

THE DEVELOPMENT OF INFORMATION LITERACY IN EARLY CHILDHOOD EDUCATION TEACHERS. A STUDY FROM THE PERSPECTIVE OF THE EDUCATION CENTER'S CHARACTER

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Abstract

The development of the digital competence is one of the current challenges of the educational community. Specifically, the area of information literacy is presented as a main pillar for the subsequent optimal development of a digital teaching competence. Based on this, the present article aims to evaluate the area of information literacy in practicing teachers from Early Childhood Education (N=57). A descriptive and inferential quantitative analysis was made for this piece of work in order to analyze the perceptions of the teachers towards this area, the accomplishment of the t-student test for the comparison of means between teachers of public and private with state-funded financial support centers and the application of a linear regression model that allows to predict the information literacy through the variable "education center". The results obtained reflected an optimal level of perceptions as for the information area, regardless of the type of school, as well as the possible prediction, regarding the school typology, of some information literacy variables.

Keywords – Digital competence, Information literacy, ICT, teachers, Early Childhood Education.

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1. Introduction

In the recent years, our society has undergone profound transformations that have had repercussions on the educational system. The social panorama is characterized by having experienced a process of transformation from an analogical era to a digital one (Stefani, Andrés & Oanes, 2014). The drastic impact of technological information, globalization and the vertiginous growth of economies, along with the digital revolution, has provoked that all institutions and disciplines found themselves in a period of transition towards the information and knowledge society in which we find ourselves nowadays (Ravelo, Revuelta-Domínguez, & González-Pérez, 2018).

Because of these changes, educational institutions have needed to rethink the educational priorities relationated to the conception of education and have realized that their pedagogical approaches should have a holistic and current vision that involves cognitive, procedural and attitudinal aspects, which provide people with functional skills and competencies in, with and for digital media (Esteve, Adell & Gisbert, 2013; Trujillo, Hinojo & Aznar, 2011; De Pablos-Pons, Bravo & Moreno, 2010).

The mission of preparing young people to achieve an adequate insertion in a society whose academic and intellectual requirements have been increasing means that the educational work has to be exemplary and has to promote innovation and continuous improvement in their classrooms as immediately as possible.

Following the aim of promoting and improving the educational process, the immersion of information and communication technologies (ICT hereafter) is presented as one of the most innovative measures in the social and, of course, educational panorama, to carry out this progress in the educational context (Trujillo, Aznar & Cáceres, 2015). The arrival of technology has undoubtedly been a real revolution in all sectors, but especially within the youth population (Area, 2008), constituting in a compendium of “digital natives”, who have experienced this incorporation as something natural and innate (Barbosa & Amariles, 2019).

Multiple studies indicate that Spain has the highest digital rate among its population in Europe. This is proved by the most recent data from the We are Social (2016), which is a reflect of the three major trends that strengthen digitalization in the Spanish society: the display of multi-device video through mobile devices; the consolidation of digital tools that allow continuous interaction between people and the interest in tools that provide security in digital environments.

Based on these data, the need for information and digital literacy in the citizenry is seen as a priority need for the imminent future panorama. Given this expectation, within the context of the educational environment, the need to strengthen the so-called “digital competence” is and has been in recent years a main competence in the various legislative and regulatory documents (Area, 2010).

This is reflected in *Ley Orgánica 8/2013 para la mejora de la calidad Educativa (LOMCE)* (2013), Spanish law for the improvement of quality in education, whose preamble XI shows the need to digitally alphabetize students through the immersion of information and communication technologies, in order to achieve an insertion in a present and future technological society. The same idea is emphasized in the article 111 of the same law (bis), which indicates the possibilities and advantages that provide to education the fact of working through the creation of virtual learning environments. Therefore, with the aim of achieving this objective, it is a priority to carry out a digital literacy among teachers and, therefore, to develop a digital teaching competence in order to achieve an optimum teaching performance.

1.1. Digital Teaching Competence. An Educational Challenge

For the past few years, the research in Educational Technology has focused on the analysis of programs and models that support the teaching and development of this competence within teachers from different educational levels and in their respective student body (Castañeda, Esteve & Adell, 2018).

