videocasts	Italy	2,98	1,092	372
	Spain	2,97	,979	314
	Total	2,97	1,025	686
I use QR codes to disseminate information	Italy	1,64	,917	372
	Spain	1,84	,980	314
	Total	1,76	,959	686
Total Scale	Italy	2,77	,560	372
	Spain	2,81	,641	314
	Total	2,79	,609	686

After confirming normality measures through the Levene Test for homoscedasticity and normality, parametric analyses were conducted for most factors. The Multivariate Analysis of Variance (MANOVA) was employed to examine the relationship between the country variable and other factors (age, training location, internet connection, course enrolment, and browsing hours), while controlling for Type I errors. MANOVA is effective for larger sample sizes and allows for simultaneous consideration of multiple dependent variables. All prerequisites for parametric tests were met in this study.

Table 6 shows multivariate test results, including Wilks' Lambda ( $\lambda$ ), p-value, effect size ( $\eta^2$ ), and observed power ( $1-\beta$ ). Significant differences were found only in the item related to working with documents in cloud environments, specifically in relation to the country of origin and enrolled course. No significant differences were found between Italian and Spanish students regarding the location of education and browsing time after conducting post-hoc tests for inter-subject comparisons.

**Table 6.**

*Multivariate analysis of intersections with age, internet connection, training place and age*

<b>Intersection Country* Age</b>	<b><math>\lambda</math> Wilks'</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
	,905	,107	,033	,977
	<b>F</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
I am able to browse the Internet using different web browsers	3,668	,012*	,024**	,800
I am capable of utilizing various search engines	4,239	,006*	,028**	,859
I work with documents on the internet	3,470	,016*	,023**	,775
<b>Intersection Country* Place where the training was received</b>	<b><math>\lambda</math> Wilks'</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
	,934	,622	,023	,870
<b>Intersection Country* Internet connection location</b>	<b><math>\lambda</math> Wilks'</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
	,916	,234	,029	,953
	<b>F</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
I work with documents on the internet	2,884	,037*	,019**	,681
I am capable of using podcasting and videocasts	3,668	,012*	,024**	,800
<b>Intersection Country* Enrolled Course</b>	<b><math>\lambda</math> Wilks'</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
	,945	,305	,028	,857
	<b>F</b>	<b>p-value</b>	<b><math>\eta^2</math></b>	<b>1-<math>\beta</math></b>
I work with documents on the internet	3,634	,013*	,024**	,796

Note.  $p \leq .05$ . Low effect size ( $\eta^2 = .010-.059$ ).

A multivariate analysis on dimension items was conducted, followed by post-hoc tests. The Bonferroni method was used to adjust confidence intervals for intergroup differences. Table 6 shows significant differences in country, age, and three scale items.

When it comes to web browser usage ( $F=3.668$ ;  $p=.012$ ), older Italian students excel ( $M_{IT}=3.82 > M_{SP}=2.88$ ) (Table 7). Regarding the use of various search engines ( $F=4.239$ ;  $p=.006$ ), Italian students, particularly those aged 27 or older, demonstrate more extensive proficiency compared to Spanish students, showing clear disparities ( $M_{IT}=3.86 > M_{SP}=2.75$ ). In working with cloud-based documents ( $F=3.470$ ;  $p=.016$ ), Spanish students aged 18-21 exhibit greater competence than Italian counterparts ( $M_{SP}=3.62 > M_{IT}=2.91$ ), with minimal variations in other age groups. However, Italian students aged 27 or older surpass both Italian and Spanish students in their capacity to work with documents in cloud environments.



