The Holistic Practice of Educator Digital Competencies: Diagnostics and Prospective

La práctica holística de las competencias digitales docentes: diagnóstico y prospectiva

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Abstract

Digital teaching competences emerge in the context of educational activity as a mechanism of development with high possibilities of success and feasibility. For teachers, the appropriate use of information and communication technologies (ICT) means the possibility of more agile, efficient, and effective communication with students. In this context, ICT are a fundamental means of production, dissemination, and assessment to meet educational needs and build meaningful learning. This study focuses on the creation of a diagnosis of digital teaching competences and the development of a prospective that helps the participants achieve better application of ICT in the context of building learning. This research identifies and describes digital competences and then develops sub- competences for each of them, which allows more significant pathways of action to be plotted out regarding the incorporation of ICT into the teaching-learning process. The instrument developed was applied to a group of teachers involved in the Bachelor's Degree Program in Digital Arts at the Universidad de Guanajuato, Mexico. The analysis of the data enabled the development of a plan that would encourage better practices among the teachers on this program.

Keywords: agency, communication, diagnostic, digital resources, digital teaching competences, higher education, improvement plan, learning process.

Resumen

Las competencias digitales docentes aparecen en el contexto de la actividad educativa como un mecanismo de desarrollo con altas posibilidades éxito y factibilidad. El uso adecuado de las tecnologías de información supone para los profesores la posibilidad de una comunicación más ágil, eficaz y efectiva con los estudiantes. Las TIC aparecen, en este contexto, como un mecanismo de producción, difusión y evaluación fundamental para satisfacer las necesidades educativas y construir aprendizajes significativos. Este trabajo se concentra en la creación de un diagnóstico de las competencias digitales docentes y la elaboración de una prospectiva que conduzca a los participantes a una mejor aplicabilidad de las TIC en el contexto de la construcción de aprendizajes. La investigación identifica y describe las competencias digitales para luego elaborar subcompetencias para cada una ellas, lo cual permitió trazar caminos de acción más significativos respecto de la incorporación de las TIC en el proceso de enseñanza-aprendizaje. El instrumento elaborado se aplicó a un grupo de profesores del Programa Educativo de Licenciatura en Artes Digitales de la Universidad de Guanajuato, México. El análisis de los datos permitió la elaboración de un plan que incentivaría mejores prácticas entre los profesores de dicho programa.

Palabras clave: agenciamiento, competencias digitales docentes, diagnóstico, educación superior, enseñanza-aprendizaje, plan de mejora, comunicación, recursos digitales.

Introduction

The emergence, strengthening, and consolidation of information and communication technologies (ICT) has led to a change in the way in which we humans relate to practically all walks of life. Gisbert Cervera, González Martínez, and Esteve Mon (2016) state that news ways of carrying out educational practices have been adopted and this assumes a more active attitude on the part of those involved in the teaching-learning process. In this context, it is essential for teaching staff to develop or demonstrate a series of competences that allow them to move freely in the digital environment. According to Rangel Baca (2015), in schools at present, teachers should mobilize digital resources that allow them to enrich their practices. In the same vein, Lankshear and Knobel (2008) argue that it is necessary to find a mechanism to define what they call *digital literacies*, due to the nature of the social, political, and cultural implications of using ICT in relation to educational areas. These authors refer to the need for a more specific demarcation limitation of digital literacies because of three fundamental aspects:

   A. the diversity of the conceptual dimensions of the concept;

   B. the strength and usability of the sociocultural perspectives that accompany it; and

   C. the benefits of adopting an expansive definition of the concept in relation to learning.

In this respect, Goodfellow (2011) stated that discussion about digital literacies has to be conducted based on the logic of a reconceptualization of the term, which allows the efforts of universities to be guided towards more meaningful use of ICT. According to this author, it is essential to achieve a convergence that allows the actors to move beyond the traditional roles of apprentices and specialists.

As regards the Leicester Project[1] and the possibilities of digital literacy, Hall, Atkins, and Fraser (2014) considered that the most important aspect is that:

> This recognises the importance for staff: first, in developing the skills to utilise technology purposefully within the classroom; second, in critiquing the underlying knowledge and attitudes that enhance their existing practices; and third, in being positive role models for the critical use of technology (p. 5)

According to these authors, during the Leicester Project two priority areas were identified in the use of technology in connection with the teaching-learning process: pedagogical and collaborative. For Hall et al., therefore, the pedagogical dimension is the responsibility of teachers and it is aimed at enabling technical innovations to have high factors of success linked to assertive action of digital literacy.

