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The Generational Digital Gap within Dual Vocational Education and Training Teachers

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Abstract: In our current society, Digital Competence is an essential and basic competence for teachers. The students need trained teachers who know how to use Information and communication technologies (ICTs) and develop them into pedagogy. However, some of them do not know how. This phenomena is called "The generational digital divide", which occurs when teachers do not have sufficient digital or technological skills or do not adapt to them. This article aims to determine whether the age of teachers has an influence on their knowledge about Information and Communication Technologies. The objective is to detect if there really exists a digital gap between generations, specifically in Dual Vocational Education Training, a kind of education which has been growing in the recent years. To do so, a study with a quantitative and descriptive method has been carried out, with the participation of 1.568 teachers of this training modality in the Autonomous Community of Andalusia. The data were extracted by means of a questionnaire to measure the level of digital teaching competence in Dual Vocational Education and Training schools. The results showed that the level of digital competence shown was medium to low across all dimensions. With regard to the age factor, only the problem-solving dimension was found to be age-dependent.

Keywords: *ICTs skills, digital resources in teaching, generational digital divide, dual training.*

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Introduction

So far in this century, Information and Communication Technologies (ICTs) have revolutionized social, professional, educational and communicational relations; turning society, according to Cabero and Llorente (2006), into a more dynamic and interconnected group of individuals that demands new skills from its citizens and trainers.

The European Parliament in its "Recommendation on Key Competences of Lifelong Learning" (European Commission, 2006) established the term "Digital Competence", which is defined as "the creative, critical and safe use of information and communication to achieve objectives related to work, employability, learning, leisure, inclusion and social participation". Such competence is essential in all areas of work. Having a good level of ICTs knowledge is necessary to access any qualified job with greater possibilities, otherwise there is a risk of unemployment and a difficult work insertion.

In this sense, the intervention of the education system is essential to acquire these skills. In fact, teachers should be the ones who transmit these skills at all levels of education. That is the reason why they should feel comfortable in the use of new technologies (Suarez-Rodriguez et al., 2012).

To achieve this objective, an initial and permanent training of suitable teachers is essential to achieve Digital Skills, which would help them to alleviate that feeling of "instability and ignorance" that many possess (Julian, & Martin-Diaz, 2014). Thus, in 2005 the OECD established that key knowledge in digital competences are important to teacher training. In Spain, with the reformulation of the teaching training plans of the *Ley Organica para le mejora de la calidad educativa* (LOMCE) (2013) emerged the Europe 2020 Strategy, which indicated the need to acquire the necessary knowledge to provide quality education in areas such as diversity , mastering of languages, continuous education and integration of ICTs (Morales Capilla et al., 2015).

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Currently, the various pieces of legislation consider the Digital Teaching Competence to be crucial for the development of teacher activity, and it is also considered cross-cutting in all areas of the curriculum. Diez (2012) considers essential that new teachers finish their studies with a high level of ICTs skills, which according to Cabero and Llorente (2008) should not be taught as mere instrumental actions, but rather to help them jump right into the Information Society to the Knowledge Society.

To do this, a quality training is needed so teachers can integrate the technology in their pedagogical methodology. Such training should be based on data assessment, collaboration with the educational community through digital technologies, content development, evaluation, programming, data protection, and ICTs knowledge (Amhag et al., 2019; Rodriguez-Canfranc, 2019).

Thus, the Spanish National Institute of Educational Technologies and Teacher Training (Instituto Nacional de Tecnologias Educativas y Formacion del Profesorado [INTEF]), which belongs to the Ministry of Education and Vocational Training, is the one responsible for the integration of ICTs and teacher training in the non-university educational stages. This agency proposed in 2017 within the "Digital Teaching Framework" five areas or dimensions that make up the Digital Competence of Teachers (Table 1). Having this knowledge, as indicated by institutions such as the European Commission, the World Bank or the Organization for Economic Co-operation and Development (OECD), is a strategic requirement for the economic and social development of any country.

Table 1. Dimensions of the Digital Teaching Competition (INTEF, 2017)

AREA	DESCRIPTION	COMPETENCES
A1 Information and information literacy	To identify, locate, obtain, store, organize and analyse digital information, evaluating its purpose and relevance.	Navigation, search and filtering of information, data and digital content. Evaluation of information, data and digital content. Storage and retrieval of information, data and digital content.
A2 Communication and collaboration	To communicate in digital environments, to share resources through networked tools, to connect with others and collaborate through digital tools, to interact and participate in communities and networks and to develop an intercultural awareness.	Interaction using digital technologies. Usage of shared information and content. Online citizenship participation. Collaboration through digital channels. Etiquette in technology. Managing digital identity
A3 Creating digital content	To create and edit new digital content, to integrate and rework previous knowledge and content, to make artistic productions, to produce content and computer programming, to know how to apply intellectual property rights and licenses of use.	Development of digital content. Integration and reworking of digital content. Copyright and licensing. programming.
A4 Security	To protect information and personal data, the digital identity, to know security measures, and to make a responsible and secure use of them.	Protection of devices and digital content. Protection of personal data and digital identity. Protecting health and well-being. Protecting the environment.
A5 Problem solving	To identify digital resource usage needs, to make informed decisions about the most appropriate digital tools based on purpose or need, to solve conceptual problems through digital media, etc.	Technical troubleshooting. Identification of technological needs and responses. Innovation and use of digital technology creatively. Identification of gaps in the Digital Competence.