The European Commission (2009, 2016) states that the seven key competences of the 21st century citizenship are: communication in their mother tongue and in a foreign language; mathematical, scientific and technological competence; digital competence; learning to learn competence; innovation and entrepreneurship competence; cultural awareness, social inclusion and critical thinking competences. This same entity defines the digital competence, the one we are concern about, as follows (European Commission, 2009: page 15):

“Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.”

The conceptualization of digital teaching competence lies in the Presentation about the Digital Teaching Competence organized by the National Institute of Educational Technologies and Teacher Training (INTEF, in its Spanish acronyms, 2017). Its objective was to present the Common Framework for Teacher Digital Competence (Blanco, 2018), according to the principles established by the Strategic Framework for Education and Training and to the recommendations stipulated by the European Parliament (European Commission, 2009; Ferrari, 2013).

Thus, digital teaching competence was organized in a generalized way and under a common criterion. It was divided into the following areas (Figure 1): 1) Information and informational literacy; 2) Communication and collaboration; 3) Creation of digital content; 4) Security in digital environments; 5) Troubleshooting (Esteve, 2016).

Numerous authors have worked in the field of digital teaching competence (Gallego, Gámiz & Gutiérrez, 2010; Gisbert & Esteve, 2011; Prendes & Gutiérrez, 2013; Vera-Noriega, Torres-Moran & Martínez-García, 2014; Esteve, 2015; Morales-Capilla, Trujillo-Torres & Raso-Sánchez, 2015; Durán, Gutiérrez & Prendes, 2016; Martínez, Lorenzo & Camacho, 2016; Marín, 2017; Falcó, 2017; Martínez & Rodríguez-García, 2018), and those studies have fundamentally investigated the analysis and evaluation of the skills from the different dimensions that make up the digital teaching competence in different educational levels, with a clear and final purpose: to achieve a continuous and of quality digital training that leads in a process of digital literacy within the teaching body, which allows to break the digital gap between students and teachers (Cózar & Roblizo, 2014).

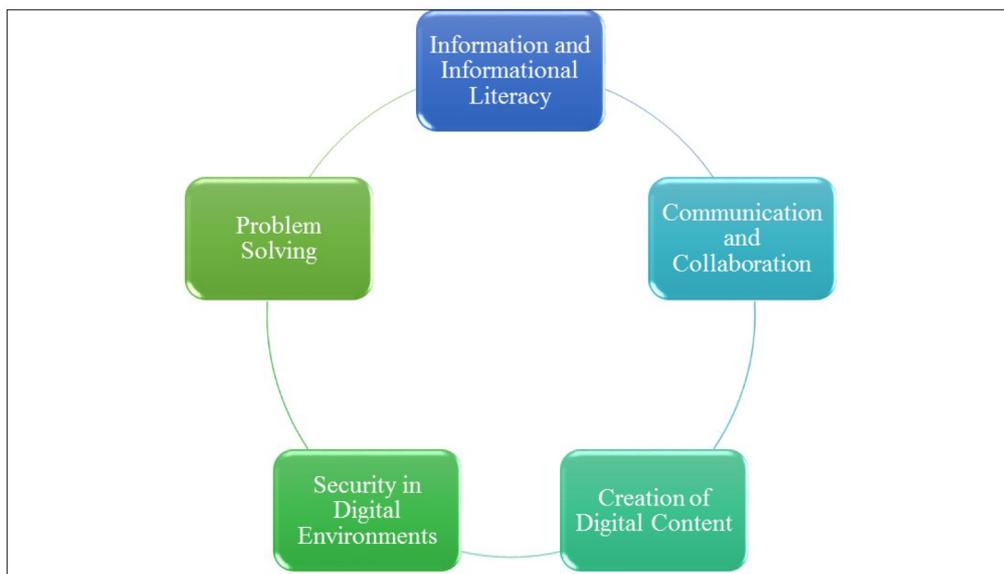


Figure 1. Areas of the digital teaching competence

1.2. The Need for Information Literacy

Information literacy is one of the competency dimensions of the digital teaching competence. Its need within the educational community is vital because it compromises the starting point of the treatment of information for achieving the necessary knowledge and learning to be able to answer possible problems (Area & Guarro, 2012).