Castañeda, Esteve and Adell (2018) refer to a sizeable number of studies regarding digital teaching competences and state that their applications should be aimed at legitimizing the teacher from the logic of guided education, in which the execution of these competences is based on instrumental needs that are related to a "pedagogical layer" (p. 2). For these authors, it would be possible to create a holistic model of digital teaching competences that responds to the present needs of education. From this point of view, a teacher should be competent in: creating emerging pedagogical practices, development and management of pedagogical content in digital media, enriching their practice based on sensitivity and the use of technology, and the expansion of their practice with their surroundings.

Pérez Gómez (2010), meanwhile, believes that it is necessary to overcome the ostracism in traditional education that perpetuates declarative learning and replace it with practices linked to agency. Thanks to this action—and from a constructivist perspective of knowledge—the author refers to the need for a global and complex vision that paves the way for the development of new learning. He states that one aspect that favors the improvement of digital literacy is the development of practical knowledge that allows the curriculum to be diversified. In this scenario, the inclusion of ICT is particularly important because, thanks to its appropriate use:

> the task of the teacher will not consist solely nor mainly of teaching decontextualized disciplinary content, but of defining and proposing situations in which students can construct, modify, and reformulate knowledge, attitudes, and skills, that is, to promote that learners themselves live the relationship between experience and knowledge (Pérez Gómez, 2010, p. 44)

In the Latin American context, Lázaro-Cantabra, Gisbert-Cervera, and Silva-Quiroz (2018) state that the challenge for teachers consists of assuming a proactive attitude in relation to their practices and transcending the social and political conditions in which they work. Since proactive behavior forces teachers to develop constant self-assessment, their proposal is aimed at self-regulation through a rubric that allows the design, incorporation, and development of more significant learning.

The objective of this study was to produce a diagnosis of the mastery of the teachers on the Degree Program in Digital Arts, PELAD (Universidad de Guanajuato, 2014) regarding digital teaching competences. The hope is that the diagnosis will allow the development of a prospective that will lead them to make more successful use of these competences in the design, production, and assessment of the teaching-learning process.

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1. A digital literacy project developed at the University of Leicester between January 2013 and April 2014 with the intention of improving educational practice by means of the use of ICT.

Digital Teaching Competences. A Characterization

In her research, Cano García (2008) produces a description of the concept of competence and articulates it, in accordance with various authors, such as aptitude (Perrenoud, 2004), effective capacity, repertoire of behavior, and complex know-how. Thus, according to the author, the competence would have implications as to how we address knowledge, so it has to respond to the situationality of the subject. In this sense, if we assume the competence as a situational condition in which a degree of expertise is manifested regarding the knowledge with which someone relates, it is essential to establish that all these mechanisms and instruments should be perfectly measurable. However, as regards the use of ICT in the production, dissemination, and assessment of learning, the acquisition of digital competences seems to be a new paradigm for teachers and the activities that they have to carry out in their professional field.

In *Digital Competence in Practice: An Analysis of Frameworks* (2012), Ferrari defines competence as: "a multifaceted moving target, covering many areas and literacies and rapidly evolving as new technologies appear. Digital competence is at the convergence of multiple fields" (p. 3). This multifactorial dimension reinforces the situational consideration of the teaching-learning process, as it allows us to better understand a certain learning.

Thus, since the teacher's role is to facilitate learning, this involves the implementation of perfectly situated actions that require the use of ICT. In the sphere of university education, Martínez Ruíz and Sauleda Pares (1997) talked about the situated nature of teaching and considered that education requires understanding that knowledge is socially constructed, so the dynamics in which ICT are involved are productive. In this regard, Niemeyer (2006) considered that situated learning allows competences to be consolidated as a scheme of active participation in the teaching-learning process. In this context, it is possible to accept that ICT favor the participatory dimension, in such a way that the criteria based on which the contents are assessed require more objective and qualitative instruments.