Literature Review

The Digital Teaching Competence is not only about mastering technology, but also it needs to establish how to apply to its pedagogy. For this reason, many authors differentiate between technological and pedagogical competences (Law, & Chow, 2008; Suarez et al., 2010). The former are linked to the knowledge and skills of teachers in ICTs, while pedagogical competences are based on skills and knowledge on how to use digital resources in curriculum design and development, and on the planning and execution of educational practice.

In short, the teacher must know the technological resources and simultaneously use them in his daily teaching task. ICTs make the teaching process adapt to the personal characteristics of each student and their learning style, which involves moving from the culture of teaching to the culture of learning, which is characterized in that the student acquires the knowledge by actively building them (Cabero, 2006).

In this sense, in these recent years there have been multiple researches that have studied the self-assessed Digital Competence in the educational field, in different contexts and levels (Belichenko et al., 2017; Edelhard, 2015; Fernandez Batanero et al., 2017; Fernandez, & Torres, 2015; Garzon et al., 2020; Heads et al., 2014; Rambousek et al., 2016; Sanchez Prieto et al., 2020). It is clear from these studies that even if the availability of technological resources in the schools increases, teachers do not apply to their pedagogical practice the necessary use of ICTs, which leads to a stagnant traditional education (Area, 2010). They also show that, in Spain, a significant number of teachers require training, especially methodologically speaking.

This article reflects how age influences the digital knowledge of teachers, also known as “Generational gap”. Prensky (2001) coined the terms "digital natives" and "technological immigrants". The first are people born in the “era” of computers, while later are the most senior teachers (Monereo & Pozo, 2008). Although there are still many teachers considered as “immigrants”, newly graduated teachers are already digital natives.

Digital natives are the generation born between 1980 and 1994 that grew and are familiar with ICTs (Oblinger, & Oblinger, 2006). They integrated into society with different learning preferences (Jukes et al., 2010) and designed their subjects thinking about leveraging the Network and generating a formative continuum that goes beyond the virtual classroom (Belichenko et al., 2017; Duart, 2010).

On the other hand, technological immigrants only use the Internet as a place where the documents of the subject are located or a way to replace the hours of tutoring of students in the office (Duart, 2010). These teachers have difficulty in acquiring ICTs knowledge, which develops a concern on how to address the challenges posed by the latest technological innovations (Garrido et al., 2016), developing a kind of "technophobia" or rejection to new technologies and refusing to include them in their classroom without being aware of their importance (Hervas et al., 2016).

Because of these differences, age is an influential factor in the use of ICTs in teaching. In addition, there are several studies (Sigales et al., 2008) that indicate that as the age of the teacher increases, the level of ICTs skills decreases (Hermino, & Arifin, 2020).

The age variable has been studied by many researchers with favourable results to younger generations. According to Fernandez-Cruz and Fernandez-Diaz (2016), the older teachers (56-66 years), have a much lower ICTs teacher training profile than those teachers who are younger, and teachers between 20 and 25 years of age the ones who achieve the best digital profile. Another example that supports this idea is the research carried out by Garcia et al. (2014) with the aim of identifying the levels of digital competence by surveying 2,143 students of Early Childhood Education, Primary, Secondary and Baccalaureate, where the good predisposition to the use of ICTs was proven because it is a sample of digital natives. Another example is the study carried out by Martos et al. (2016), through a sample of 207 music teachers of the Secondary Education, with the aim of knowing if there was a relationship between the age of teachers and the development of the Andalusian program School ICT 2.0., which concluded that depending on the age of the teacher in question, it is also more reluctant to incorporate new technologies into the classroom.

In contrast, these differences are not detected in other investigations. Examples include the study carried out by Hernandez Ramos and Torrijos Fincias (2018) where the age of the teacher does not appear to be decisive in determining the level of integration of ICTs into their teaching, although it should be taken into account that in the group surveyed (university teachers), older teachers tend to have a degree of greater stability and, therefore, they are more prone to the realization of innovations that facilitate the integration of ICTs to their teaching methods. On the other hand, it is also important to mention the article by Fernandez Batanero and Torres Gonzalez (2015) carried out by teachers on the Education of Adults in Andalusia to observe the use and integration of ICTs, in which there are no significant differences in the age variable, although the huge commitment of this kind of teachers to their work and their recognition of ICTs is highlighted.

