Proyección pedagógica de la competencia digital docente. El caso de una cooperativa de enseñanza

Pedagogical projection of teaching digital competition. The case of a cooperative education

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RESUMEN.
La sociedad en la que nos encontramos obliga al colectivo docente a adquirir competencias profesionales concernientes al ámbito tecnológico, con el propósito de atender a las necesidades de un alumnado envuelto en una era digital. El objetivo de este estudio se ha centrado en conocer el alcance pedagógico de la competencia digital de los docentes de una cooperativa de enseñanza. Para ello se ha seguido un diseño de investigación no experimental de tipo descriptivo con naturaleza cuantitativa, en una muestra de 42 docentes de una cooperativa de enseñanza de Ceuta (España). Como instrumento de recogida de datos se ha utilizado un cuestionario *ad hoc*. Se ha obtenido que los participantes con mayor proyección pedagógica en el ámbito de las TIC se encuentran en un perfil masculino, de joven edad, con una licenciatura como titulación académica que desempeña su labor docente en la etapa de Educación Secundaria Obligatoria. A pesar de ello, el nivel de competencia digital revelado por estos profesionales de la educación resulta deficiente, reflejando solamente destrezas digitales en el área relacionada con la información y la alfabetización digital.

PALABRAS CLAVE.
Competencia digital docente, alcance pedagógico, innovación didáctica, TIC.

ABSTRACT.

The society in which we require the teaching staff to acquire professional skills concerning the technological field, in order to meet the needs of a student involved in a digital era. The aim of this study has focused onmeet the educational scope of the digital competence of teachers of a cooperative education. For this it has followed a non-experimental design research with quantitative descriptive nature, in a sample of 42 teachers teaching a cooperative Ceuta (Spain). As data collection instrument has been used an ad hoc questionnaire. It has been obtained that participants with higher educational projection in the field of ICT are in a male profile, young age, with a degree as academic qualifications played teaching at the stage of compulsory secondary education. However, the level of digital competence revealed by these professionals in education is deficient, reflecting only digital skills in the related information and digital literacy area.

KEY WORDS.

Digital competence teacher, educational scope, educational innovation, ICT.

1. Introduction.

The unstoppable development of technology requires finding answers to the problems of joining the educational process from the perspective of pedagogy: the analysis of the theory, curriculum design, initial and continuing training of teachers, educational foundation and methodological use of technology in teaching and learning, among other analysis edges generate significant scientific production that highlights the Spanish publications (López, Pozo and López, 2019; Martínez and Hernández, 2017; Mendieta, 2016; Rodríguez and Martínez, 2018; Rodríguez, Cáceres and Alonso, 2018).

In order to deepen the current state of the problems surrounding the development of teaching digital competence (TDC), this analysis of the consultation of exploratory studies focusing on teachers, especially in their knowledge, attitudes and uses of technology.

Among the problems affecting the development of TDC the predominance of an instrumental view technologies (Gewerc and Montero, 2015) mentioned; incoherence between education policy and curriculum design (Valverde, 2015); limitations in the preparation of teachers and their attitudes (López, Pozo, Morales and López, 2019; Padilla, 2018; Carrasco, Sánchez and Carro, 2015); and even the absence of "research to realize the achievement of performance in a consistent manner" (Silva, Miranda, Gisbert, Morales and Onetto, 2016, p. 66).

Exploratory studies on knowledge, attitudes and uses of technology reveal different standards considered as an expression of TDC in specific contexts. In evaluating the development of digital skills in schools' teachers (Fuentes, López and Pozo, 2019; Morán, Cardoso, Cerecedo and Ortíz, 2015) to planning, teaching, evaluation and use of information and communications technology tends (ICT). Thus, teachers "see themselves with a high level of proficiency in the skills related to planning, while for the other three components (didactic, evaluation and management of ICT), respondents have a regular domain" (p. 63), contrasted by other experts judgment as Fernández, Leiva and López (2018).
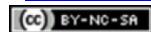
Coincidentally, Carrasco, Sánchez and Carro (2015), in a direction to determine the level of development of digital skills of education professionals research, found that "teachers require greater skill in managing programs, networks and information available on the Internet as an educational element for the development of digital skills and complex thought applicable to their academic and work performance "(p.17).

As stated so far it appears that the exploratory studies on the problems of development of the TDC focus primarily on the analysis of knowledge and the use and attitudes of teachers. However, other indicators such as infrastructure, access and safety are also considered in the tasks diagnostic investigations. There is also consensus in the interest of seeking an integrated perspective of instrumental, informational and interactive aspects, considering the latter the least developed among teachers analyzed.