In short, it is necessary to measure the behavior of teachers in relation to their digital competences, that is, to investigate their acquisition of technological mastery to strengthen these competences, because, as Vera, Torres and Martínez (2014) explain, it is essential to approach ICT from the perspective of pedagogical innovation, since

> it is an opportunity to reposition teachers based on their didactic knowledge. The mastery of ICT by teachers is only a first step, since the essence consists of incorporating the contributions of ICT in order to implement new learning strategies that add value to everyday educational practice. Exploring the possibilities of ICT to promote changes in practices that allow greater and better appropriation of content by students, while contributing to the development of new capabilities that allow them to rise to new challenges (pp. 144-145)

In this sense, it is necessary to design instruments that allow us to find out the degree of competence that teachers possess regarding the use of ICT. In that regard, Rangel Baca (2015) describes digital teaching competences in three levels: "basic notion of ICT, deepening of knowledge, and management of knowledge" (p. 239).

This author describes and analyzes different models to measure teaching competences and argues that "the type of personal resources that are expected to be able to mobilize a teacher in the digital area include technological, informational, axiological, pedagogical, and communicative dimensions" (Rangel Baca, p. 241). For this reason, she developed an instrument to measure these categories of mastery by teachers in relation to various standards of digital competence and she broadly determined that a competent teacher should, among other things, have knowledge about how ICT work—that is, about the equipment involved, the management of networks, the various types of software, their installation, maintenance and security—as well as demonstrating mastery in searching for, selecting, and storing information, and ethical-legal aspects related to ICT management.

Thus, with the objective of sharing ideas, knowledge, and experiences that enrich the educational process, teachers should have mastery and the knowledge and skills that allow them to establish and maintain contact with students, experts, or colleagues, through various media.

These are the antecedents that oblige teachers to consider the need to establish objective criteria to measure the degree of incorporation of ICT in higher education in Mexico, a subject that we address in the next point.

Signification processes in using ICT in teaching practice in Mexico

After describing some of the aspects of digital teaching competences, their applicability, and the educational implications they have regarding the performance of teachers, it should be noted that efforts have been made in Mexico to implement profiles and programs that encourage and fortify these competences in higher education. In this regard, in April 2014 a cooperation agreement on higher education and research for the construction and development of the Digital Learning Communities System was signed between the Mexican and French governments. The project Digital Communities for Learning in Higher Education (CODAES) emerged from a promotional strategy to create and strengthen a digital agenda.

The general objective of this initiative was to build digital communities dedicated to the development of learning objects and tools to support teaching-learning processes in higher education. For this purpose CODAES developed a Reference framework for digital competences (*Marco de referencia de competencias digitales*) with technical-methodological guidelines, which entailed training of students and continuous training of their teachers. The CODAES methodology had two phases:

- identification, description, and analysis of various frames of reference for digital competences;
- design of an instrument that would allow diagnosis of the degree of competence in relation to what Ramírez and Casillas (2014) call digital knowledge.

This knowledge to which the authors allude includes the following aspects, among other things: manipulation of files, device management, programs and information systems specific to the subject's discipline, creation and manipulation of text content and rich text, creation and manipulation of data, creation and manipulation of digital content, communication, socializing and collaboration, digital citizenship, and digital literacy.

In addition to building on the aforementioned sources, CODAES resumed the work of the Digital Conference for Education and Work, which created a series of tests intended to measure the level of digital competence through observation of the performance of individuals and using that to assess the following knowledge:

- Use of digital tools and resources.
- Use of digital languages and symbols.
- Use and management of information.
- Production of information.
- Communication of information.
- Collaboration in communities.

Lastly, in order to achieve greater efficiency in the construction of the instrument to measure digital competences, CODAES also observed the Matrix of skills in the use of information and communication technologies (*Matriz de habilidades en el uso de tecnologías de información y comunicación*) published by the General Directorate of Computing and Information and Communication Technologies (DGTIC) of the Universidad Nacional Autónoma de México, based on national and international ICT certification standards. The eight competences that a university student should demonstrate are taken from this document:

- Access to information.

- Online communication and collaboration.

- Information security.

- Processing and management of information.

- Media management.

- Computer equipment and mobile devices

- Virtual learning environments.

- Resources and technological tools to support teaching.