These factors may indicate that the real variable is not the age, but of the training deficit of the type of teachers being studied, or the inequality of many schools to recycle the Digital Competence effectively for teaching (Sainz, 2013).

In any case, multiple studies make a reflection on teacher training, due to the need of a greater training for the real integration of ICTs into the classrooms, in order to reduce the presumed generational digital divide.

The main objective of this article is to detect these alleged differences of Generational Digital Competence with the data provided by a study carried out between teachers of "Dual Vocational Education and Training" in the Autonomous Community of Andalusia. Dual Training is a mode of teaching that is carried out simultaneously in two different places: the educational center and the real company, two places that are complemented by coordinated activities. It is not simply based on internships in a company to put into practice what is learned in the school, but rather requires that the

teaching-learning process is carried out both in the classroom, where the theoretical knowledge is acquired, and in the company, where the students can assimilate the practical concepts (Nowak, 2019; Molina, 2016).

The *Real Decreto 1529/2012* introduced in Spain the model of the Dual Vocational Education and Training with the aim of developing professional and qualified workers, who are more adapted to the demands of the business fabric, following the examples of countries like Germany, and with the objective to fight against the high rate of youth unemployment (Sanchez Prieto et al., 2020).

Dual Vocational Education and Training is a system where the application of ICTs in the learning teaching process becomes even more necessary, since the essential collaboration between tutors in the study and in the work center the students. Therefore, digital skills should not only be possessed by the teachers in schools, but also by the trainers in the companies (Sanchez Prieto et al., 2020).

Due to the scarcity of research carried out on digital skills in Dual Education and Training and because it has experienced a great expansion in the recent years, it is intended to detect its training needs in digital pedagogy and to see whether the digital gap between teachers really exists in this area.

Method

Research Goal

The acquisition of an optimal level of digital competence has become an increasingly indispensable requirement for teachers, in order to respond to the new demands requested by the current society and the education system. Similarly, and based on the specialized literature referred to above, age has been an influential factor in the development of digital competence of teachers of several educational stages.

As a result of these ideas, the objective of this work is to detect the level of digital competence of Dual Vocational Education and Training Teachers and to check whether age is a determining factor in presenting greater or less digital skill.

Methodology

A quantitative cross-sectional study (Hernandez et al., 2016) is presented. The intention is to describe by means of descriptive and inferential statistical evidence the situation of education in relation to the digital knowledge of Dual Vocational Education and Training teachers. Similarly, through techniques and regression modeling, it is intended to find out whether age is a predictor of the development of this competition.

Sample and Data Collection

A total of 1,568 dual-trained teachers from the Autonomous Community of Andalusia participated in the study. The sampling technique employed was through convenience sampling. The questionnaire was distributed through the digital platforms on repeated occasions to all the centres in Andalusia, obtaining this number of responses. According to its main characteristics, the average age of the study sample was 33, being the older a 49 years old and the youngest 18. In terms of gender, there were 745 women and 823 men.

Instrument

To achieve the investigation, an ad hoc questionnaire based on the five areas of e-skills proposed by INTEF was set up. In addition, a sixth area linked to the technology tooling domain was added. Therefore, the European Framework for Digital Skills for Citizens (DigComp) (Fernandez et al., 2013) was taken as a reference for its configuration.

The independent variables (features) were the age (Age) and the years of work experience (Exper); the dependent variables were based on the areas of knowledge raised by INTEF.

- IDL (Degree of Information and Digital Literacy)
- LCCD (Level of communication and collaboration of digital resources)
- ACD (Ability to create digital content)
- DT (Knowledge of digital tools)
- CS (Knowledge in computer security)
- PS (Problem-solving capability)

The study has been carried out with the following variables. The initial data frame consisted of 68 columns and 1,568 observations and participating subjects, teachers of professional training of a dual nature. The qualitative variables were then factored:

- Gender (Man=0; Woman=1)
- Previous ICTs training (ICT.F) (YES=1; No=0)
- Previous study level (L.Stud) (Degree=0; Degree, Master=1; Degree, Master=2; Doctorate=3; Professional Formation=4; Degree=5; Degree, Professional Formation=6; Degree, Master=7; Engineering=8; Bachelor's Degree=9; Bachelor's Degree, Master=10; Master=11)
- Professional Category (P.Categ)(Freelance=0; Civil Servant=1; Provisional=2; Employee=3)
- Professional family to which they belong (B.Know) (Others=0; Administration and management=1; Commerce and Marketing=2; Languages=3)

The questionnaire was subject to a process of content validation by experts, which were lecturers from different Spanish universities (University of Seville, University of Malaga and University of Granada). The measure of Kaiser-Meyer-Olkin for the adequacy of the sampling (KMO=.741) and the Barlett's Test of Sphericity (χ^2 = 984.143; p-value = .000) was applied.

