

## Implementation of ICT Tools in Post-pandemic Schools in Spain: Language Teachers' Perceptions

### Implementación de herramientas TIC en centros educativos españoles tras la pandemia: percepciones del profesorado de lenguas

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#### Abstract

*The present study, focused on Spanish language teachers, pretends to determine how ICT implementation has evolved after confinement, when teaching returned to being face to face or hybrid. The objectives are knowing which have been the most applied ICT tools and their real use; learning about teachers' perceptions of their digital skills, and their satisfaction degree with online teaching; identifying teachers' attitudes towards a future ICT implementation, and finally, elaborating a multiple regression model of analysis to determine the relationship between the last two objectives with teachers' years of experience and teachers' opinion on post-pandemic ICT use. Accordingly, an ad hoc questionnaire was applied, receiving 700 answers. Among other things, findings indicate a higher frequency of use of those digital tools that allow instant messaging, facilitate collaborative networks, promote interaction, and store data. They also show that teachers' perceptions on their technological competence and ICT utilisation in post-pandemic scenarios is rather low, although they say they will continue using these tools in the future. In conclusion, there is an imperative necessity to reinforce pre-service and in-service teachers' digital training, with the aim of improving this situation. This urgency had already been highlighted in previous studies, and became clearly evidenced not only during lockdown, but after that period too.*

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*Keywords:* ICT enhancement; teachers' perceptions; post-pandemic; language teachers.

### Resumen

*El presente estudio, dirigido al profesorado de lenguas de toda España, pretende determinar cómo la implementación de las TIC ha evolucionado después del confinamiento, cuando la enseñanza volvió a ser presencial o híbrida. Sus objetivos se centran en saber cuáles han sido las herramientas TIC más utilizadas y su uso real; conocer las percepciones del profesorado sobre sus competencias digitales, y su grado de satisfacción con la enseñanza online; identificar las actitudes de los y las docentes hacia una futura implementación de las TIC, y finalmente, elaborar un análisis de regresión múltiple para determinar la relación entre los dos últimos objetivos, los años de experiencia del profesorado y su opinión sobre el uso de las TIC tras el confinamiento. Para ello, se aplicó un cuestionario ad hoc que recibió 700 respuestas. Los resultados indican, entre otras cosas, una mayor frecuencia de uso de aquellas herramientas digitales que permiten la mensajería instantánea, facilitan las redes de colaboración, y promueven la interacción y almacenan datos. También muestran que la percepción del profesorado sobre su competencia tecnológica y la utilización de las TIC es más bien baja, aunque afirman que seguirán utilizándolas en el futuro. En conclusión, existe una necesidad imperiosa de reforzar la formación digital de los y las docentes en formación y en activo, con el propósito de mejorar esta situación. Esta urgencia ya se había puesto de manifiesto en estudios anteriores, y se ha evidenciado con claridad, no sólo durante el confinamiento, sino también después de ese período.*

*Palabras clave:* refuerzo de las TIC; percepciones docentes; post-pandemia; profesores de lenguas.

### Introduction and objectives

After the crisis caused by COVID 19 pandemic outbreak, many social sectors had to adapt to new scenarios in order to continue their development. One of the areas that had to evolve more precipitately was education. In this sense, schools' lockdown meant an ICT massive and sudden integration in learning environments. Later, when schools reopened, the teaching scenario was forced to change radically again to continue with the teaching-learning processes (Sofianidis et al., 2021) regardless of the possible instructing contexts (online, face-to-face or hybrid). This transformation occurred in a very short time and produced the modification of structures that involved and affected the entire educational community (Gourlay, 2021) Extensively, this evolution had an impact on social relations and work environments (Fernández-Batanero et al., 2021). The continuance of teaching was undoubtedly preserved thanks to ICT implementation when face-to-face instruction was not possible in any respect whatsoever (Almazán, 2020; Cáceres-Piñaloza, 2020; Rodríguez-Olay & Nadal, 2021; Mishra, 2020; Vivanco-Saraguro, 2020), and the implementation of new approaches to support the teaching-learning process was indispensable (Meletiyou-Mavrotheris et al., 2022). Educational technology required, more than ever, of an urgent adaptation to the new academic context, in which not only did the way of teaching have to be modified, but also the way of learning (Argudo & Tenecela, 2020).