As for the conceptualization of TDC, we have a wide range of approaches in the current scientific literature. Terminological precision, as well as profiling, descriptors and indicators for evaluating the TDC, constitute the central aim of much research (Durán, Gutiérrez and Prendes, 2016a; Pettersson, 2018; Castañeda, Esteve and Adell, 2018; Lazaro, Gisbert and Silva, 2018; López, Pozo and Fuentes, 2019a; López, Pozo, Fuentes and López, 2019; López, Pozo, Fuentes and Trujillo, 2019).

Most analyzes are based on the TPACK model (Technology, Pedagogy and Content Knowledge) posed "the interaction of pedagogy (how to teach), the substantive knowledge of what is taught and technology (with what tools)" (Tourón, Martin, Navarro, Pradas and Íñigo, 2018, p.27); these authors define TDC as:

> Set of skills and abilities that lead us to incorporate technology-and properly-use information and communication technology (ICT) as a methodological resource, integrated into the teaching process-learning, becoming Technologies for Learning and Knowledge (TLK) with a clear didactic application (p.28).

The domain of ICT acquires a specific character as a teacher professional competence, determined by the purpose of use, application forms and the integration of technology and educational content in the solution of educational and methodological problems that arise in the educational process:

> A competent teacher regarding ICT should be able to select and appropriately use digital tools and resources necessary to manage information, create tasks in relation to a problem, design appropriate to the needs of a particular context resources and participate in environments to develop and disseminate their knowledge. And all this from a not only technical knowledge but also didactic and communicative possibilities of ICT. (Durán, Gutiérrez and Prendes, 2016b, p.529).

Rangel (2015) brings together three-dimensional resources to be able to mobilize teachers to integrate ICT effectively in their teaching ways: technological, informational and educational. Calderón and Gómez (2018) propose a route teacher training covering technology, communication, educational, and research management areas:
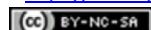
Technological competence refers to the ability to choose various technological and understand the right way to combine them and use them in the context of the scope and limitations that they possess tools; the communication refers to the development of verbal and written skills in physical and virtual spaces, expression by various means, resources, languages in simultaneous or later times; teaching to the incorporation of the possibilities of ICT in various teaching strategies; the management's ability to plan, organize, manage, monitor and evaluate the processes developed both pedagogical and didactic practice and in the development of institutional strategies, and research, capabilities to make use of ICT in research processes that lead to progress or transformation of knowledge. (p.242)

Enough theory about the TDC and clarity about the importance of diagnosis and assessment is appreciated. There is much concern about the pedagogical aspect of the TDC, but to explain the sociological arguments prevail rather than didactic, methodological and pedagogical arguments in general. That is why a paradigm shift to techno-pedagogical level in education today, in order to meet the needs of their students in a technological society is demanded (López, Pozo and Fuentes, 2019b; Moreno, López and Leiva, 2018).
This research was developed in a cooperative education, understood as one of the types of schools that are today in the Spanish educational landscape (López, Moreno and Fuentes, 2018). These institutions have emerged to be among the centers with the highest quality of educational services offered (López, 2017; López, López and Fuentes, 2019). Cooperatives also teaching base their rationale on the effectiveness of their professional leadership and innovation (López and Fuentes, 2018; López, Pozo and Fuentes, 2019c; López, Pozo, Fuentes and Fuentes, 2019). That is why we have chosen this type of school to carry out the study in the following sections detail.

1.1. Objectives of the study.
The main objective of this research is centered in the educational scope of the digital competence of teachers of a cooperative education.
In order to guide the study has broken down this overall objective the following specific objectives:
- To determine the gender of teachers with the highest digital skills in the educational field.
- To know the age group of teachers having higher levels of digital educational level competition.
- To determine the degree of academic qualifications of teachers more tecnopedagógica projection.
- To define the educational stage in which their professional competence have greater level of technological nature.
- To know the pedagogical use of educational technology in teaching.
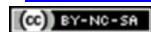
2. Material and methods.

2.1. Research design.

To achieve the objectives formulated under the guidance of McMillan and Schumacher (2005), has established a non-experimental design quantitatively descriptive.

2.2. Participants.

This research has involved the entire teaching population (n = 42) of a concerted (Co-operative education) center of the Autonomous City of Ceuta, which has specialists of the first three stages of education (Kindergarten, Primary and Secondary mandatory). These professionals have an older (M = 43; SD = 4.61).