**Table 7.***Comparative results Country\*Age*

	Country	Age	Mean	SD
I am able to browse the Internet using different web browsers	Italy	18 to 20	3,85	,456
		21 to 23	3,90	,298
		24 to 26	3,92	,272
		<b>27 or more</b>	<b>3,82</b>	<b>,623</b>
		Total	3,87	,451
	Spain	18 to 20	3,66	,584
		21 to 23	3,60	,628
		24 to 26	3,67	,637
		<b>27 or more</b>	<b>2,88</b>	<b>1,126</b>
		Total	3,62	,634
I am capable of utilizing various search engines	Italy	18 to 20	3,74	,655
		21 to 23	3,77	,581
		24 to 26	3,85	,368
		<b>27 or more</b>	<b>3,86</b>	<b>,530</b>
		Total	3,80	,564
	Spain	18 to 20	3,54	,714
		21 to 23	3,60	,648
		24 to 26	3,58	,654
		<b>27 or more</b>	<b>2,75</b>	<b>1,165</b>
		Total	3,54	,716
I work with documents on the internet	Italy	<b>18 to 20</b>	<b>2,91</b>	<b>1,148</b>
		21 to 23	3,23	,942
		24 to 26	3,08	1,093
		<b>27 or more</b>	<b>3,22</b>	<b>1,045</b>
		Total	3,11	1,056
	Spain	<b>18 to 20</b>	<b>3,62</b>	<b>,617</b>
		21 to 23	3,59	,669
		24 to 26	3,46	,779
		<b>27 or more</b>	<b>2,88</b>	<b>,991</b>
		Total	3,57	,670

Analysing the intersection of country and the primary location for internet access, significant differences emerge in the use of image editing tools or social applications ( $F=2.884$ ;  $p=.037$ ) and proficiency in podcasting or videocasting ( $F=3.668$ ;  $p=.012$ ) (Table 8). Although trends are similar between Spanish and Italian students (Table 9), Spanish students exhibit higher use of podcasting and videocasting platforms when connecting from the university ( $M_{SP}=3.67 > M_{IT}=2.00$ ), while Italian students show a preference for social applications or image editing tools when accessing the internet from their mobile devices ( $M_{IT}=2.26$ ).

**Table 8.***Comparative Results Country\*Internet Connection Location*

	Country	Internet Connection Location	Mean	SD
I work with images using tools and/or social software	Italy	Home	1,87	1,024
		At friends' homes	2,00	,000
		From the university	1,57	,976
		<b>From anywhere, as I have internet on my mobile phone.</b>	<b>2,26</b>	<b>1,128</b>
		Total	2,13	1,105
	Spain	Home	2,28	1,071
		At friends' homes	1,00	.
		From the university	2,00	1,000
		From anywhere, as I have internet on my mobile phone.	2,05	,987
		Total	2,12	1,019
I am capable of using podcasting and videocasts	Italy	Home	2,80	1,128
		At friends' homes	2,00	,000
		<b>From the university</b>	<b>2,00</b>	<b>1,155</b>
		From anywhere, as I have internet on my mobile phone.	3,11	1,048
		Total	2,98	1,092
	Spain	Home	2,98	,960
		At friends' homes	4,00	.
		<b>From the university</b>	<b>3,67</b>	<b>,577</b>
		From anywhere, as I have internet on my mobile phone.	2,94	,992
		Total	2,97	,979

In general, Spanish students excel in using collaborative and cloud-based document tools, irrespective of their year of enrolment. Third-year students demonstrate the highest proficiency ( $M_{SP}=3.85$ ). On the other hand, while both countries have mean values above 3, Italian second-year students tend to use collaborative cloud work less ( $M_{IT}=2.99$ ). Nevertheless, Italian fourth-year students stand out for their increased utilization ( $M_{IT}=3.56$ ) compared to their Spanish peers ( $M_{SP}=3.17$ ).