## Online teaching and digital skills

Online teaching during school closure revealed rather negative effects on teachers, such as fatigue and anxiety, mostly due to their lack of specific digital training (García-Sampedro et al., 2021) and an undeniable increasing workload. At the beginning of confinement, teachers' attitude towards ICTs was quite positive, however, this perspective evolved, because, in many cases, they were not able to perceive these new tools full potential (Sofianidis et al., 2021). For this reason, not only did teachers suffer from this digital skills absence, but also students and families (Arriagada, 2020).

As it has been previously suggested in various reports from the European Commission [EC], (2012; 2013; 2014; 2020) and United Nations Educational, Scientific and Cultural Organization [UNESCO], (2008; 2011; 2013; 2018), it is necessary to generate current digital literacy proposals to improve 21st century citizens' technological skills (Fueyo et al., 2018), focusing on teachers' strategies and methodologies improvement (García-Sampedro et al., 2021) to implement ICTs more efficiently in the educational contexts (Pozo et al., 2021; Zalat et al., 2021).

Educational technology had already been considered an indispensable tool in past decades (Frau-Meigs & Torrent, 2009; Jonassen, 2006; Jonassen & Carr, 1998; Lajoie, 2000) although the use of digital tools depends, to a large extent, on teachers' involvement (Cabero & Marín, 2014). If teachers remain uninterested in ICTs, incorporating digital tools into classroom daily life will be a fairly arduous task to be accomplished. In this regard, Inan & Lowther (2010) suggested promoting a change in teachers' role, who would become guides in the teaching-learning processes, facilitating students' critical and reflective ICT use (Ruiz & Hernández, 2018).

## Objectives

The fundamental role of teachers in the development and implementation of ICTs in teaching-learning processes during schools' closure and schools' reopening, makes, more necessary than ever, an extensive study of their learned experiences and detected needs regarding their ICTs use with professional purposes.

Consequently, it would be desirable to know schoolteachers' perceptions about ICT implementation in post-pandemic, when teaching became face-to face again, or in some cases, blended. It would also be crucial to know their satisfaction about online teaching-learning processes in post-lockdown period contexts, when schools reopened, but some students had to remain at home due to quarantine obligations; when teachers had to combine face-to face teaching with online teaching due to schools' organizational processes, or when classrooms had to be temporarily closed once again due to the rise in Covid-19 infection cases. Hence, the objectives of this study are to identify the ICT tools employed and their use; to learn about teachers' perceptions on their digital skills and their satisfaction degree with online teaching; to know if teachers are interested in continuing with ICT tools implementation in the near future, and finally, to analyse the relationship of the last two mentioned objectives (teachers' perceptions about their own digital competence, and their satisfaction degree with online teaching; identifying teachers' interests and attitudes towards a future generalised ICT implementation) with teaching experience and teachers' opinion on ICT use in post-pandemic.

## Method

The research followed the quantitative paradigm, applying an *ad hoc* online questionnaire designed and implemented for the purpose. Afterwards, the analysis of the data and a multiple regression analysis model were developed.

### Population and sample

The sample of the study is composed by language teachers from different educational stages: pre-school, primary, secondary, upper-secondary, and vocational training. Additionally, language teachers from art schools and language schools, also participated in the study sharing pandemic and post-pandemic professional challenges such as the change of scenarios, methodologies, and tools.

The type of sampling was incidental or non-probabilistic. It was made up of 700 language teachers from all over Spain, being 25.33% (N = 175) men and 74.67% (N = 516) women. The average number of years of experience was 17.54 (D.T. = 10.16) (three teachers have less than one year of work experience, and one teacher has been working for forty-four years). Besides, 15.14% (N = 106) teach in Pre-school Education stage (PSE); 19.71% in Primary Education stage (PE) (N = 138); 18.57% (N = 130) in Compulsory Secondary Education (CSE); 26.29% (N = 184) in Upper Secondary Education (USE); 9.00% (N = 63) in Vocational Training (VT) and 11.29% (N = 79) in other educational stages (OTHERS). Finally, 67.57% (N = 473) of these teachers work for state schools and 32.43% (N = 227) are employed at private schools. (See Table 1).