The domain of information literacy is considered as one of the challenges of the 21st century teachers. This competence allows them to be able to manage, to receive and to decide what information is functional from what is not, and to carry out strategies for curing content when locating and selecting it (Porlán, Espinosa & Sánchez, 2018).

At the same time, this skill has the same competence when it comes to choose and select different technological resources. The digitally competent teacher must differentiate between those relevant resources, as well as visualize them, in digital information sources, the possible learning paths for their students.

The affirmation of the need of dealing with information literacy has been studied by various experts and understood by teachers and experts as a challenge to be achieved in the educational community (Zelada, & Izquierdo, 2018). The typology of studies in this area is, mostly, the evaluation and analysis of the development of this skill in both teachers and students.

To exemplify this idea, we have highlighted the evaluative studies of Secondary Education teachers (Egaña, Bidegain & Zuberogoitia, 2013; Wilson, 2012), the informational competence within the students analyzed is very low. Accordingly, it has also been shown the study of Guzmán-Simón, García-Jiménez and López-Cobo (2017) in which the informational skill is analyzed within the digital competence, and it reflects a low level of its knowledge among the future teachers and, therefore, shows the necessity of its improvement.

In the majority of studies on this subject, the positive evolution of this competence is observed in the teaching staff of different educational levels and different disciplines of knowledge (Serafín, Depešová & Báñez, 2019; Ilina, Grigoryeva, Kokorev, Ibrayeva & Bizhanova, 2019; Rodríguez, Méndez & Martín, 2018; Corona, Martínez-Abad & Rodríguez Conde, 2017), However, it still needs a considerable improvement.

After reviewing the specialized literature of this topic, a shortage of the evaluation and analysis of information skills among Early Childhood Education teachers was visualized. For this reason, the objective of this study is to identify the informational competence of practicing Early Childhood Education teachers. This objective is stratified by the following specific objectives:

- To analyze the perceptions and development of information literacy skills of practicing Early Childhood Education teachers.
- To check if there is any significant difference between the answers obtained from the teachers according to the nature of the educational center in which they carry out their work (public or private with state-funded financial support center).
- To identify, if possible, whether the variable “school” can lead to the prediction of the teachers’ performance in the area of information literacy.

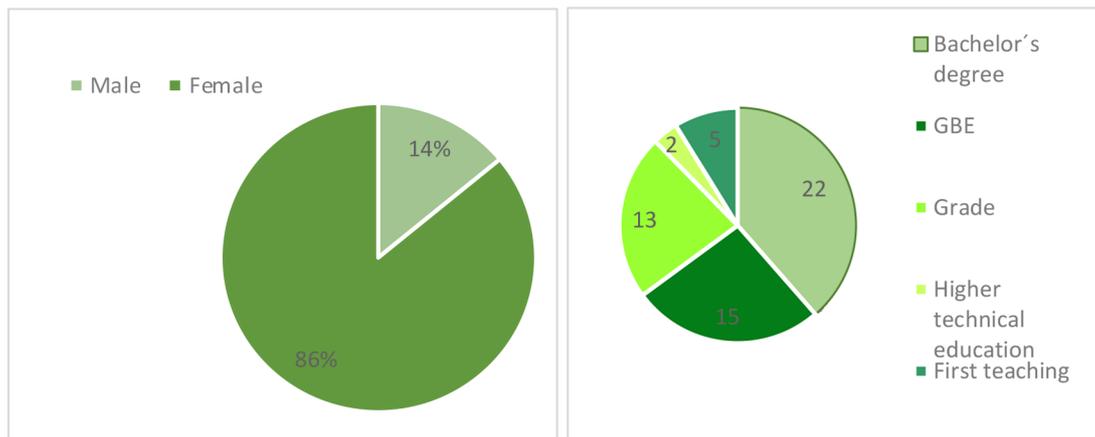
2. Method

The selected research design is established in a descriptive and inferential quantitative analysis. The purpose was to approach the object of study through its exploration and description and the subsequent application of hypothesis contrast tests, as well as the identification of predictor variables (Hernández, Fernández & Baptista, 2016).