**Table 9.***Comparative results Country\*Enrolled Course*

	Country	Enrolled Course	Mean	SD
I work with documents on the internet	Italy	<b>First</b>	<b>3,03</b>	<b>1,126</b>
		Second	2,99	1,037
		Third	3,37	,967
		<b>Fourth</b>	<b>3,56</b>	<b>,814</b>
		Total	3,11	1,056
	Spain	First	3,59	,658
		Second	3,25	,957
		<b>Third</b>	<b>3,85</b>	<b>,362</b>
		Fourth	3,17	,816
		Total	3,57	,670

No statistically significant differences were found between Italian and Spanish students regarding the location of received education and browsing time after applying post-hoc tests for inter-subject comparisons.

### ***Variables related to the competence in the use of ICT for searching and processing information***

In order to identify factors associated with the scale measuring competence, the ANOVA and T-test statistic is performed by country. These results will be used as a basis for further regression modelling. The inferential analysis reveals significant differences in five and four variables related to the use of

ICT for information search and processing by Italian and Spanish students respectively. Table 10 shows the results of the significant variables by country.

**Table 10.**

*Inferential analysis of the competence in use of ICT for information search and processing by country*

	Italy			Spain			Trend
	p	t/F	df	P	t/F	df	
<b>Training in Web 2.0<sup>a</sup></b>	,001	3,529	180	,002	3,081	265	Higher competence in those who received training
<b>Internet browsing time<sup>b</sup></b>	,005	3,320	2	,042	2,588	2	Greater competence in students who connect for more than 9 hours a week compared to those who do so for 1 to 3 hours in Italy (p=,02) and 4 to 9 in Spain (p=,48).
<b>Ownership of a Tablet<sup>a</sup></b>	,032	2,162	180	,022	2,303	265	Higher competence in those who own a Tablet
<b>Internet connection at home<sup>a</sup></b>	,043	2,042	180				Greater competence in students who have Internet at home.
<b>Location of Internet connection<sup>b</sup></b>	,001	3,182	3				Greater competence in students who connect from any location compared to those who connect only from home (p=,04)
<b>Enrolled Course<sup>b</sup></b>				,033	3,563	3	Greater competence in students in the third year compared to those in the fourth year (p=,41)

a. T-test; b. ANOVA.

As for the regression study, Tables 11 (Italy) and 12 (Spain) shows the regression models with the variables that acquired a significant effect.

**Table 11.**

*Regression models of factors influencing in use of ICT for information search and processing (Italy)*

Model	Adjusted R <sup>2</sup>	R <sup>2</sup> change	F	Sig. F	Beta	Sig. Beta
<b>1<sup>a</sup></b>	,060	,065	12,453	,001	,254	,001
<b>2<sup>b</sup></b>	,106	,051	11,681	,000	,239 ,226	,001 ,002
<b>3<sup>c</sup></b>	,143	,042	11,089	,000	,237 ,229 ,205	,001 ,001 ,003
<b>4<sup>d</sup></b>	,151	,017	7,433	,000	,219 ,199 ,201 ,095 ,095	,002 ,006 ,004 ,173 ,179

a.Predictors: Training in Web 2.0.

b.Predictors: Training in Web 2.0, Internet browsing time.

c.Predictors: Training in Web 2.0, Internet browsing time, Location of Internet connection.

d.Predictors: Training in Web 2.0, Internet browsing time, Location of Internet connection, Ownership of a Tablet, Internet connection at home.

**Table 12.***Regression models of factors influencing in use of ICT for information search and processing (Spain)*

Model	Adjusted R <sup>2</sup>	R <sup>2</sup> change	F	Sig. F	Beta	Sig. Beta
1 <sup>a</sup>	,031	,035	9,496	,002	,186	,002
2 <sup>b</sup>	,047	,020	7,626	,001	,187 ,142	,002 ,019
3 <sup>c</sup>	,062	,018	6,875	,000	,180 ,133 ,135	,003 ,026 ,024
4 <sup>d</sup>	,059	,000	5,141	,001	,180 ,134 ,135 ,008	,003 ,026 ,025 ,898

a.Predictors: Training in Web 2.0.

b.Predictors: Training in Web 2.0, Ownership of a Tablet.

c.Predictors: Training in Web 2.0, Ownership of a Tablet, Internet browsing time.

d.Predictors: Training in Web 2.0, Ownership of a Tablet, Internet browsing time, Enrolled course.

