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RESEARCH ARTICLE

Enhancing Digital Competency: Validation of the training proposal for the development of Teaching Digital Competence according to DigCompEdu

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Abstract: The technologicalization of society has been a great challenge for education in the XXI century, seeing this in the need to face it in order to provide quality digital literacy. These accelerated changes have repercussions in various areas, among them the professionalization of teachers, due to the difficulties presented when updating their knowledge and adapting to the dizzying technological pace. Teaching Digital Competence (TDC) as a safe and critical use of technologies is considered one of the key competencies, guarantors of educational success, within a new ap-proach in virtual education. Following this line, the present research focuses on the design and subsequent validation of the structure, contents and activities of a training programme aimed at improving and developing the digital competence of non-university teachers according to the model of the DigCompEdu Framework belonging to the European Union. This research is part of a larger one and, as a previous step to a larger study, a Delphi-type validation design is estab-lished using an expert coefficient that has the participation of 50 people. The results demonstrate the validity of the training proposal, as well as the uniformity of the experts' criteria. In this sense, the application and benefits of this training action for skills development are discussed.

Keywords: teaching digital competence; DigCompEdu; teacher training; digital literacy.

1. Introduction

We live absorbed in a new digital reality, as a result of the accelerated changes that society is going through, where information generates new paths promoted by the advances produced by the Information and Communication Technologies (ICT).

A "hyper-technologized" society (Tornero & Varis, 2010), immersed in multiple and continuous changes, produced by the incorporation of digital technologies. New media that alphabetize practices, adding relevance when defining the functioning of labor and recreational contexts of the 21st century society (Mills, 2010).

In this context, new methods of communication emerge, which in turn generate new trends and leadership frameworks oriented towards increasingly demanding and competitive social development (Romero-Tena et al., 2020).

Creating new collaborative and communicative environments, which in addition to bring-ing improvements in today's society, also generate benefits in the educational framework (Cabero-Almenara et al., 2020; Guillén-Gámez et al., 2021).

Despite this progression, the mere fact of immersing ourselves in the technological current does not guarantee equal opportunities for access and use, causing differences in society and in the different levels of competence (Casillas-Martín et al., 2020).

Despite this progression, the mere fact of incorporating technologies does not make learn-ing environments change (Marcelo et al., 2015; Pelgrum & Voogt, 2009), to achieve this purpose, it is necessary to have a center leadership that manages to increase the motivation of the teaching staff when implementing new teaching processes through the use of ICT, and to achieve an increase in the level of competencies in the use of these, generating a development of the collaborative culture, promoting the inclusion of technologies in the teaching and learning process (AE).

Understanding these realities, the European Union Commission decided in 2013 to emphasize the need to "rethink education" to achieve quality education through the effective integration of ICT in education. It would seem, then, that technologies acquire an essential role as an indispensable resource among teachers, whose level of competence will be crucial in order to provide quality to the educational process (Salinas, 2004).

Therefore, it shows the need to develop digital literacy that manages to be integrated, transversely, at each of the different levels that make up the educational system (Osuna-Acedo et al., 2012; López-Romero & Aguaded-Gómez, 2015).

The need for teacher training in the use of technology has led to the emergence of new terms, such as Digital Competence in Teaching (CDD), seen as the second most important teach-er training need worldwide according to the Organisation for Economic Co-operation and De-velopment (OECD), which is essential for the use of Information and Communication Technolo-gies (ICT) encompassing broader dimensions than the simple instrumental use of them (Casal et al., 2021; Cabero-Almenara et al., 2020).