Table 1

*Sociodemographic data.*

700 language teachers		
Gender	Men	25.33% (N = 175)
	Women	74.67% (N = 516)
Years of experience	17.54 (D.T. = 10.16)	
	(three teachers have less than one year of work experience, and one teacher has been working for forty-four years).	
Educational Stages	Pre-school Education	15.14% (N = 106)
	Primary Education	19.71% (N = 138)
	Compulsory Secondary Education	26.29% (N = 184)
	Upper Secondary Education	18.57% (N = 130)
	Vocational Training	9.00% (N = 63)
	Other educational stages	11.29% (N = 79)
Type of School	State	67.57% (N = 473)
	Private	32.43% (N = 227)

## Instrument

The online (Microsoft Forms) questionnaire was thought to collect information on language teachers' ICT employment in post-pandemic and was validated in a previous study and adapted to this current research (García-Sampedro et al., 2021).

It is composed by a 10 items Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) and measures ICT teachers' use in post-pandemic opinion. In order to design the questionnaire, psychometric guidelines such as American Educational Research Association, American Psychological Association & National Council on Measurements in Education (2014) and International Test Commission [ITC], (2005) were followed. Besides, pertinent studies (Downing & Haladyna, 2006; Fonseca-Pedrero & Muñiz, 2017; Fonseca-Pedrero & Muñiz, 2019; Hernández et al., 2010) were considered for the items design.

To know the dimensionality of the scale, an Exploratory Factor Analysis (EFA) with a maximum likelihood estimation was implemented. These results indicated an essential one-dimensional scale, since the first factor explains 21.12% of the total variance; the items show factor loadings greater than .20. The reliability of the instrument was measured using Cronbach's Alpha, with a score of 0.71, presenting items with values higher than .20 on the discrimination indexes.

## Procedure and data analysis

This online questionnaire was elaborated in Microsoft Forms and distributed through e-mail and teachers' social groups in networks such as WhatsApp and Twitter. These networks were included as a tool because of their immediacy, resulting of a great interest for the research. Teachers were also informed about the researchers' commitment about confidentiality and anonymity. Later, the data was analysed as detailed below.

The variables used in the analyses are: "ICT tools and its usage"; "Digital Skills" (teachers' self-perception on their own digital skills) assessing their competence as insufficient, sufficient, notable and outstanding; "Satisfaction" (the satisfaction degree with online teaching in the "new normal") measured on a scale between 1 and 5, where 1 means not at all satisfied and 5 means totally satisfied; "Future" (the interest in using these technological resources in future) measured on a scale of 1 to 5, where 1 means little interest and 5 means a lot of interest; "Teaching experience" (teachers' years of experience), and "ICT-Post-Pandemic opinion" (teachers' opinion on ICT use in post-pandemic). This last variable was collected through a one-dimensional scale including the following items: on-line education effectiveness; teachers' workload; emotional connection with students; economic costs; students with special needs; students' preferences, and finally, assessment.

Therefore, "ICT tools and its usage" are nominal variables; "Digital Skills", "Satisfaction", and "Future" are ordinal variables. Meanwhile, "ICT-post-pandemic opinion" is a quantitative variable. Additionally, demographic, and professional variables were also included.

All the analyses were carried out with a confidence level of 95% and were developed with the IBM SPSS program (version 20), except for the multiple regression analysis

that was done through Mplus 5 (Muthen & Muthen, 2012) and G\*power 3. (Sandoval, 2020) to calculate the effect size.

## Results and discussion

### Findings

Regarding the first objective, the next table (Table 2) shows that the most frequently used ICT tools were Teams (57,43%) and WhatsApp (53,71%). They were mainly applied to interact with students (82%), to store data (73,29%), to explain contents (71,86%), to make presentations (63,57%), to create video-tutorials (54,14%), and to design interactive questionnaires (50,71%).