Model 4 is the one that explains a higher percentage of the variance in the dependent variable with an adjusted R<sup>2</sup> of 15.1%. Thus, all the variables in model 4 are elements that explain competence in the use of ICT for searching and processing information. However, both in the changes in R<sup>2</sup> and in the Beta values it is observed that the last variables introduced do not cause large changes in the variance. Thus, having a Tablet and Internet at home are not so essential in the explanation of competence, with education, time and place of Internet connection being more important.

In Spain (Table 12) the model that explains a higher percentage of the variance is Model 3 (with an adjusted R<sup>2</sup> of 6.2%). This means that of the variables analysed, all of them explain the competence studied, with the exception of enrolled course, since this does not cause significant changes, as can be seen in R<sup>2</sup> and in the Beta values. Although the variable that best explains the competence studied is the training received, the changes in R<sup>2</sup> also do not vary much in the first three models analysed, indicating that having a Tablet and the Internet browsing time have a similar influence on competence.

## Discussion and conclusions

As regards ICT proficiency in information retrieval and processing among university students in Spain and Italy, it should be noted that, in a first descriptive analysis, both countries show remarkably similar trends. This observed similarity can be attributed to the shared cultural and educational-historical characteristics of both nations (Paciaroni, 2018).

Italian and Spanish students demonstrate high proficiency in utilizing web browsers and search engines, primarily due to their foundational importance in digital competence (European Commission, 2019). This proficiency is also influenced by the inherent familiarity of this generation with technology for information retrieval (Liu et al., 2022). Notably, students show lower competence in using QR codes for information dissemination. This may stem from their prevalent role as consumers rather than producers, often using QR codes for information reception rather than distribution (Bonilla-del-Río et al., 2018).

However, a more in-depth analysis shows that there are small differences in some items between countries by age, with Italian students over 27 years old being more proficient in the use of web browsers and search engines than their Spanish counterparts. This finding is in line with previous

research, where age was considered a determining factor (Raggiotto et al., 2023). The place of Internet connection is also relevant, with Spaniards connecting from university showing a higher use of podcasting and videocasting platforms, while Italians connecting from mobile phones make better use of image editing tools and social software. This fact reaffirms the idea that the use of social networks, especially those with images, is very powerful in Italy (Verrastro et al., 2020), as well as the importance of showing other uses of technology at university (Hu et al., 2020). In terms of working with documents on the Internet, there are variations between courses, which may be due to different experiences depending on the subject and teacher they have had.

Regarding the factors associated with the competence in the use of ICTs for searching and processing information among university students from Italy and Spain, it is essential to highlight that no significant disparities are evident with respect to gender and age of the students. Nevertheless, training in Web 2.0 is crucial for attaining competence in information retrieval and processing in both Spain and Italy. Being a digital native doesn't guarantee digital competence, emphasizing the need for targeted training (Pozos-Pérez & Tejada-Fernández, 2018). Also, owning a tablet correlates with higher competence, highlighting the digital divide in resource accessibility (Schroeder, 2018). In Italy, enhanced digital competence is associated with internet access at home and other locations, mobile internet availability, and more than 9 hours of internet usage. Access to the Internet is closely tied to the digital divide, dependent on resource accessibility (Pozos-Pérez & Tejada-Fernández, 2018; Schroeder, 2018). The regression study supports the above findings, with training being relevant, followed by accessibility to both portable electronic devices and Internet connection.

In conclusion, university students from both countries exhibit a robust level of competence in the use of ICTs for searching and processing information. However, it is prudent to encourage and reinforce their role as prosumers (Bonilla-del-Río et al., 2018). To further enhance this competence among university students in Italy and Spain, an emphasis should be placed on Web 2.0 training, coupled with the assurance of universal and unrestricted access to digital resources. Universities can enhance the development of this competency by fostering creative and communicative skills, concurrently fostering accessibility to devices and internet connectivity. This approach would significantly contribute to the reduction of the digital divide amongst citizens (Wang et al., 2021).