Finally, regarding the internal consistency of the instrument, the Cronbach's Alpha test was applied, which obtained a result of α= .877, an optimal value to guarantee the viability of the research.

Analyzing of Data

For the analysis of the data the statistical package lmtest of the statistical software Rstudio in its version 3.6.1 was used. First, the common descriptive statistics were applied, which allowed us to approach the description of the perceptions of teachers of Dual Vocational Education and Training.

Two atypical values were found. One for the age variable (55) and the other on the experience one (25). For both cases, a manual function was defined with the R software tool, which established that if the value of each of the variables was greater than the quantile or percentile 95, it would be attributed by the median, even though it was more robust than the median.

After that, the feature engineering was done. The original dataset was divided into two large sets: training and testing, using the initial split function of R with 85% prop. This implied that the training dataset kept the 85% of the initial data. This was due to the use of the training group to model the algorithm and testing to evaluate its performance.

The independent metric variable experience was focused and applied to the transformation of Yeo-Johnson. The categorical variables were then converted to indicator variables or dummies. Finally, the scores of the different study-dependent variables were added. In this study, however, the independent variable of interest was the age of the participants.

Finally, polynomial regression was used. This is a simple approach to modelling nonlinear relationships by adding polynomial terms or quadratic terms to a regression.

Results

In the first instance, descriptive tests were applied to make it clear that similar scores were generally obtained in each of the dimensions (Table 2). Slightly noteworthy, the results of the ACD and DT dimension.

Table 2. Descriptive statistical data for analysis

Items	Mean	SD	Skewness	Kurtosis
IDL.1	2.4925	1.1139	-.01368	-1.35057
IDL.2	2.5169	1.1278	-.03705	-1.38053
IDL.3	2.4753	1.1178	.03666	-1.3579
IDL.4	2.4667	1.1302	.04201	-1.38586
IDL.5	2.5271	1.1262	-.01627	-1.37901
IDL.6	2.4957	1.0897	.00923	-1.29275
IDL.7	2.5584	1.1285	-.08645	-1.37635
IDL.8	2.5114	1.1068	-.02008	-1.33307
IDL.9	2.5035	1.1209	-.01051	-1.36615
IDL.10	2.44	1.1165	.07457	-1.35162
LCCD.1	2.549	1.1086	-.05296	-1.33611
LCCD.2	2.4463	1.1231	.07108	-1.3669
LCCD.3	2.5467	1.1073	-.04687	-1.33378
LCCD.4	2.4988	1.1075	.00991	-1.33524
LCCD.5	2.4714	1.1255	.01185	-1.37798

Table 2. Continued

Items	Mean	SD	Skewness	Kurtosis
LCCD.6	2.4941	1.1369	.00170	-1.4024
LCCD.7	2.4847	1.1166	.03332	-1.35527
LCCD.8	2.4776	1.1002	.02143	-1.31789
LCCD.9	2.462	1.1062	.04230	-1.33095
LCCD.10	2.5035	1.0961	-.01258	-1.30822
ACD.1	2.5176	1.1166	-.04601	-1.35435
ACD.2	2.5075	1.1327	-.02497	-1.39255
ACD.3	2.4957	1.1202	-.00598	-1.36478
ACD.4	2.5027	1.1307	.0307	-1.38872
ACD.5	2.531	1.1219	-.00234	-1.37129
ACD.6	2.4776	1.1207	.03082	-1.36488
ACD.7	2.5396	1.1348	-.0368	-1.39755
ACD.8	2.4902	1.1265	.02278	-1.3784
ACD.9	2.5365	1.1231	-.04954	-1.36909
ACD.10	2.5051	1.0918	-.0203	-1.29773
DT.1	2.5004	1.1209	-.00601	-1.36625
DT.2	2.5122	1.1251	-.0088	-1.37576
DT.3	2.5169	1.1046	-.05674	-1.32577
DT.4	2.5435	1.1152	-.03125	-1.35422
DT.5	2.4847	1.1117	.01795	-1.3447
DT.6	2.4792	1.1228	.02195	-1.37036
DT.7	2.5161	1.1409	-.01423	-1.4113
DT.8	2.4988	1.1026	.01530	-1.32353
DT.9	2.4643	1.1161	.04726	-1.35331
DT.10	2.509	1.132	-.0045	-1.39156
CS.1	2.542	1.1257	-.02037	-1.37978
CS.2	2.5027	1.1202	.00319	-1.3647
CS.3	2.4949	1.1424	-.00643	-1.41475
CS.4	2.5153	1.1278	-.03643	-1.38066
CS.5	2.4651	1.1204	.06896	-1.3603
CS.6	2.4957	1.1314	.00419	-1.38995
CS.7	2.531	1.1135	-.0182	-1.35015
CS.8	2.4816	1.1423	.01057	-1.41463
CS.9	2.5161	1.1271	-.0137	-1.38034
CS.10	2.4902	1.0954	.02681	-1.30589
PS.1	2.5122	1.1244	-.03035	-1.37324
PS.2	2.5106	1.1272	.00985	-1.38118
PS.3	2.4549	1.1381	.08426	-1.398
PS.4	2.5255	1.108	-.02109	-1.33641
PS.5	2.4588	1.1533	.04986	-1.43651
PS.6	2.4706	1.1205	.01162	-1.36692
PS.7	2.4949	1.1209	-.01571	-1.3666
PS.8	2.4933	1.1139	.0253	-1.34957
PS.9	2.4878	1.1251	.00548	-1.3759
PS.10	2.4549	1.1038	.05129	-1.32466