In addition to the standards mentioned above, CODAES reviewed the work done by the National Institute of Educational Technologies and Teacher Training (INTEF, 2017), which, in its 2013 edition, used the European reference framework to classify digital competences into five categories: information, communication, content creation, safety, and problem-solving. It should be noted that in 2017 INTEF altered these categories, expanding the aspects that each of them addresses and modifying the categorization by renaming them: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving.

That said, as this study is aimed at developing an instrument that allows the level of digital competence of PELAD teachers (2014) to be measured, it is important to note that it establishes seven specific competences for its teachers, which, from an institutional perspective, guarantee effective practice that is perfectly measurable in terms of their teaching competences and their performance in relation to the objectives of the educational program. These competences are as follows:

- CE1. Reflects on their teaching practice and incorporates innovative elements that contribute to their continuous improvement.

- CE2. Congruently guides the student in their comprehensive training, both inside and outside the classroom, through permanent tutoring.

- CE3. Designs and uses different environments, tools, and teaching resources to promote the learning of disciplinary content among the students.

- CE4. Plans the teaching and learning processes, defining the levels of depth to which the disciplinary content should be addressed, so that the student develops the competences proposed in the academic program.

- CE5. Promotes and plans autonomous work by the student, making use of innovative learning methodologies to strengthen their comprehensive education.

- CE6. Critically and reflexively manages the technological tools in the implementation of teaching in order to promote the development of the student's generic and specific competences.

- CE7. Plans the process of assessing performance.

So, having identified the parameters for assessment and the components that will allow the results to be compared, the methodology and analysis of the data applied to this study are described below.

It is important to underline that, since the specific competences defined by the PELAD are linked to the process of evaluating teachers' performance, in this study the comparison of the results will allow us to observe how digital competences influence the professional development of teachers, in order to create a prospective of work.

Methodology and Development of the Diagnostic Instrument

This study is based on producing a diagnosis of the digital competences of PELAD teachers in order to analyze the underlying relationship between these and the specific competences considered in the profile of the program teacher. This was done in order to observe the implications of the technological mastery of the program teachers in relation to the applicability of digital teaching competences in the teaching-learning process. For this reason, we considered it necessary to link the results of the instruments described below with the CE7 competence of the PELAD: Plans the process of assessing performance.

In order to carry out the diagnosis, we designed an instrument to measure the PELAD teachers' degree of mastery of digital teaching competences. This instrument was based on the competences established by CODAES for the work carried out in relation to the *Reference framework for digital competences*:

- C1. Use of tools and content creation. This refers to the use of computer equipment and mobile devices to carry out activities both in life and at work, through the effective and responsible use of ICT

- C2. Information. Involves management of ICT to meet information needs through the use of search strategies in reliable digital sources in an ethical manner.

- C3. Communication. Represents the management of communication processes to transmit effective messages, applying criteria of inclusion and equity through digital resources and tools.

- C4. Collaboration. Involves participation in collaborative activities to jointly build products through the pertinent use of digital media with a critical and proactive attitude.

- C5. Digital citizenship. Includes interaction in a digital environment, exercising one's digital citizenship in a responsible, ethical, and legal manner.

As we can see, each competence is characterized according to its scope and from those comes a series of sub-competences that allow their area of characterization to be specified, as described below in Table 1.

Table 1. CODAES competences and sub-competences

Competence	Sub-competence
C1. Use of tools and content creation	1.1. Use of computer equipment and mobile devices
	1.2. Management of files
	1.3. Use of office software
	1.4. Management of multimedia content
C2. Information.	2.1. Uses different internet services to consult information
	2.2. Uses strategies to search for and select information
	2.3. Ethical use of information (standards of reference and citation)
C3. Communication.	3.1. Message effectiveness
	3.2. Communication in digital environments

	4.1. Use of effective digital tools for collaboration
C4. Collaboration.	4.2. Collaboration in digital media with a respectful and ethical attitude and language
	4.3. Critical thinking (they can argue, support their arguments, and their contributions are relevant)
	5.1. Analyzes their role as a digital citizen, conscious of the social implications of their actions in the digital environment
C5. Digital citizenship.	5.2. Identifies the ethical and legal considerations in the use of ICT
	5.3. Manages their digital information in a responsible manner
	5.4. Protects their digital identity

Source: Prepared by the authors.

Based on the above—and in order to have accuracy in the design of the measurement instrument—it was established that the questions would be asked according to the sub-competences derived from the *Reference framework for digital competences*. Therefore, the instrument included 96 questions organized hierarchically, with the intention of obtaining a more accurate range of assessment.