Frequency and percentage statistics were also estimated for the comparison of independent samples through the calculation of the t-student test. This parametric statistic was applied once the compliance with the Kolmogorov-Smirnov normality test, ideal for the sample size of this study, and the homoscedasticity tests (Levene Test) were verified. The purpose of this test is to compare the means between two groups formed around the independent variable “educational center” because, in previous works, some possible differences were reflected in certain digital skills between teachers who belong to public or private with state-funded financial support centers (Fuentes, López & Pozo, 2019; Falcó, 2017). Finally, linear regression was applied to identify whether the independent variable “type of educational center” influenced any of the dependent variables analyzed in the study (Peláez, 2016).

2.1. Description of the Sample

The target population is made up of teachers from twelve different centers in which Early Childhood Education is taught in the province of Granada (Spain). The sample taken for the study was of 57 practicing Early Childhood Education teachers (n=57). The recruitment procedure was carried out through a stratified random sample, in which the twelve centers chosen had a different nature (public and private with state-funded financial support) in order to be able to establish comparisons between them, with a 95 % confidence interval and a margin of error of 5 % (Casal & Mateu, 2003). In Figures 2 and 3, we specify the identifying characteristics of the sample.



Note: GBE: General basic education

Figure 2. Teaching gender and academic qualifications of the sample

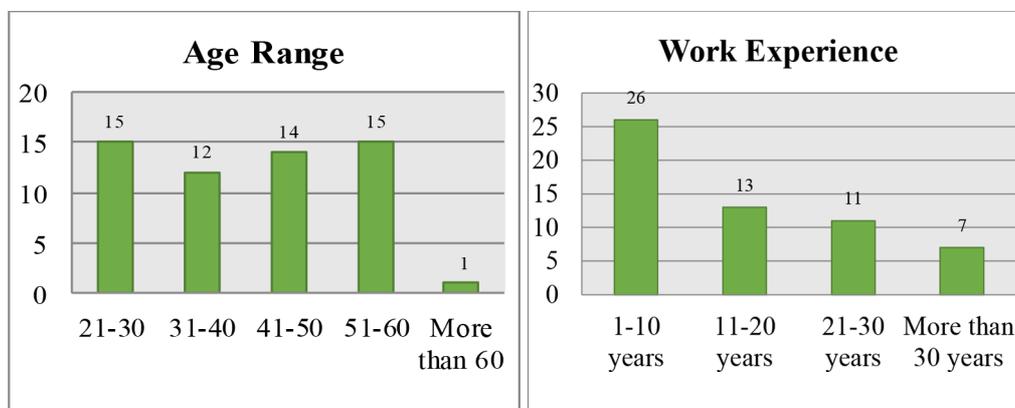


Figure 3. Age and work experience of the sample

2.2. Measuring Instrument

In order to carry out this procedure, the questionnaire has been chosen as the measuring instrument. Specifically, the choice of the questionnaire proposed by the DIGCOMP Project (Digital Competence) for the achievement of the Digital Teaching Competence (Ferrari, 2013) was advocated, which works in all the areas described above: information literacy, communication and collaboration, content creation, security in digital environments and troubleshooting.

Specifically, in this piece of work, the focus was on the area of information literacy, which is the main object of study. This area is at the same time divided into 3 specific skills: a) Navigation, search and filtering of information; b) Evaluation of information; c) Storage and retrieval of information.

The entire questionnaire is made up of a total of 91 items. However, for the area of information literacy, there are a total of 16 items. This is a Likert scale with 4 response options: 1 = Strongly Disagree; 2 = Disagree; 3 = Agree; 4 = Strongly Agree. Barlett's factorial test was applied, obtaining a coefficient of .794 (sig.<.001). The instrument contains a variety of questions as well about the identifying characteristics of the participating teachers, such as gender, age, degree and teaching experience. These aspects formed the independent variables of the study and have been described in the description of the sample.

The level of reliability was evaluated through the Cronbach Alpha test of .897, as well as the test of the two Guttman halves, which had a value of .781. Thus, based on these optimal coefficients about the reliability of the scale, favorable conditions were presented for the conduct of the investigation. The Alpha test was also applied to the dimensions in which the area of information literacy is stratified. A value of .784 was obtained in the dimension “Navigation, search and filtering of information”; .860 in “Evaluation of information”; and .832 in the dimension “Storage and retrieval of information”.