For the choice of subjects, based on the precepts of Hernández, Fernández and Baptista (2014), it has used a convenience sampling, justified on ease of access to this group of education professionals.

Further details of the study sample are reflected in the Tables 1 and 2.

Table 1. Participants in the study.

Sample	n	%
Men	15	35.7
Women	27	64.3
Total	42	100

Source: self made.

Table 2. Distribution of teachers by educational stage.

Educational stage	Gender: n (%)
Early Childhood education	Men: - Women: 6 (14.3)
Primary education	Men 8 (19) Women 11 (26.2)
Secondary education	Men 7 (16.7) Women: 10 (23.8)

Source: self made.

2.3. Instrument.

It has employed an ad hoc questionnaire process I collected data, designed specifically for this study, under the guidance of Alaminos and Castejón (2006). This tool has been validated by expert opinion, specifically for 5 Doctors specialists in educational technology, whose feedback were appropriate and satisfactory, revealed by Kappa Fleiss and Kendall's W coefficients (K = 0.833; W = 0854). Also, the reliability of the instrument is calculated by statistical alpha (α) Cronbach throwing consistent values according George and Mallery (2003). In Table 3, they are the main features of the questionnaire.

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Table 3. Features questionnaire.

Dimension	Items	Type of response	Reliability (Cronbach α)
Social	8	Likert (1-4)	0.812
Competential	25	Likert (1-4) Closed answer	0.835
Methodologic	8	Likert (1-4) Closed answer Multiple choice	0.861
Training	5	Likert (1-4) Closed answer	0.827
Total	46	Varied responses	0.834

Source: self made.

Ultimately, as recommendation Corral (2009), it was held piloting the instrument in a group of 12 independent subject to the study sample (teachers from other schools) in order to reduce bias in the fieldwork.

2.4. Concreteness of variables.
The variables established in this study are collected under the following classifications:
- GEN: Gender participants.
- AGE: Age of teachers.
- QUALI: Qualification of teachers.
- STA: Educational stage where they perform their work.
- TDC: teaching digital Competition (AREA1, AREA2, AREA3, AREA4 and AREA5).

2.5. Process.
To effectively accomplish the objectives formulated in this research various actions developed. The study originated in October 2018 with the contacting in a first moment of researchers with the management team of the school in question, to explain the purpose of research and obtain the necessary authorization for the display of the same. Then, it was carried out the design and validation of the questionnaire used to collect the data. Instrument for the implementation of the completion of a Senate took advantage in this, teachers completed the tool, the researchers being present to answer any questions or problems encountered during the process. Further, in that event participants reported that data would be treated anonymously in order to maintain the objectivity of these. Finally, all the information extracted raw questionnaires. They were prepared and data to be imported into statistical program, with the intention to conduct a thorough study of the different variables were categorized.

2.6. Analysis of data.

We used the Statistical Package for the Social Sciences (SPSS), version 22, for data analysis program.

In the descriptive statistical analysis present the number of cases in each category and the percentage was obtained, besides the mean (M), the standard deviation (SD), the skewness of Fisher (CAF) and asymmetry coefficient (CAP).

3. Results.

This section highlights research findings are shown. Starting with the pedagogical use that teachers make ICT potential level by gender (Figure 1), the data obtained have shown that men (59.52%) who reveal greater techno pedagogical supremacy over women (23.81%).
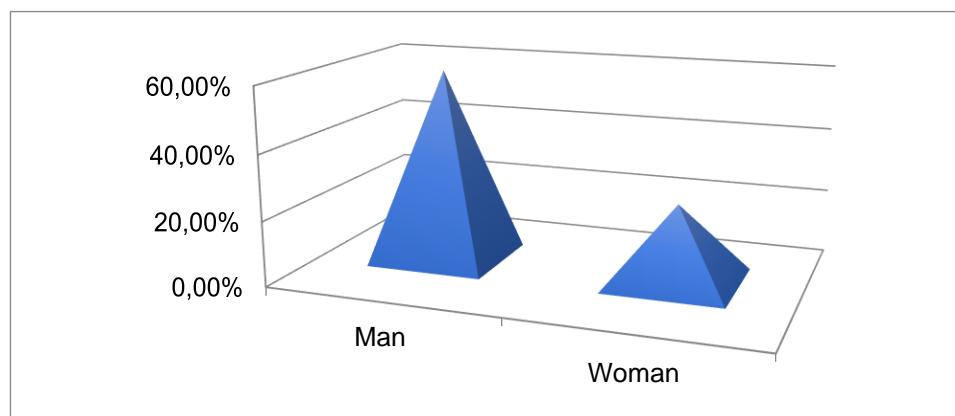

Figure 1. Potential pedagogical use of ICT by gender.
Source: self-made.