Having identified and described the criteria based on which the authors of this study would create the questions for the evaluation instrument on digital teaching competences, we decided that the performance parameters for these questions would be standardized against those proposed by Benjamin Bloom in his taxonomy. It is important to note that a value was given to each of the levels proposed by Bloom in order to develop a scheme that offered greater reliability of the results obtained.

The questionnaire was therefore evaluated according to the following parameters:

- Declarative knowledge (low). Refers to the ability to recall knowledge without the need for changes or entering a higher level of comprehension.

- Comprehension (basic). The subject at this level is aware of what is communicated to them, but does not identify all the implications of the data that they use or the methods and materials presented to them.

- Application (regular). This level requires the use of abstractions in particular and specific situations.

- Analysis (high). At this level the subject is able to break down a problem into more accessible pieces of understanding and establish relationships between them.

- Synthesis, development (very high). This level involves the subject being able to establish relationships between the pieces into which they have broken down a problem, without these necessarily being present or manifesting themselves obviously.

- Evaluation (expert). At this level, the subject is able to measure the object with which they are relating and make quantitative and qualitative judgments, and value judgments according to specific purposes.

After the assessment criteria were established and we described the nature of the levels to which each competence should be associated, the instrument constructed was very extensive, so we was decided to reduce it with a focus on two questions:

- To which aspect of the proposed taxonomy does each of the questions related to the proposed sub-competences and levels of measurement respond?

- Is it possible to integrate actions at different levels of the taxonomy that firstly allow the number of items in the instrument to be reduced and, at the same time, ensure that the actions described are associated with the identification of a level of personal achievement in relation to with each sub-competence?

By answering these questions, it was possible to reduce the size of the instrument from 96 to 35 items that ensured we could obtain reliable information, as well as establishing value judgments focused on quantitative and qualitative criteria regarding the level of the respondents' digital competences.

Once the instrument was complete, it was necessary to analyze six of the specific competences of the PELAD in order to determine whether it was possible to establish a relationship with the five digital teaching competences that gave rise to the assessment instrument. The correspondence was thus described as presented in Table 2.

Table 2. Correlation of digital teaching skills and the specific competences of the PELAD

Specific PELAD competences	Digital teaching competences
CE1. Reflects on their teaching practice and incorporates innovative elements that contribute to their continuous improvement	C5. Digital citizenship
CE2. Congruently guides the student in their comprehensive training, both inside and outside the classroom, through permanent tutoring	C5. Digital citizenship
CE3. Designs and uses different environments, tools, and teaching resources to promote the learning of disciplinary content among the students	C3. Communication
CE4. Plans the teaching and learning processes, defining the levels of depth to which the disciplinary content should be addressed, so that the student develops the competences proposed in the academic program	C2. Information
CE5. Promotes and plans autonomous work by the student, making use of innovative learning methodologies to strengthen their comprehensive education	C4. Collaboration
CE6. Critically and reflexively manages the technological tools in the implementation of teaching in order to promote the development of the student's generic and specific competences	C1. Use of tools and content creation

Source: Prepared by the authors.

The 35 questions that comprise the assessment instrument show that the development of the digital competences of the PELAD teachers is closely related to the design, production, and assessment of the teaching and learning process that is insinuated in the CE7 competence of the PELAD (Plans the process of assessing performance). In fact, the comparison of the results obtained from the instrument allows us to observe that digital competences are linked to an appropriate assessment of educational processes.

Analysis and Results

The sample was developed intentionally. The results included the teachers on the Bachelor's Degree in Digital Arts (N = 18; 7 women and 11 men, between 27 and 54 years old, with an average age of 38.8). Some 38.9% of the study participants had a bachelor's degree, 16.7% had a master's degree, and 44.4% had a doctorate.

In the instrument developed, the values of the analysis of the underlying relationship between the digital teaching competences and the specific competences of the PELAD establish that the levels proposed by Bloom are described from 0 to 100 points. However, since a zero level was not considered for the relationship between the two types of competences, the first level—linked to the declarative knowledge in Bloom's proposal—was defined as the lowest level in the instrument, with a value of 10 points. This decision was taken because none of the participants had total ignorance of the implications of the use of ICT. On the other hand, this decision allowed the remaining five thresholds to be graduated at intervals of 20 points for each of the competence values, ranging from the level of understanding (basic) to the level of assessment (expert). As regards the questions on the sub-competences, they are also organized in a hierarchical manner and the same weighting was applied (10, 20, 40, 60, 80, and 100) with the aim of obtaining a more precise range of evaluation.