## References

- Ascencio-Ojeda, P., Glasserman-Morales, L., & Quintana-Albalat, J. (2019). Digital Competences: Reality of students starting university life. *Digital Education Review*, 36, 68-84. <https://doi.org/10.1344/der.2019.36.68-84>
- Bisquerra, R. (2016). *Metodología de la investigación educativa*. La Muralla.
- Bonilla-del-Río, M., Diego-Mantecón, J.M., & Lena-Acebo, F.J. (2018). Estudiantes Universitarios: prosumidores de recursos digitales y mediáticos en la era de internet. *Aula Abierta*, 47(3), 319-326. <https://doi.org/10.17811/rifie.47.3.2018.319-326>
- Brown, M., McCormack, M., Reeves, J., Brooks, C., Grajek, S., Bryan Alexander, B., & Bali, M. (2020). *2020 EDUCAUSE Horizon Report: Teaching and Learning Edition*. EDUCAUSE. <https://www.learntechlib.org/p/215670/?nl=1>
- Bustamante, G., Jaramillo-Castro, O., & Piña-Araya, R. (2019). Competencias mediáticas para periodistas en tiempos de infoxicación. *Latin American Journal of International Affairs*, 9(2), 84-92. <https://www.lajia.net/lajia/article/view/92>

- Council of Europe. (2015). *Digital Citizenship Education Project. Steering Committee for Educational Policy and Practice*. Council of Europe. <https://www.coe.int/en/web/digital-citizenship-education/digital-citizenship-education-project>
- Erlangga, D.T. (2022). Student Problems in Online Learning: Solutions to Keep Education Going on. *Journal of English Language Teaching and Learning*, 3(1), 21-26. <https://doi.org/10.33365/jeltl.v3i1.1694>
- European Commission. (2019). *The Digital Competence Framework 2.0*. European Commission. <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>
- From, J. (2017). Pedagogical Digital Competence—Between Values, Knowledge and Skills. *Higher Education Studies*, 7(2), 43-50. <https://eric.ed.gov/?id=EJ1140642>
- Galuppo, L., Ripamonti, S., & Benozzo, A. (2022). University teachers and students in the pandemic. *QWERTY*, 17(2), 67-83. <https://doi.org/10.30557/QW000058>
- Grande-De-Prado, M., Cañón-Rodríguez, R., & Cantón-Mayo, I. (2018). Competencia digital y tratamiento de la información en futuros maestros de Primaria. *Educatio Siglo XXI*, 34(3), 101-118. <https://doi.org/10.6018/j/275961>
- Guillen-Gámez, F., & Mayorga-Fernández, M.J. (2020). Quantitative-comparative research on digital competence in students, graduates and professors of faculty education: An analysis with ANOVA. *Education and Information Technologies*, 25(5), 4157-4174. <https://doi.org/10.1007/s10639-020-10160-0>
- Liu, S., Xu, B., Zhang, D., Tian, Y., & Wu, X. (2022). Core symptoms and symptom relationships of problematic internet use across early, middle, and late adolescence: a network analysis. *Computers in Human Behavior*, 128, 107090. <https://doi.org/10.1016/j.chb.2021.107090>
- Llorent-Vaquero, M., Tallón-Rosales, S., & De las Heras, B. (2020). Use of Information and Communication Technologies (ICT) in Communication and Collaboration: A Comparative Study between University Students from Spain and Italy. *Sustainability*, 12(10), 3969. <https://doi.org/10.3390/su12103969>
- Lopez-Gil, K., & Sevillano-García, M.L. (2020). Development of digital skills of university students in informal learning contexts. *Educatio Siglo XXI*, 38(1), 53-78. <https://doi.org/10.6018/educatio.413141>
- Lopez-Meneses, E., Sirignano, F.M., Vazquez-Cano, E., & Ramirez-Hurtado, J.M. (2020). University students' digital competence in three areas of the DigCom 2.1 model: A comparative study at three European universities. *Australasian Journal of Educational Technology*, 36(3), 69-88. <https://doi.org/10.14742/ajet.5583>
- Ovcharuk, O. (2020). Current Approaches to the Development of Digital Competence of Human and Digital Citizenship in European Countries. *Information Technologies and Learning Tools*, 76(2), 1-13. <https://doi.org/10.33407/itlt.v76i2.3526>
- Paciaroni, L. (2018). Gli studi sul patrimonio storico-educativo in spagna e in italia. Due realtà a confront. *History of Education and Children's Literature*, 13, 521-526. <http://digital.casalini.it/10.1400/266704>
- Pettersson, F. (2018). "On the issues of digital competence in educational contexts – a review of literature." *Education and Information Technologies*, 23(3), 1005-1021. <https://doi.org/10.1007/s10639-017-9649-3>