Table 2

*ICT tools and its usage.*

Digital tools	Tasks		N	%	
	N	%			
Whatsapp	376	53.71	445	63.57	
Telegram	31	4.43	379	54.14	
Teams	402	57.43	513	73.29	
Campus FP distancia	14	2.00	254	36.29	
Classroom	219	31.29	145	20.71	
Google meet	195	27.86	30	4.29	
G-suite	63	9.00	109	15.57	
Wordpress	21	3.00	355	50.71	
Others	234	33.43	Social networks	143	20.43
			Knowledge generation platforms (Moodle)	253	36.14
			Content explanation	503	71.86
			Interaction with students	574	82,00
			Assessment	342	48,86

Descriptive statistics of the variables are shown in Table 3. Analyses were developed to identify any case of outliers using box-plot diagrams, and to check that the skewness and kurtosis statistics were within a range from  $-1$  to  $1$ . The box-plot diagrams did not indicate the presence of atypical values, although in the case of POST-PANDEMIC OPINION, four outlier cases were found, and these were replaced by the mean value.

Table 3

*Descriptive statistics of the variables.*

			Skewness		Kurtosis	
	M	S.D.	Statistic	SE	Statistic	SE
Teaching Experience*	17.54	1.16	.13	.09	-.92	.18
Digital Skills**	2.48	.80	.05	.09	-.47	.18
Using technological resources in future**	3.71	1.18	-.51	.09	-.67	.18
Satisfaction**	2.86	1.06	-.03	.09	-.61	.18
ICT-Post-Pandemic opinion*	2.14	.58	.35	.09	-.29	.18

\*quantitative variables; \*\*ordinal variables; M: Mean; SD: standard deviation; SE: standard error.

Table 3 columns represent the mean values of Skewness (Mean, Standard deviation, Statistic and Standard error) and Kurtosis (statistic and standard error). In the rows, the overall results of the five variables are presented: Teaching experience, Digital skills, Future, Satisfaction, and ICT-Post-Pandemic opinion.

Regarding the second objective, the valuation means about the “ability to use digital tools” is 2.48, a score that is considered low (maximum is 5); and “satisfaction with online teaching in post-pandemic” is an average of 2,86 (maximum 5). Concerning the third objective, the possibility of “extending the use of ICT resources in future” is medium-high 3,71 (maximum is 5).

In connection with the fourth objective, the variables used in the multiple regression analysis are, on the one hand, those that have been analysed previously, such as teachers’ satisfaction and self-perception on their digital skills, and their attitude and interest in extending ICT use in their future practice. On the other hand, there are added variables for this objective such as years of teaching experience and the average score obtained on the questionnaire Likert scale about ICT teachers usage opinion in post-pandemic.

The score has included the average obtained in the questionnaire about teachers’ opinion on ICT use in post-pandemic, which is rather low 2.14 (maximum 5). The multiple regression analysis was made using all these variables. It was elaborated using the correlation analysis results and multiple linear regression.

The results obtained through rho Spearman correlations indicate statistically significant scores between a favourable opinion about ICT use in post-pandemic (ICT-

POST-PANDEMIC OPINION) with other variables such as years of teaching experience (TEACHING EXPERIENCE) ( $p < .05$ ), the ability to manage ICT tools (DIGITAL SKILLS) ( $p < .001$ ), the belief that they will continue using these resources in future (FUTURE) ( $p < .001$ ) and the degree of satisfaction with online teaching (SATISFACTION) ( $p < .001$ ). In turn, satisfaction shows statistically significant correlations with self-perception in ICT tools management ( $p < .001$ ) and with their probable future use ( $p < .001$ ). In addition, these two variables show statistically significant relationships ( $p < .001$ ). Finally, we found statistically significant but negative correlations between the ability to handle ICTs and the years of teaching experience ( $p < .05$ ).

As it can be seen in the previous analyses, language teachers' perceptions about online instruction after confinement show statistically significant relationships amidst the different variables analysed.

Table 4

*Correlation matrix between variables.*

	Teaching experience	Digital Skills	Future	Satisfaction	ICT-Post-Pandemic opinion
Teaching experience	1.00	-.20**	.07	.04	.08*
Digital Skills		1.00	.25**	.28**	
Using technological resources in future			1.00	.43**	.27**
Satisfaction				1.00	.47**
ICT-Post-Pandemic opinion					1.00

\*Correlation is significant at 0,05 (bilateral). \*\* Correlation is significant at 0.01 level (bilateral)

Table 4 columns represent five variables (Teaching experience, Digital skills, Future, Satisfaction, and ICT-Post-Pandemic opinion). Rows show the same variables to establish a correlation among all of them.

The statistically significant correlations between the variables present large effect sizes  $\geq .50$  or medium  $\geq .30$  (Cohen, 1988).