As pointed out (Calderón-Garrido et al., 2020), the TDC has different dimensions. For this reason, for the

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development of this TOC different frameworks have been proposed, such as: ISTE Standards, Unesco Framework, safe and critical use of ICT in the field of education, under the DigCompEdu reference framework, and to diagnose

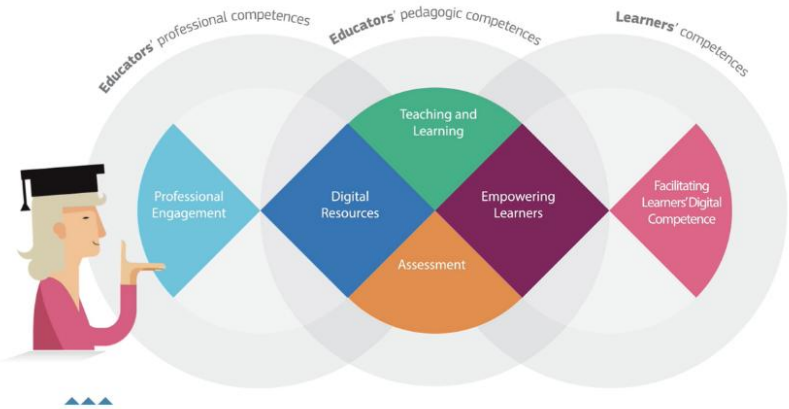

Figure 1. DigCompEdu framework. Source: JRC.

INTEF Framework. In our current context of transformation, the one detailed by the European Union, the DigCompEdu Framework (Digital Competency Framework for Educators), becomes more important. DigCompEdu has six areas of competence (Figure 1).

This framework was created with the main purpose of offering help to member states to promote digital competence and thus favor educational innovation, having as main objectives the following (Cabero-Almenara & Palacios-Rodríguez, 2020):

(1) Found a model that would serve as the development of professional teaching skills and that in turn would be able to align with European policies.
(2) Be a reference and be able to advance in the development of an instrument that adapts to the different institutional demands without requiring the development of a conceptual basis for it.
(3) Creation of a common language and logic that would help in the reflection and exchange of ideas and opinions between the various states that make up the European Union.
(4) To be able to position itself as a benchmark for the states belonging to the EU, as well as for other interested nations, highlighting the importance of knowing how to apply ICT in different social spheres.

The "DigCompEdu" model was created with the main objective of ensuring that educators obtain an improvement in their understanding of said framework, providing them with their own evaluation of their strengths and weaknesses, necessary to become highly competent teachers in their practice.

2. Materials and Methods

This study focuses on the evaluation of a training action for non-university teachers, designed with the main objective of acquiring TDCs according to the DigCom-pEdu framework. This research is linked to the project "Design, production and evaluation of t-MOOC for the acquisition of digital teaching competences" (DI-PROMOOC).

The evaluation of a training program focused on the development of teaching competencies, understood as the and improve teaching competencies, with the main objective of knowing the level of competencies achieved. The user will have at his disposal an explanatory video for each of the areas that make up the training action, a total of 6 areas. After watching the video, the teacher will start to visualize the content of the area and once finished, he/she will perform different tasks. In total, the user will have to perform between 4 and 6 activities per competency and level. Of this total number of activities, the user will only have to complete two activities.

In order to understand how to perform the activities, a didactic guide will be offered where aspects related to identification, guidelines for their completion and checklists for the teacher to measure the quality and delivery of the tasks will appear, and a rubric for the student's self-assessment and the tutor's evaluation.

The e-activities or tasks proposed are of different kinds: the creation of concept maps, active participation in forums, construction of blogs, creation of PLE with digital tools, organization of tasks for students and other teachers, creation of learning communities ...

For its evaluation, the technique of expert judgment is used, consisting of: "an informed opinion of people with significant experience in the subject, recognized by others as qualified experts in it, and who can give information, evidence, judgments and valuations" (Escobar-Pérez & Cuervo-Martínez, 2008).

The present study establishes the criteria for the identification of experts is to have:

- University teaching experience in the use of ICT.
- Experience in the field of teacher training.
- Published about e-learning, virtual training or MOOC in the last 5 years.