Having established the valuation method, the instrument for assessing digital teaching competences was applied to the PELAD teaching staff. The survey was implemented in Google Forms, which allowed the data to be collected online. The participants answered voluntarily and anonymously. The instrument facilitated the diagnosis of the degree of applicability of digital competences in the teaching-learning process on the part of the teachers. After these actions, we carried out a univariate descriptive statistical analysis of both types of competences and subsequently verified the correlational analysis to determine to what extent the specific competences of the PELAD include digital teaching competences and thus compare the respondents' comprehension regarding personal knowledge and management of ICT and their use in the classroom.

For the graphical representation, we chose a box plot, which is a standardized method that demonstrates a series of numerical data through quartiles. The box plot shows the median (in red) and quartiles of the data as follows: 75% of the data is concentrated in the box, the lines extend from the box forming the whiskers and go to the maximum and minimum values of the series or up to 1.5 times the interquartile range. Outliers were not considered for the calculation of the median.
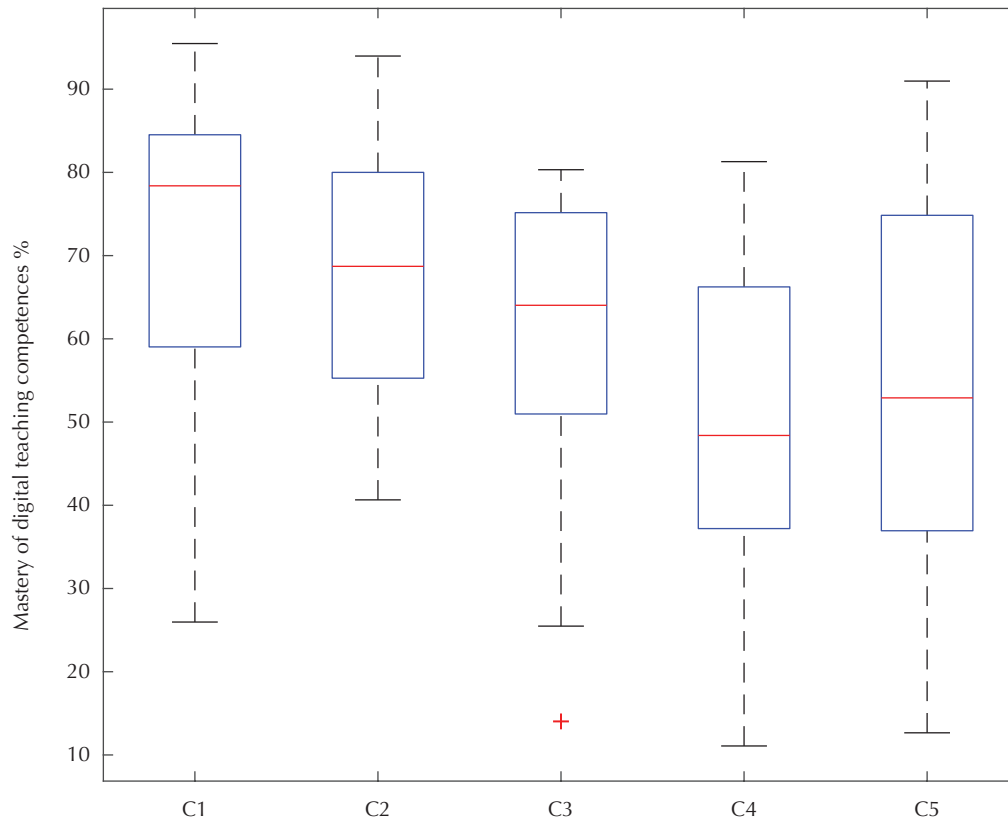
Figure 1. Mastery of digital competences among PELAD teachers.
Source: Prepared by the authors.