All the information summarized in Table 4 indicates that the 5 variables are all correlated with each other, either directly or indirectly through other variables, such as TEACHING EXPERIENCE and FUTURE through DIGITAL SKILLS.

Since the main objective is to explain teachers' post-pandemic opinion, it is natural to propose a multiple regression model for the ICT variable. So that, this regression model about online teaching and ICT use in post-pandemic explains 23,30% of the total explained variance (adjusted R2), and it is significant [F (4, 699) =54,15;  $p < .001$ ]. SATISFACTION is shown to be the only significant variable ( $p < .001$ ), so satisfaction is a predictor of ICT-POST-PANDEMIC OPINION.



Table 5

Multiple regression model of ICT-POST-PANDEMIC OPINION.

	B	$\beta$	t	p-value
(Constant)	1.21	-	14.04	.000
Future	.02	.05	1.24	.21
Digital Skills	.03	.04	1.22	.22
Satisfaction	.25	.44	11.87	.000
Teaching experience	.00	.07	1.96	.06

B: unstandardized coefficients;  $\beta$ : standardized coefficients. t: T-statistic.

Table 5 columns represent the mean values of unstandardized and standardized coefficients, T-statistic and p-value. The results indicate that TEACHING EXPERIENCE increases, the ICT POST-PANDEMIC OPINION by .07, however, it is not statistically significant. The case of the variable SATISFACTION is more remarkable and significant. For every point that satisfaction increases, the ICT POST-PANDEMIC OPINION increases by .44 points.

As mentioned above, the multiple regression model indicates that SATISFACTION is the predictor variable that best explains ICT POST-PANDEMIC OPINION. However, even if the other three variables are not significant, it should be noted that this does not mean that they do not influence ICT when, in fact, the opposite occurs. In Table 3, it was shown that all the variables were directly or indirectly related to each other, so the multiple regression model shows that SATISFACTION is the variable that, encompassing the other three, predicts ICT POST-PANDEMIC OPINION better.

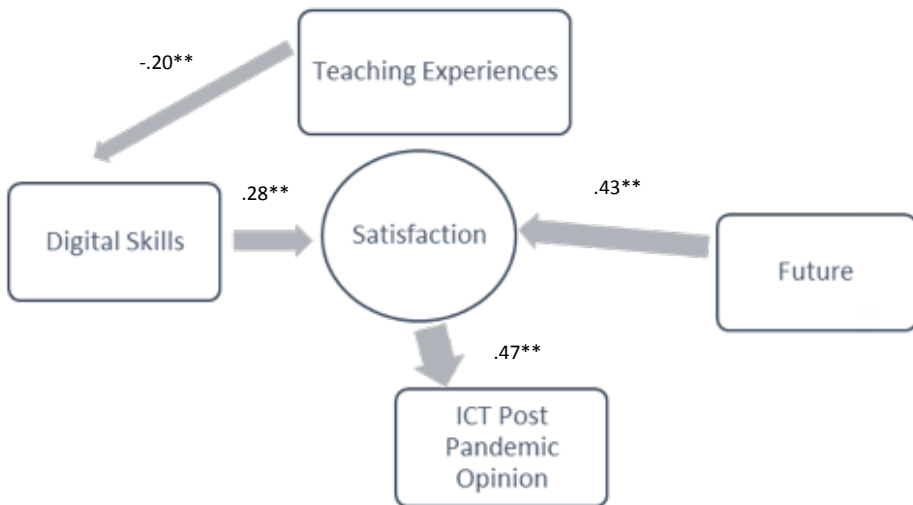


Figure 1. Multiple regression model overview

Figure 1 shows the relationship amidst the variables FUTURE, TEACHING EXPERIENCE and DIGITAL SKILLS with SATISFACTION, which is the variable that predicts ICT POST-PANDEMIC OPINION. The relationship is given by correlation coefficients that are statistically significant according to standardized statistics.  $p < .001^{**}$  or  $p < .05^{*}$ .

In short, it can be said that teachers' ICT post-pandemic opinion will be conditioned by their level of satisfaction, which, in turn, will depend on their digital skills, their teaching experience, and their willingness to use ICT in future. Furthermore, satisfaction increases in teachers who think that ICTs are useful and easy to be applied, and who will employ ICT in future.