As for the age variable, as shown in Figure 2, the range reflecting higher rate of penetration pedagogical technology is that corresponding to the younger population (21-30 years), with 73% of these professionals the to make greater use of ICT pedagogical level in their daily exercises as a teacher. Another aspect is that every time increasing age teacher, the percentage figures for techno pedagogical potential decrease.
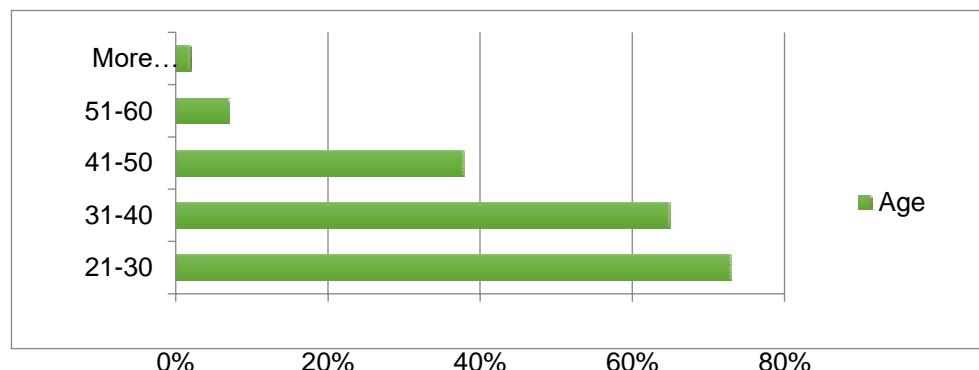

Figure 2. Pedagogical potential of ICT usage by age.
Source: self-made.

On tecnopedagogía potentially used by teachers by academic title, Figure 3 shows how the teaching that has a degree ICT used educationally effectively, reaching 68% over other titer levels, followed in a lesser extent by graduates (14%) and grade (12%). And in latter position with low figure doctorates (6%).
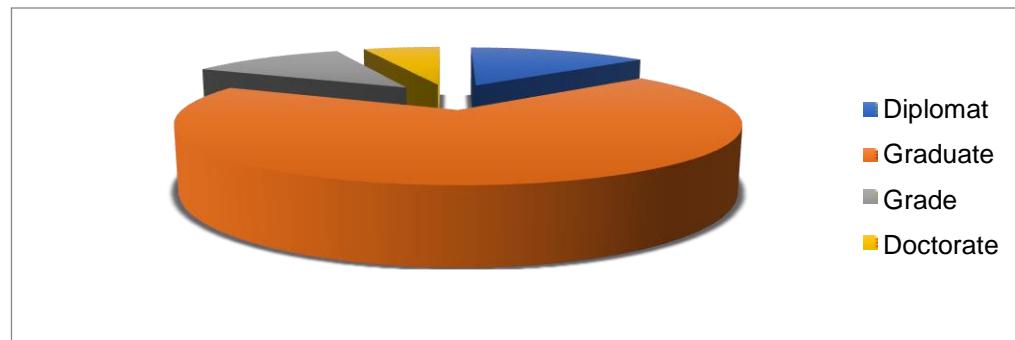

Figure 3. Comparison of the pedagogical use of ICT by academic qualifications.
Source: self made.

Referring to the use of technology in pedagogical spectrum, considering the educational stage where he teaches teachers in the surface plot (Figure 4), has been obtained in step secondary school teachers made greater technopedagogical use of digital resources at your fingertips with respect to other stages.
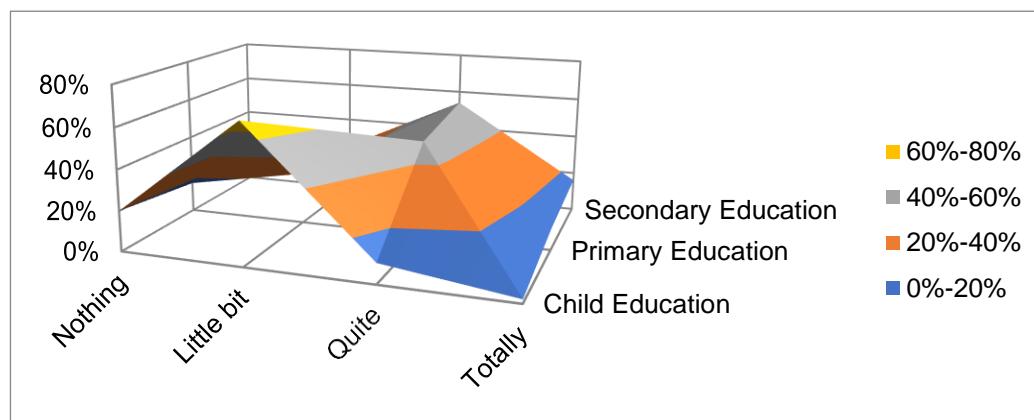