The median mastery of each digital competence of the PELAD teachers was calculated in relation to the average level of mastery of the corresponding competence of each teacher in the program according to equation (1):

$$C = \frac{\sum_1^m (k_1 * R_1 + k_2 * R_2 + k_3 * R_3 + k_4 * R_4 + k_5 * R_5 + k_6 * R_6)}{M_{max} * m} * 100\%$$

where C – is the median of the digital teaching competence of the PELAD teacher; m – the number of sub-competences, in %. $k_1, ..., k_6$ – weights established 0.1, 0.2, 0.4, 0.6, 0.8, and 1 depending on the contribution of the question to the sub-competence; R – set of teachers' responses: R= {1, 2, 4, 6, 8, 10} as established by the Bloom taxonomy; Mmax – maximum level of mastery (expert) of the sub-competence for the instrument developed, equal to 31.

The results obtained from the statistics show high levels in the competences C1 Use of tools and content creation (73.08%), C2 Information (67.98%), and C3 Communication (60.56%), compared with C4 Collaboration (50.28%) and C5 Digital Citizenship (54.2%).

The 35 questions selected represent the greatest mastery of the different sub-competences and assess the behavior of the teachers in the relationship between digital competences and specific competences.

Once the questions were defined, the same formula was applied to calculate the median of each specific competence of the PELAD, after which the results shown in Figure 2 were obtained, where the trend described above can be observed, that is, high levels of proficiency in CE6 Critically and reflexively manages the technological tools in the implementation of teaching (69.2%), which is equivalent to C1; CE4 Plans the teaching and learning processes (67.05%), which is equivalent to C2; and CE3 Designs and uses different environments, tools, and teaching resources (57.35%), which is equivalent to C3, compared to the lowest level in CE5 Promotes and plans autonomous work by the student (40.44%), which is equivalent to C4; and CE1, CE2 Reflects on their teaching practice and congruently guides the student in their comprehensive training (50.48%), which is equivalent to C5 .
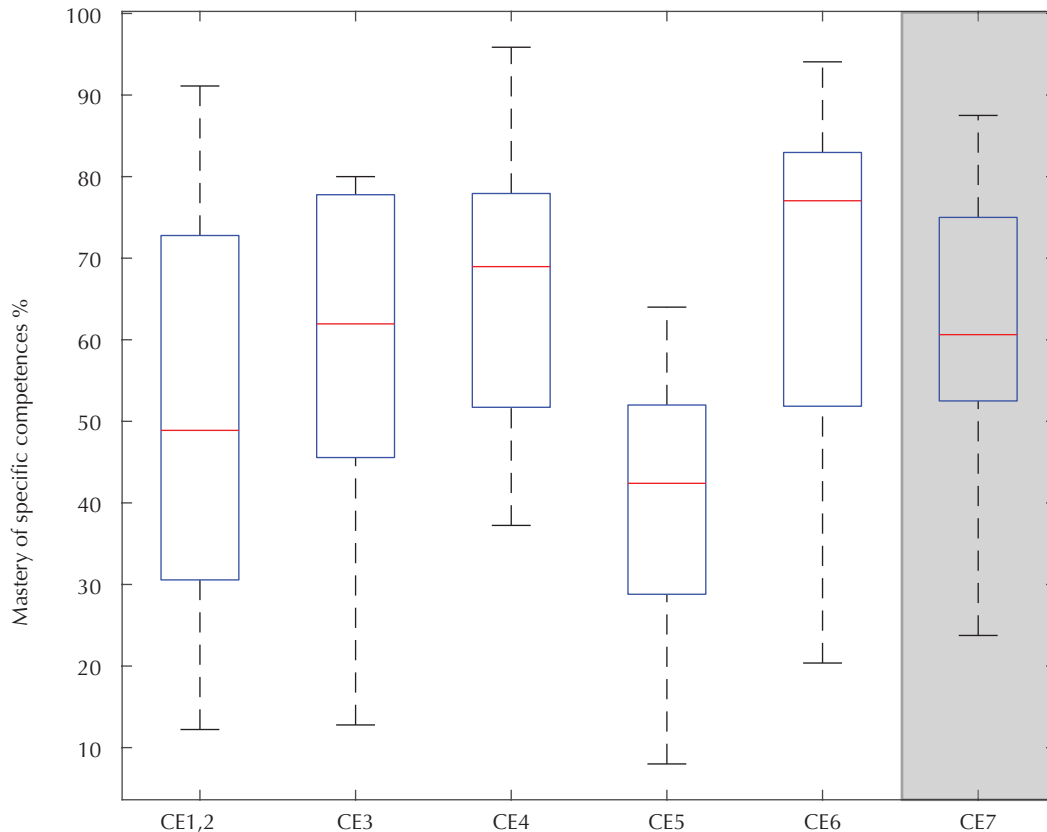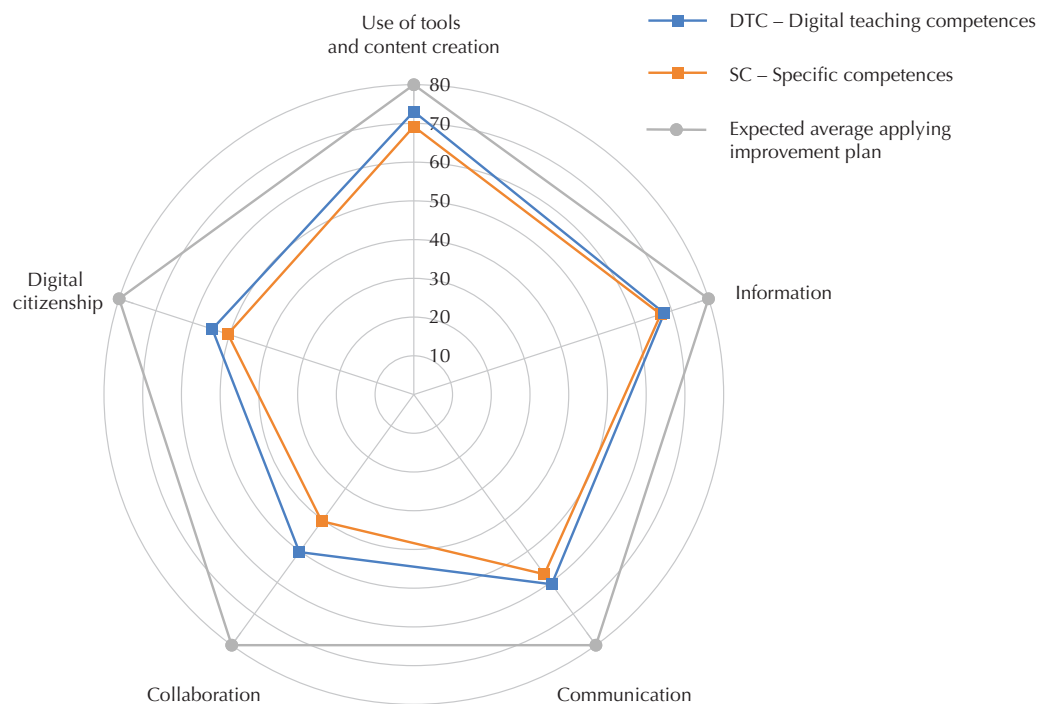