SD= Standard deviation

Consequently, the polynomial regression models were set up for each area of the teaching digital competence. The models that were significant ($p < .05$) will be presented below. In the case of the DT dimension, the model was not significant. The rest of the models elaborated from the dimensions of digital teaching competence did obtain significance.

Firstly, with reference to IDL (table 3), there were no significant differences in the participants' age groups. The model developed was significant and explained 17% of the data variance ($R^2 = 0.173$).

Table 3. Polynomial regression for Age-IDL

	Estimate	Std. Error	t value	Pr(> l t l)
Intercept	27.899644	1.555396	17.937	< 2e-16***
Training set	-0.163774	0.096573	-1.696	0.0902
Test set	0.002445	0.001411	1.733	0.0834
Residual standard error	3.818 on 1064 df	**F**= 1.519	$\mathbf{R^2}$= 0.173	***p*** = .0013

Note: ***= p-value<.001;

In terms of the LCCD dimension, the linear regression model obtained was equally significant (Table 4). However, it also verified the absence of a digital divide among the participants according to their age. The model explained 19% of the variance of the data.

Table 4. Polynomial regression for Age-LCCD

	Estimate	Std. Error	t value	Pr(> l t l)
Intercept	25.165684	1.593660	15.791	< 2e-16***
Training set	0.003192	0.098948	0.032	0.974
Test set	-0.000128	0.001446	-0.089	0.929
Residual standard error	3.912 on 1064 df	**F**= 0.1018	$\mathbf{R^2}$= 0.097	***p*** = 0.019

Note: ***= p-value<.001;

Similarly, the model developed for the CDA dimension found that there were no significant differences in the responses given by the participants as a whole with respect to age (Table 5). The model explained 15% of the total variance.

Table 5. Polynomial regression for Age-ACD

	Estimate	Std. Error	t value	Pr(> l t l)
Intercept	25.8840086	1.6069970	16.107	<2e-16***
Training set	-0.0401094	0.0997764	-0.402	0.688
Test set	0.0004982	0.0014580	0.342	0.733
Residual standard error	3.945 on 1064 df	**F**= 0.1841	$\mathbf{R^2}$= 0.1533	***p*** = 0.043

Note: ***= p-value<.001;

Regarding the CS dimension (table 6), the extracted model was considered significant (p-value<.05), even though it showed that age was not an incident factor in the development of this skill set. Both the training and the test group were not significant.

Table 6. Polynomial regression for Age-CS

	Estimate	Std. Error	t value	Pr(> l t l)
Intercept	26.293960	1.598273	16.451	<2e-16***
Training set	-0.066539	0.099235	-0.671	0.503
Test set	0.000864	0.001450	0.596	0.551
Residual standard error	3.923 on 1064 df	**F**= 0.3774	$\mathbf{R^2}$= 0.391	***p*** = 0.012

Note: ***= p-value<.001;

In contrast, the model developed for PS did show that age was a significant factor in determining significant differences among the participants analyzed (Table 7). Both the training and test data sets were significant. Similarly, the p-value of the model is valid. The percentage of explained reality is approximately 47% of the total variance.

Table 7. Polynomial regression for Age-PS

	Estimate	Std. Error	t value	Pr(> l t l)
Intercept	1.044e-14	1.446e-15	7.219e+00	9.97e-13***
Training set	1.00e+00	1.118e-16	8.84e+15	< 2e-16***
Test set	1.317e-18	2.138e-18	6.160e-01	0.538***
Residual standard error	1.714e-15 on 1064 df	**F**= 2.791e+33	$\mathbf{R^2}$= .4710	***p*** = .0001

Note: ***= p-value<.001;

In short, the models obtained with the exception of the TD dimension were significant. Although the adjustment coefficient was not high, it can be established that, with the exception of the PS dimension, age is not a relevant factor in the digital competence of Dual Vocational Education and Training Teachers. Also, all intercepts were significant, indicating that it should be centered or removed.