Figure 4. Pedagogical use of ICT for educational stage.
Source: self made.

Referring to the detailed description of digital competence teaching for different areas (Table 4), based on the data obtained it. It is determined that the AREA1 variable concerning the skills relating to information and digital literacy teacher, has been which has reached top rating, followed closely communication and collaboration between teachers (AREA2). Statistical made (CAF; CAP) reveal an asymmetric distribution of positive character data and a pointing platicúrtico kind in the results offered.

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Table 4. Distribution by CDD level.

	Likert scale *n (%)*				Parameters			
	Nothing	**Little bit**	**Quite**	**Totally**	**M**	**SD**	**CAF**	**CAP**
AREA1	2 (4.76)	4 (9.52)	22 (52.38)	15 (33.33)	3,142	0.773	-0,868	2,769
AREA2	4 (9.52)	8 (19.04)	19 (45.24)	11 (26.19)	2,881	0.905	-0,534	2,078
AREA3	7 (16.66)	17 (40.47)	10 (23.81)	8 (19.04)	2,452	0.981	0.208	1,481
AREA4	7 (16.66)	11 (26.19)	15 (35.71)	9 (21.43)	2,619	0.998	-0,186	1,621
AREA5	8 (5.19)	13 (30.95)	11 (26.19)	10 (23.81)	2,547	1,051	-0.002	1,472

Source: self made.

4. Discussion and conclusions.

As revealed in the manuscript, teaching digital competence acquires a relevant value in educating the XXI century due to the impact of technology in today's society and catalogándose as one of the professional skills that every teacher must acquire for quality education in the information society and knowledge (Durán, Gutiérrez and Prendes, 2016b). The faculty today should encourage the use of digital resources in their daily practice, intended to address and alleviate the needs of a learner framed group within a technological era, as established López and Bernal (2019) and reduce the digital divide between teacher and pupil, as recently postulated Cabero and Ruiz (2018).

Following Moreno, López and Leiva (2018), all this can only be achieved through a transformation and innovation in educational paradigms, through a pedagogical updating of teachers and a technological inclusion in the teaching and learning.

On the competence level having teachers in digital terms, consistent with previous studies (Carrasco, Sánchez and Carro, 2015; Fernández, Leiva, López, 2018; Morán, Cardoso, Cerecedo and Ortíz, 2015; Padilla, 2018). They have limited skills in different areas such competition. Only in the area of information and digital literacy reveal relevant skills.

With the completion of this research descriptive in nature are determined the following conclusions:

- By gender of teachers are men who made a greater potential of technology in the educational sphere use.
- Based on the age of the teacher, the intervals are younger age who have achieved greater pedagogical potential of ICT, changing that from 41 years onwards.
- Regarding educational qualifications, are teachers with a bachelor's degree who have manifested an increase in their daily technopedagogical praxis.
- As for the educational stage where they perform their teaching, it is the question of compulsory secondary education which has obtained a higher rate of penetration pedagogical educational technology.

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- Referring to the level of digital competence of teachers analyzed, this sum is in a technopedagogical deficit, reaching only relevant skills in the area of information and digital literacy. Performance in other areas of digital competition is quantified in a cluster in the central values of the scale used, which notes a competence level that while it is not in the lowest range is insufficient in a panorama education in the use of ICT becomes mandatory.

Conducting this study has revealed the state of the current issue of the educational level of digital competence of teachers who perform their professional duty in a type of school in particular and brief historical life in the Spanish educational landscape as they are teaching unions.

The limitation found in this study originated in the process of data collection, mainly in the lack of understanding of some elderly participants when responding to the items on the competence dimension. As a future line of research is to extrapolate the stated objectives covering other types of schools, including public and private nature.

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