- Pozos-Pérez, K., & Tejada-Fernández, J. (2018). "Digital Competences in Higher Education Faculty: Levels of Mastery and Training Needs." *Revista Digital de Investigación en Docencia universitaria*, 12(2), 59-87. <https://doi.org/10.19083/ridu.2018.712>
- Raggiotto, F., Mazzoni, E., Benassi, M., Panesi, S., Vacondio, M., & Filippi, S. (2023). Mind the Age Gap! How Problematic Internet Use Affects Adults' and Emerging Adults' Well-Being and Prosocial Consumer Behavior. *Journal of Interactive Marketing*, 58(23), 268-279. <https://doi.org/10.1177/10949968231155803>
- Rodriguez-García, A.M., Fuentes-Cabrera, A., & Moreno-Guerrero, A.J. (2019). "Competencia digital docente para la búsqueda, selección, evaluación y almacenamiento de la información." *Revista Interuniversitaria De Formación Del Profesorado*, 94, 235-250. <https://doi.org/10.47553/rifop.v33i3.73200>
- Schroeder, R. (2018). Towards a theory of digital media. *Information, Communication & Society*, 21(3), 323-339. <https://doi.org/10.1080/1369118X.2017.1289231>
- Senkbeil, M., Marten Ihme, J., & Schoeber, C. (2019). Are first-semester and advanced university students ready for life and work in the digital world? Results of a standard setting method to describe ICT-related proficiency levels. *Zeitschrift Fur Erziehungswissenschaft*, 22(6), 1359-1384. <https://doi.org/10.1007/s11618-019-00914-z>
- Tobías, A. (2020). Evaluation of the lockdowns for the SARS-CoV-2 epidemic in Italy and Spain after one month follow up. *Science of the Total Environment*, 10(725), 138539. <https://doi.org/10.1016/j.scitotenv.2020.138539>
- Verrastro, V., Liga, F., Cuzzocrea, F., & Gugliandolo, M. C. (2020). Fear the Instagram: beauty stereotypes, body image and Instagram use in a sample of male and female adolescents. *QWEERTY*, 15(1), 31-49. <https://doi.org/10.30557/QW000021>
- Hu, S., Laxman, K., & Lee, K. (2020). Exploring factors affecting academics' adoption of emerging mobile technologies-an extended UTAUT perspective. *Education and Information Technologies*, 25, 4615-4635. <https://doi.org/10.1007/s10639-020-10171-x>
- Wang, X., Zhuo W., Qiyun W., Wenli C., & Zhonling P. (2021). Supporting digitally enhanced learning through measurement in higher education: Development and validation of a university students' digital competence scale. *Journal of Computer Assisted Learning*, 37(4), 1063-1076. <https://doi.org/10.1111/jcal.12546>