2.3. Procedure

The research was carried out in the second quarter of 2018. We contacted different centres of different nature (public and private with state-funded financial support centers) randomly, which allowed us the access to the Early Childhood Education teaching body itself, the main object of this piece of work.

The application and dissemination of the measuring instrument to the sample itself was carried out through the digital platform Google Forms, which facilitated the dissemination of the survey to all the teachers who made up the sample's population. The analysis of the statistical data collected was carried out through the SPSS software, version 23.

3. Analysis of the Results

Hereunder, it is shown an in-depth study of the descriptive results and their subsequent interpretation after applying different statistical measures (Table 1).

This table reflects the active use of the Internet and its tools by the teacher, as well as its inclusion and the ability to didactically transpose the contents found on the networks to finally give them a didactic-pedagogical character in the classroom, and among classmates, by sharing that multimedia material among them.

Navigation, search and filtering of information	M	S.D.	As	Kurt
1.1. I use the Internet and its different tools to search for educational information and resources.	3.72	.453	-1.003	-1.032
1.2. I select and adapt the different resources and information that I find on the net to filter them according to the purpose of my teaching work.	3.60	.563	-1.020	.079
1.3. I am able to analyse the different information and resources that I find on the net in order to filter them according to the purpose of my teaching work.	3.47	.658	-1.267	2.194
1.4. I am able to manage the information flows to which I have access (social networks, subscriptions, etc.) for my teaching activity and I share this information with my classmates.	3.16	.676	-.200	-.762
1.5. I use key words and specific vocabulary, sometimes in English, to find the information I need at any given time.	2.96	.865	-.274	-.886

Table 1. Results Competence 1: Navigation, search and filtering of information.

M: mean; S.D.: Standard deviation; As: Asymmetry; Kurt: Kurtosis

Evaluation of information	M	S.D.	As	Kurt
2.1. I value the adequacy of my teaching activity and the quality of the resources and information I find on the Internet.	3.30	.566	-.057	-.523
2.2. I critically evaluate the resources and information I find on the Internet and that I use for my teaching activity.	3.40	.593	-.409	-.655
2.3. I am able to analyse the reliability of various sources of information before using any of them.	3.26	.745	-.473	-1.039
2.4. I have evaluation strategies on the usefulness and accuracy of the resources and information I find on the net to optimize the time I dedicate to it.	2.91	.739	-.134	-.461
2.5. I know how to identify the licenses for use and the authorships of the resources in Internet by comparing and contrasting them for their later use in my activity.	2.81	.833	-.003	-.851
2.6. I develop and use different advanced strategies in the search of information and resources on the Internet and share them with my peers.	3.02	.767	-.521	.146

Table 2. Results Competence 2: Evaluation of information

As for the variability of the answers obtained, we present a set of answers that tend towards homogeneity, as reflected in their dispersion measures. On the other hand, we also find a slight decrease in the average, in item 1.5, referring to the exhaustiveness of the network searches, although in this case, it is evaluated that there is a greater dispersion among the answers viewed in the present item.

As for the way in which the data collected from the sample studied are distributed, we can affirm that they do not present an excessive asymmetry, and in the case of items 1.4. and 1.5. there is a tendency towards data symmetry. In the case of the answers to items 1.1, 1.2 and 1.3, the trend is towards negative asymmetry, i.e. the distribution is biased to the left.

The results obtained in the following items present optimal results in items 2.1, 2.2, and 2.3, as reflected in the arithmetic means obtained, which shows the value that teachers give to the technological resources and information used in the classroom, as well as the previous evaluation of their quality for their future didactic application.

As for the item 2.5 on knowledge about the type of licenses for use and authorships on the Internet, a slight knowledge deficit is demonstrated by the sample. Finally, item 2.6 is studied, referring to web searching and its different strategies for curing content, in which teachers show proper results.

To further specify the position of the data, it is presented that, in the majority of items, the data that make up the arithmetic mean are below the central or median point, as indicated by the kurtosis coefficients that, in the items cited, have a negative value, which indicates the presence of leptokurtic curves when graphically representing the mention data.