On the one hand, there are teachers with little experience, with a good command of technology and who are aware of ICT relevance and usefulness in future. These people are satisfied with ICT use, as proved in the analysis, and have a better opinion of them. On the other hand, there is a totally opposed profile presenting experienced teachers with scarce technological skills and a lack of interest in using ICT in the future. These teachers are not satisfied with ICT, which has a negative impact on their ICT post-pandemic opinion.

In view of the correlation matrix results, it may be said that the 5 variables studied were somehow related to each other. In particular, the variable SATISFACTION is the one that, considering the variables FUTURE, TEACHING EXPERIENCE, SATISFACTION and DIGITAL SKILLS, best predicts ICT POST-PANDEMIC OPINION. The multiple regression model that provides this result, together with the significant correlation coefficients, makes it possible to differentiate two teacher profiles.

## Discussion

Schools' lockdown and the following period, may be considered as a phase of "cultural transition" (Angeli, 2005, 68). Teachers have not been equally trained, and consequently, they are not similarly skilled in order to cope with digital conversion. This transformation evolved from face-to-face teaching to a totally or partially online instruction; and later, to a blended type. In this regard, the European Commission has proposed a new Digital Education plan that will help provide keys for future generations training, paying attention not only to teachers, but also to students (EC, 2020).

In this post' pandemic virtual context, teachers have actively accelerated their own ICT implementation process by applying teaching strategies that had not been developed until then (Sandoval, 2020). It should be convenient to continue with these processes as an opportunity to promote flexible educational models (Villafuerte, 2019) to generate new spaces for educational innovation.

This study findings, related to the proposed objectives, lead to a series of conclusions that might also be considered as future research lines. They indicate that COVID-19 pandemic has generated a remarkable change in the use of ICTs, being Microsoft Teams (to create collaborative work networks) the most frequently applied tool, followed by WhatsApp (instant messaging). Previous studies such as Giraldo et al. (2021) developed in Spain during confinement, also proved that WhatsApp, together with Facebook and YouTube, were the most utilised ICT tools in the field of medical education, because

of their friendliness, immediacy, and convenience of use. In this sense, and according to Olugbade & Olurinola (2021), teachers from Nigerian schools also presented a very positive attitude to the use of Microsoft Teams as a communicative and interactive platform that facilitates tasks completion and assessment. On the other hand, Yildirim & Güler (2021) explore students' perceptions on the use of the same tool in Turkey and concludes that Microsoft Teams is a helpful tool to establish bidirectional interaction amidst teachers, students or teachers and students.

Teachers express a positive perception towards online teaching in post-pandemic, however, they also feel that their ability to use digital tools is scarce. Generally speaking, teachers' self-perception about ICT utilisation can be related to digital tools usage more than about their pedagogical application (Almerich et al., 2011). Similarly, studies by Peirats et al., (2018) and Cotino (2021) reassure the same idea: the use of digital resources requires methodological and technological skills that not all the Spanish teachers have. They also stress the need for specific pedagogical training on ICT in to learn how to design, select or adapt these resources and materials to different classroom needs (García-Sampedro et al., 2018).

Sandoval (2020) analysed the new teachers' role and the use of ICTs in pandemic from a pre-school and primary schools teaching staff and families' point of view in Colombia. Additionally, in Turkey, Mazman (2019) revised primary and secondary teachers' personal innovativeness effects on their technology acceptance. Both conclude that more than two thirds of the teachers considered themselves scarcely digital skilled admitting a very low innovativeness impulse and remarking the increasing workload.

García-Sampedro et al. (2021) also studied teachers' perceptions on online teaching during lockdown and revealed the following aspects: an increasing extra workload for teachers, an additional economic cost not only for teachers, but for families, too, and some emotional problems derived from the lack of physical and emotional connection both for teachers and students. All these aspects had a deep impact in teachers' performance and ICT implementation and management.

Teachers' perception about their own digital competence was low but has improved slightly after school reopening. Teachers have been persuading themselves about the importance of ICT implementation in their teaching practice (Angeli, 2005; Barger, 2020). Besides, teachers do express and recognize ICT potential and the imperious necessity to receive specific training to use them efficiently (Condie & Munro, 2007) and creatively (García-Sampedro et al., 2021)

In this regard, the study by Gudmundsdottir and Hatlevik (2018) explains that teachers' digital competence is increasingly more relevant in a reality where digital resources and media are part of daily educational practice. They also explore newly qualified teachers' ICT self-efficacy in Norway and come to the conclusion that these teachers have received a fairly poor quality ICT training during their teacher education. Baturay et al. (2017) also agree in their study that one of the things that mostly helps improve teachers digital competence is computers daily use.