In order to refine the expert selection process, the CCE method is applied (Cabero & Barroso, 2013; Cabero & Infante, 2014; López Gómez, 2018; Martínez et al., 2018), an index that is obtained from the teacher's own self-perception of his or her knowledge of the subject matter. To obtain this, the formula is used: K = ½ (Kc + Ka). Where Kc is the "knowledge coefficient", and is obtained from the score offered directly by the expert in the following question:

Check the box that corresponds to the degree of knowledge in relation to the following topics: teacher training in the use of ICT, digital skills, digital literacy... Rate your level on a scale from 0 to 10 (0= no prior knowledge and 10= total knowledge in the subject).
On the other hand, Ka is the "argumentation coefficient". It is obtained by adding up the options detailed by the expert:

	LOW	MEDIUM	HIGH
Theoretical analysis	0.10	0.20	0.30
Teaching experience	0.20	0.40	0.50
Work study on the subject, Spanish authors	0.05	0.05	0.05
Work study on the subject matter, international authors	0.05	0.05	0.05
Knowledge of the subject matter	0.05	0.05	0.05
Intuition of the subject matter	0.05	0.05	0.05

Source: own elaboration

A total of 364 e-mails were sent following the above criteria. After two weeks from the start of the questionnaire, 241 responses were obtained, of which a total of 50 were randomly selected for the study.
The instrument for the collection of information is a questionnaire that includes two blocks. The first is demographic, including the expert's characteristics, and the second includes the expert's evaluation of the training action.
The instrument uses a Likert-type scaling, with six response options: 1. MN= Very negative / Strongly disagree / Very difficult; 2. N= Negative / Disagree / Difficult; 3. R-= Regular negative / Moderately disagree / Moderately difficult; 4. R+= Regular positive / Moderately agree / Moderately agree / Moderately easy; 5. The dimensions analyzed are: technical aspects, ease of use, diversity of resources and activities, and quality of content.

3. Results

En la siguiente tabla se muestran los valores medios y la desviación típica adquiridas en cada una de las dimensiones que conforman el instrumento para la recogida de datos, además de incluirse una valoración global de las mismas (Table 1).
The data obtained offer a different way of designing training plans, characterized by the use of information resources such as: videos, didactic animations, infographics...) as well as the car-rying out of e-activities (tasks) in each of the different modules that the students must pass in order to move on to higher levels.
The scores obtained allow us to corroborate that, in the evaluation of dimensions, the experts determine that the training action responds positively.

4. Discussion and Conclusions

In recent years, educational institutions have reformulated their digitization plans, betting on quality training mediated by the use of digital technologies, taking into account the opinion of teachers when developing digitization plans, as shown in the basis of this study.
According to the results obtained, the experts find essential the development of action plans for the improvement of teacher training, and feasible the proposal as progress to change, highlighting; the ease of use, the diversity of learning objects, as well as the e-activities available to the user and the quality of the training content. On the other hand, we can observe that none of the scores oscillates below 5.20, so that a high valuation within the scale can be deduced.

Dimensiones	M	SD
Technical aspects	5.44	0.71
Easy to use	5.33	0.70
Diversity of resources and activities	5.36	0.69
Content quality	5.35	0.72
TOTAL	5.42	0.71

Table 1. Average assessment and standard deviation carried out by the experts in the environments perceived jointly and separately.

The importance offered in the following work is supported by the effectiveness of the procedure carried out. Each of the evaluations carried out by the experts allow us to determine that these will considerably improve some of the aspects. Following this line, the reformulated version will include:

- Less linear structure.
- Modification of some tasks.
- Presentation of content including complementary material.

The data obtained offer a different way of designing training plans, characterized by the use of information resources such as: videos, didactic animations, infographics...) as well as the car-rying out of e-activities (tasks) in each of the different modules that the students must pass in order to move on to higher levels. This way of designing the training action requires the need to think about specific design forms for the materials used in online training (Budnyk & Kotyk, 2020; Martín-Párraga, et al., 2022).
Finally, it is noted that this tool, according to the experts' evaluations, is feasible when training non-university teachers in teaching competencies following the DigCompEdu Framework. All this allows the approach to the personalized training plan for non-university teaching staff. Therefore, the pilot experience can refine and guide institutions the guidelines for establishing teacher training plans in digital teaching skills.
In short, the creation of these training environments will have an impact on teacher training, thus enriching training activities and, ultimately, improving teacher training and achieving quality digital education.

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Author Contributions
P. -R. designed our research and structure of the paper. L.M.-P. and J.J.G-C. validated this analysis, wrote the original draft, reviewed the draft, and edited this article. A.P.-R. conducted data curation and visualization. All authors equally contributed to write and review this article.

Finally, all authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

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