The items studied in the descriptive table generically represent the personal competencies shown by each teacher in mastering digital storage tools. The results obtained show that teachers have specific strategies that allow them to store the digital information they have when they are being used in the classroom, with different types of devices (item 3.4). The ability of teachers to compress information and create backups, as reflected in item 3.5, tends to be at the optimal level.

The great majority of answers obtained present a negative asymmetry, which reflects that the majority of the answers are positive, and that, therefore, the distribution is biased to the left. Regarding the kurtosis coefficients, most of them are also negative, and reflect that the answers obtained are below the values represented through the arithmetic averages obtained.

Information storage and retrieval	M	S.D.	As	Kurt
3.1. I know about and I use the existing storage systems on the different devices.	3.18	.782	-.322	-1.282
3.2. I have both local and online storage strategies (applications and browser extension) for saving finished files related to my teaching activity.	3.14	.743	-.504	-.121
3.3. I update my resources and information regarding my teaching activity, making copies of them and storing those that I do not use.	3.14	.743	-.233	-1.126
3.4. I have storage devices (cloud or external storage) in which I store and share resources and files that may be of interest.	3.33	.764	-1.154	1.363
3.5. I am able to compress and back up the materials I use to optimize the storage space I have on my devices.	2.82	.848	.167	-1.229

Table 3. Results Competence 3: Storage and retrieval of information

Dimension	Center	N	Mean	S.D.	t	df	p-value
Navigation, search and filtering of information	Public	23	3.36	.712	-1.77	55	.761
	Private with state-funded financial support	34	3.40	.598			
Evaluation of information	Public	23	3.00	.719	-1.01	55	.401
	Private with state-funded financial support	34	3.20	.692			
Information storage and retrieval	Public	23	2.93	.753	-1.62	55	.147
	Private with state-funded financial support	34	3.25	.761			

Table 4. T-student test for the comparison of means between teachers from public and private with state-funded financial support centers.

In order to make the comparison between means, it was necessary to calculate the parametric character of the data distribution beforehand. For this purpose, the normality index is first calculated using the Kolmogorov-Smirnov test, the proportionate value of which is below 0.01, thus indicating that the distribution follows a Gauss or normal trend (sig. < 0.01). The degree of homoscedasticity or homogeneity of variances is also checked, that is, the variances of the dependent variable in the groups being compared should be approximately equal. Through Levene's test in which a $p > .005$ value was obtained in all the items, therefore, we could assume, equal variances in the distribution of the data based on the independent variable “educational centre”.

Being demonstrated the parametric nature of the distribution, the comparative analysis carried out through the t-student parametric test (Table 4) showed that, taking as an independent grouping variable the centre where teaching is given (public or private with state-funded financial support centers), there are no significant differences between teachers from one centre to another, so it shows a homogeneity in the averages obtained.

However, despite these results, which are contrary to the hypothesis, there are significant differences between the character of the center and the perception and ability towards informational literacy. We proceeded to check whether the independent variable “educational center” had any influence and could predict the informational skill inserted in each variable depending on the dimensions analysed. For this purpose, a linear regression model was used, in which its possible performance was previously checked through the ANOVA test (Tables 5 and 6) in order to contrast the existence of a relationship between the variables involved. After the application of this test, only dependent variables 3.3. and 3.4. responded positively to the application of the statistical test.

Once the valid ANOVA tests were determined, a linear regression model was developed, the purpose of which is to allow prediction from the following values, such as the variable “school” influences the dependent variables 3.3: “I update my resources and information referring to my teaching activity, making

copies of them and storing those that I do not use” and 3.4: “I have storage devices (the cloud or external storage) in which I store and share resources and files that may be of interest”. (Table 7 and 8). The veracity of the model is determined by its coefficient R². In this case, it is visualised in the tables that the variable “educational center” predicts the dependent variables expressed following the linear trend expressed in 7.7 % and 9.8 % of the possible cases.