In this study, teachers' satisfaction degree with the use of ICT presented medium results. In other research by Alves et al. (2020) developed in Portugal, teachers' satisfaction was also measured obtaining moderate results in general, too.

On the other hand, the degree of interest on using ICT tools in the future is medium high. In this sense, the study by Castro et al. (2021) found that teachers' future expectations about the use of ICT are focused on the need for training and technological literacy.

With regard to the relationship between the use of ICT and the years of professional experience, it was revealed that newly-incorporated teachers and in-training teachers assume ICT training and digital skill development as one indispensable factor for their own instruction. This makes this group of age very favourable to be trained and to self-incorporate digital teaching tools in their practice. The regression analysis also allows to obtain a more global vision of how teachers' attitudinal variables towards ICTs influence the way of understanding new technologies in post-pandemic. In short, those teachers who perceive themselves as more digitally skilled, more experienced, more willing to introduce new technologies in their methodologies, and more satisfied with online teaching, are those who have a more positive perception about ICT use in post-pandemic. Consequently, they are the ones that may adapt themselves more easily to these contexts alternating periods of face-to-face and online teaching, or simultaneously applying both types of teaching in the same classroom group.

Martos et al. (2016) confirm that regarding age, teachers between 26-35 years obtain a higher score in ICT tools management compared to those who are older. Likewise, those under 25 years of age obtain a higher score in general ICT skills dimensions with respect to those who are over 36 years of age. These findings coincide with other studies developed in Spain that show greater ICT knowledge in favor of younger teachers and with this present study results in which there is a significant but negative relationship between self-perception in digital competence and the years of experience.

In this sense, some research by Falcó (2017); Fernández et al. (2018), and Padilla (2018) agree with the idea that age is a relevant and influential factor in education, especially in the 21st century, bearing in mind that teachers' average age is very high in Spain. This aspect has an impact on the way teachers face increasingly techno-updated schools and present-day technological resources. However, Falcó (2017) also indicates that factors such as gender or age, among others, do not influence the level of digital competence that teachers may have, but this competence is more related to a personal component and professional commitment. On the other hand, López-Belmonte et al. (2019) state that, the new students' generations show great adaptability and technological mastery towards ICTs, what denotes a more and more precocity in school ages. However, teachers, do not have the necessary digital skills to teach these students. Similarly, Cabero & Ruiz-Palmero (2017) think that the digital gap between teachers and students is becoming increasingly visible, mainly because they belong to different generations.

## **Conclusions**

In conclusion, it should be said that there is an imperative necessity for reinforcing Spanish pre-service and in-service teachers' digital training to try to overcome this situation. This urgency had already been highlighted in previous studies on the matter (Pozo et al., 2021; Vivanco-Saragudo, 2020), and became evident, not only during Spanish confinement, but afterwards, too. Fardoun et al. (2020) agree with this conclusion

explaining that this transformation, especially in teachers, is essential to develop digital and didactic skills in distance and online education modalities.

Finally, this study presents some limitations. In the first place, the sample, despite of being large and significant, does not establish comparative parameters amidst teachers from different regions. A similar analysis about university teachers' perceptions on ICT use in post-pandemic would also complement this research, bearing in mind that both educational contexts, schools, and universities, present some common characteristics and a wide variety of differences (Valverde et al., 2010).

In any case, and as it was above-mentioned, these study limitations also represent a starting point for future analyses and point to new lines of research.

### Funding

This article is linked to the European project: Open Innovative Resources for Distance Learning (OIR) (2020-1-PLO1-KA-226 H6). Additionally, it is also related to the University of Oviedo project: Generación, Uso y Evaluación de Recursos Didácticos Online (UNOV-21-RLD-UE-5).

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Fecha de recepción: 20 de marzo de 2023.

Fecha de revisión: 16 de mayo de 2023.

Fecha de aceptación: 3 de octubre de 2023.