Discussion

Clearly**,** age influences the ICTs knowledge and there is no point in denying that younger generations have a digital culture that was not available to the elderly (Fernandez-Cruz & Fernandez-Diaz, 2016; Prensky, 2001). However, the aim of the present piece work is to evaluate the level of digital competence of teachers. The results found in the descriptive analysis made it clear that teachers do not consider themselves deep digitally literate in practically any of the dimensions of digital competence. These results are similar to previous studies carried out at an international level (Amhag et al., 2019; Chandrasena, 2019; Li et al., 2019), which conclude by advocating the need for ongoing training for teachers, which would provide practical skills and abilities in digital matters to a teaching staff that increasingly needs to make frequent use of these tools and that, currently, does not see the teaching opportunities that these resources offer.

As for digital generational gap, the degree of qualification at the user level of ICTs knowledge by the teachers is understood, and the present study, in its only hypothesis, does not detect significant differences in age, which coincides with previous ones, such as those of Romero and Minelli (2011), Hernandez and Torrijos (2018), Fernandez Batanero and Torres Gonzalez (2015), etc. This is a result that, in spite of finding results in other similar studies, is in contrast to the digital divide observed in different educational stages, so we could not establish an accurate statement about the result found in this research, but it would be a description of the reality observed in this context (Nowak, 2019).

In spite of this,, the statistical study "partially" accepts null hypothesis 1, i.e. some differences are detected in certain areas of knowledge of the study. This could indicate that in certain aspects of e-skills, the age of the trainers is a determining factor.

There is mainly a significant difference in PS 1, which consists of the statement: "I try to individually solve basic technical problems that arise on my individual devices by helping me with tutorials". This means that younger teachers dare to personally solve the basic incidents that arise in the day-to-day without having to ask for help, while the older ones require more help, i.e. the older is the teacher, the higher is the dependency to solve technical problems individually. This difference can be caused by the insecurity of digital immigrants to try to solve problems, which make them choose to ask experts or other younger colleagues (Garrido-Lora et al., 2016).

It should be noted that the study detects other age differences in the area of "Degree of Information and Digital Literacy" and "Level of Communication and Collaboration of Digital Resources", but that they are scarcely significant to indicate the existence of an age gap, because their consideration is not excluded. However, these differences could indicate that younger people are better informed and digitally literate, and that they have a greater use of ICTs.

On the other hand, it should be noted that, according to the study, the values of digital competences in all areas are low, around 2.4 out of 4, indicating that teachers of all ages need better ICTs knowledge to implement digital tools in the classroom.

In short, although the adjustment of the elaborated models does not explain a great amount of variance, they provide interesting ideas regarding the state of the issue about the generational digital divide at the Dual Vocational Education and Training stage, a stage of which the investigative landscape is aware of little statistics, and therefore it might be relevant to provide quantitative approaches to the situation of its teachers.

Conclusion

The improvement of the skills in relation to the digital teaching competence is still a challenge to be completed by Spanish teachers. In the case of the Dual Vocational Education and Training stage, this statement has been found through this study, highlighting the need to promote a permanent and qualified digital training that could provide the knowledge that teachers currently demand at this stage.

In the case of the age factor, although the results obtained by the teachers analysed are generally low, there are no differences around this parameter, except in the problem-solving area where older teachers need more external assistance.

The causes of this non-generational gap in ICTs skills of Dual Vocational teachers are due to:

- The necessary knowledge to transfer the Digital Competence to teaching is basic and teachers of any age are receiving permanent training to dispose of it.
- The percentage of teachers in the education system that are already digital natives and who contribute more to digital skills is always increasing.

In any case, the low knowledge identified in the study shows the necessity of l its improvement through teacher training and measures related to the lifelong education of teaching workers.

In conclusion, the development of the Digital Competence of teachers is crucial so that the right level in this competence can be passed on to the population, which has become even more evident and necessary following the health crisis of the pandemic in 2020. Inevitably, training will have to accelerate the inclusion of digital skills in the learning teaching process in order to adapt to the semi-presence modality needed today.

Suggestions

As suggestions and future prospects in this line of research, it is necessary for the research community to promote examples of digital innovation in the classroom, so that it serves as an example to teachers at all educational stages of how to carry out a sustainable practice in the classroom. For this reason, universities and teacher training centres, in particular, must become places that offer quality training in digital matters, and which provide examples of good practice in this area, so that teachers can incorporate it into their ordinary activity in the centre.

Limitations

With reference to the limitations of the study, they are framed by the sampling technique used, which was for convenience, being advisable to use random methods. Similarly, this is a descriptive study of a part of Spain, so it cannot infer the level of digital competence of the whole country.

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References

Amhag, L., Hellstrom, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education, 35*(4), 203-220. https://doi.org/10.1080/21532974.2019.1646169

Area, M. (2010). The process of integration and pedagogical use of ICT in schools. A case study. *Education Magazine*, 352, 77-97.