Model	Sum of squares	df	Quadratic mean	F	p
Regression	2.061	1	2.061	3.866	.048
Waste	26.735	54	.533		
Total	30.857	55			

Table 5. ANOVA test variable 3.3. with predictor variable “Educational centre”

Model	Sum of squares	df	Quadratic mean	F	p
Regression	2.485	1	2.485	4.485	.039
Waste	30.069	54	.557		
Total	32.554	55			

Table 6. ANOVA test variable 3.4. with the predictor variable “Educational centre”

Coefficients	B	Standard error	t	p	R ²
Variable 3.3.	2.523	.330	7.646	.000	.077
Center	.390	.198	1.966	.048	

Table 7. Linear regression model for variable 3.3; B: Model constant

Coefficients	B	Standard error	t	p	R ²
Variable 3.4.	2.659	.337	7.885	.000	.098
Center	.428	.203	2.113	.039	

Table 8. Linear regression model for variable 3.4; B: Model constant

4. Discussion

Information literacy is presented as one of the fundamental bases on which the digital training of teachers is based. Therefore, it constitutes a kind of knowledge that it is essential for teachers to master in order to be able to optimally carry out digital work in the classroom. In the case of this analysis, the results showed that the teachers' perceptions of information skills were adequate, a result that was also visualized in other adjacent studies (Iliina et al., 2019; Serafín et al., 2019).

The search for digital information is perceived as a fundamental skill that every teacher must master. The adequate search for digital resources, as well as web information on behalf of the teacher, is an aptitude that the Early Childhood Education teachers analysed present with a high degree of performance, and that in general, the teaching staff is performing better by time (Falcó, 2017; Martínez & Rodríguez-García, 2018). The teachers studied stated that they carry out actions linked to the exhaustive search for information, in which they use strategies for curing content, as well as for verifying information. These strategies are presented as a priority need to continue providing initial and continuing teacher training for an obsolete present and future of digital information (Morales-Capilla et al., 2015).

In addition, the importance of digital licensing and access to information is an area that is growing with the results obtained. Similar results were obtained in Rodríguez, Méndez and Martín (2018), which reflects the growing dominance of teachers when it comes to evaluating digital information, specifying the differentiation they made between one type of license and another, as well as evaluating the publication of their digital resources under a specific license.

Regarding information storage and retrieval, the results were positive, although an improvement in the ability to compress backups is needed. Even so, the teachers analysed were knowledgeable of different digital storage devices, as well as techniques and strategies for creating digital backups. In studies such as Esteve (2015) or Durán, Gutiérrez and Prendes (2016), the relevance of storage and the storage of information and digital teaching resources on web platforms coincides with that of today, in which users can share them with other users according to their interests, promoting digital interaction and networking.

This study has also confirmed, through its comparative statistical analyses, that the level of competence expressed through the perceptions measured by the instrument used in the research does not vary significantly between teachers belonging to a public school and those belonging to a subsidized school. In this way, the idea reflected in the study by Fuentes, López and Pozo (2019) and Martínez, Lorenzo and Camacho (2016) is clarified, in which reference is made to the homogeneity of digital training existing among the teachers who make up the centres of different kinds, and that, despite the existence of differences in their selection processes, there are no significant differences in their perceptions of informational literacy.

However, in spite of obtaining this contrasted affirmation, the present study was obtained through the elaboration of models of simple linear regression that showed that the character of the educational center could manage to predict the development degree of variables linked to information literacy, as has been the case of the updating and storage of teaching resources and the capacity of the teaching staff to have storage devices.

5. Conclusions

Information literacy is considered an area that teachers (study sample) claim to have a good command of. The results presented in the study reflect that the teachers are at a time when they are acquiring the knowledge to be able to play an optimal role in the present and future digital society. Without any doubt, and despite the limitation of the sample size, this work has a huge relevance because it emphasizes the development of the area of information literacy as a pillar on which the later development of the digital competence in the teaching staff is based.

This study has also attempted to establish a first approximation to the comparative analysis between centers of different nature about information literacy, which has shown, in this case, the non-existence of significant differences in the development of this area in the teaching staff based on the nature of their educational center. However, through a deeper examination, it was found that the nature of the school could predict the development of some skill related to the information area. Based on this, it is intended to promote through this study the future conduct of research that covers this subject with a greater and depth population of study, following the line of analysis presented.

Finally, it advocates the need of a continue research in the development of digital teaching competence, in its different educational levels, since its correct performance undoubtedly implies the adequate becoming of its students and future citizens of our society.

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