Belichenko, M., Davidovitch, N., & Kravchenko, Y. (2017). Digital learning characteristics and principles of information resources knowledge structuring. *European Journal of Educational Research, 6*(3), 261-267. https://doi.org/10.12973/eu-jer.6.3.261

Cabeza, M., Casillas, S., & Pinto, A. M. (2014). Perception of primary education students of the University of Salamanca about their digital community. *Edutec. Electronic Journal of Educational Technology/ Edutec. Revista Electronica de Tecnologia Educativa*, *48*, 1-14 https://doi.org/10.21556/edutec.2014.48.156

Cabero, J. (2006). Educational quality in e-learning: Its pedagogical bases. *Medical Education, 9*(2), 7-12.

Cabero, J., & Llorente, M.C. (2006). *The rose of the winds. ICT technology domains by students*. GID University of Seville.

Cabero Almenara, J., & Llorente Cejudo, M. C. (2008). Digital literacy of students: Digital skills for the 21st century. *Portuguese Journal of Pedagogy/ Revista Portuguesa de Pedagogia, 42*(2), 7-28.

Chandrasena, M. (2019). Lack of digital competence: The hump in a university - English for specific purpose - Classroom. *International Journal of Scientific and Technology Research, 8*(10), 948-956.

Cruz, F. J. F., & Diaz, M. J. F. (2016). Generation Z teachers and their digital skills. *Communicate/ Comunicar, 24*(46), 97-105.

Diez, E.J. (2012). Socio-collaborative and collaborative models in the use of ICTs in initial teacher training. *Education Journal/ Revista de Educacion*, *358*, 175-196.

Duart, Josep M., (2010). New digital gaps in higher education. *Universities and Knowledge Society Journal*, *7*(1), 1-2

European Commission. (2006). Recommendation 2006/962/EC of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:ES:PDF

Fernandez, J. M., Roman, P Ferrari, A. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe.* Publications Office of the European Union.

Fernandez Batanero, J. M., Reyes Rebollo, M. M., & El Homrani, M. (2017). TIC y discapacidad. Principales barreras para la formacion del profesorado [ICT and disability. Knowledge of primary education teachers in Andalusia]. *Journal of Media Education and ICT/ Revista de Educacion Mediatica y TIC, 7*(1), 1-25. https://doi.org/10.21071/edmetic.v7i1.9656

Fernandez Batanero, J.M., & Torres Gonzalez, J.A. (2015). Teaching attitudes and good practices with ICT of the teachers of Permanent Adult Education in Andalusia. *Complutense journal of education/ Revista complutense de educacion*, *26*(special) 33-49.

Fernandez-Cruz, F.J., & Fernandez-Diaz, M.J. (2016). Los docentes de la generacion Z y sus competencias digitales [Generation Z teachers and their digital skills]. *Communicate/ Comunicar, 46*, 97-105. https://doi.org/10.3916/C46-2016-10

Garcia, R., Ramirez, A., & Rodriguez, M. M. (2014). Media literacy education for a new prosuser citizenship. *Comunicar, 22*(43), 15-23.

Garrido-Lora, M., Busquet Duran, J., & Munte Ramos, R. A. (2016). From ICT to ICRT: A study of ICT use and the digital divide among adults and adolescents in Spain. *Analysis/ Analisi*, *54*, 44-57.

Garzon, E., Martinez, T. S., Ortega, J. L., Marin, J. A., & Gomez-Garcia, G. (2020). Teacher training in lifelong learning—The importance of digital competence in the encouragement of teaching innovation. *Sustainability, 12*(7), 1-13. https://doi.org/10.3390/su12072852

Edelhard, C. (2015). Educating teachers for the new millennium? Teacher training, ICT and digital competence. *Nordic Journal of Digital Literacy*, *10*, 138-154.

Hernandez Ramos, J. P, & Torrijos Fincias, P. (2018). Teacher perception on the integration of Information and Communication Technologies (ICT) into teaching modalities. Influence of gender and age. *EDMETIC, Journal of Media Education and ICT/ EDMETIC, Revista de educacion mediatica y TIC, 8*(1), 128-146

Hermino, A., & Arifin, I. (2020). Contextual character education for students in the senior high school. *European Journal of Educational Research, 9*(3), 1009-1023. https://doi.org/10.12973/eu-jer.9.3.1009

Hervas-Gomez, C., Real Plehan, S., Lopez Mata, E., & Fernandez Marquez, E. (2016). Tecnofobia: Competencias, actitudes y formacion del alumnado del grado en educacion infantil [Technophobia: Competencies, attitudes and training of the graduate students in early childhood education]. *International Journal of Educational Reserach and Innovation*, (6), 83-94

National Institute of Educational Technologies and Teacher Training. (2017). Marco de competencia digital [Digital competence framework]. Ministerio de Educacion, Ciencia y Deportes.

Julian, M. S., & Martin-Diaz, M. (2014). Computers in the classroom: Are teachers ready? *Science teaching/ Ensenanza de las Ciencias*, *32*(2), 239-250

Jukes, I., McCain, T., & Crockett L. (2010). *Understanding the digital generation: Teaching and learning in the new digital landscape Details*. Trove. https://trove.nla.gov.au/work/37290757

Law, N., & Chow, A. (2008). Teacher characteristics, contextual factors, and how these affect the pedagogical use of ICT. In N. Law, W. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT use in schools around the world. Findings from the IEA SITES 2006 Study* (pp. 181-219). Springer.

Ley Orgánica 8/2013, de 9 de diciembre, para la mejora de la calidad educativa. (B.O.E. nº 295 de 10 de diciembre).

Li, S., Yamaguchi, S., Sukhbaatar, J., & Takada, J. (2019). The Influence of Teachers' Professional Development Activities on the Factors Promoting ICT Integration in Primary Schools in Mongolia. *Education Science, 9*(2), 1-18. 10.3390/educsci9020078.

Martos, E., Perez, P., & Bernal, J. (2016). Relationship between the age of Andalusian music teachers and the development of ICT 2.0 school. *Complutense journal of education/ Revista Complutense de Educacion, 27*(2), 757-777.

Molina, I. (2016). Dual training: A new approach to vocational training. *International Journal of Organizations*, *17*, 129-139.

Monereo, C., & Pozo, J. I. (2008). El alumno en entornos virtuales: Condiciones, perfil y competencias [The student in virtual environments: Conditions, profile and competencies]. In C. Coll & C. Monereo (Eds.), *Psicologia de la educacion virtual* [Psychology of virtual education] (pp. 109-131). Morata.

Morales Capilla, M., Trujillo Torres, J. M., & Raso Sanchez, F. (2015). Perception of teachers and university students to the possibilities offered by ICT in their integration into the educational process: Reflections, experiences and research in the Faculty of Education of Granada. *EDMETIC, Journal of media education and ICT/ EDMETIC: Revista de educacion mediatica y TIC, 5*(1), 103-117.

Nowak, B. M. (2019). The development of digital competence of students of teacher training studies-Polish cases. *International Journal of Higher Education, 8*(6), 262-266. https://doi.org/10.5430/ijhe.v8n6p262

Oblinger, D., & Oblinger, J. L. (2005). *Educating the net generation* (Chapter 1). Educause.

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1-6.

Rambousek, V., Stipek, J., & Vankova, P. (2016). Contents of digital literacy from the perspective of teachers and pupils. Procedia - *Social and BehavioralSciences*, 217, 354-362.

Rodriguez-Canfranc, P. (2019). *European students' digital skills*. Telos. https://telos.fundaciontelefonica.com/la-cofa/una-television-a-la-carta-con-mercados-globales-y-contenidos-locales/

Romero, M., & Minelli, J. (2011). Net generation falters: perception of ICT dominance of teaching students. *Theory of education and culture in the information society /Teoria de la educacion y cultura en la sociedad de la informacion, 12*(3), 280-298.

Sanchez Prieto, J., Trujillo Torres, J. M., Gomez Garcia, M., & Gomez Garcia, G. (2020). Gender and digital teaching competence in dual vocational education and training. *Education Sciences, 10*(3), 84. https://doi.org/10.3390/educsci10030084

Sainz, M. (2013). The use of ICT in the educational field with a gender perspective. Attitudes of teachers and students. Telos: Communication and Innovation Notebooks/ *Telos: Cuadernos de comunicacion e innovacion*, 95, 116-124

Saputro, A. D., Atun, S., Wilujeng, I., Ariyanto, A., & Arifin, S. (2020). Enhancing pre-service elementary teachers' self-efficacy and critical thinking using problem-based learning. *European Journal of Educational Research, 9*(2), 765-773. https://doi.org/10.12973/eu-jer.9.2.765

Sigales, C. J. M., Momino, J.M., Meneses, & Badia, A. (2008). *The integration of the Internet into Spanish school education: Current situation and future prospects.* Universitat Oberta de Catalunya. https://www.uoc.edu/in3/integracion_internet_educacion_escolar/esp/

Suarez, J, Almerich, G., Gargallo, B., & Aliaga, F. M. (2010). Teachers' ICT skills and their relationship to the use of technological resources. *Education Policy Analysis archives, 18*(8), 1-33.

Suarez, J. M., Almerich, G., Diaz Garcia, M., & Fernandez-Piqueras, R. (2012). Competencias del profesorado en las TIC. Inlfuencia de factores personales y contextuales. [Skills of teachers in ICT. Influence of personal and contextual factors]. *Universitas Psychological/ Universitas Psychologica*, *11*, 239-309.