Figure 2. Mastery of specific competences in the PELAD study program.
Source: Prepared by the authors.

Having compared the results obtained according to Table 2 on the correspondence of the competences, the distribution was arranged as shown in Figure 3:

Figure 3. Dimensions of digital teaching competences and specific competences of the PELAD (according to Table 2).

Source: Prepared by the authors.

Based on this analysis, we were able to verify the need for an improvement plan that enables PELAD teachers to incorporate more precise mechanisms of communication and collaboration in the organization of digital competences. If the teacher's action should be aimed at the continuous improvement of teaching and its educational implications, PELAD teachers should work on the development of mechanisms for collaboration and digital citizenship, as verified by the box relating to CE7 (Figure 2).

Thus, one of the tasks of the PELAD teachers is to reinforce the levels of work that enable them to have more assertive communication in the production and implementation of the content they develop and which involves digital teaching competences.

Improvement Plan

The primary work of a university teacher is related to the promotion, acquisition, and development of student competences. For this, it is necessary to design spaces oriented to their comprehensive education. In this scenario, the use and role of digital competences are essential because they favor the creation of educational environments in which the student becomes an active subject of knowledge, allowing them to focus the teaching-learning process on the logic of self-education and self-development. For teachers, fostering confidence in the subjective experience of the student, taking into account their professional competences, will allow them to be educated in the context of the future professional field.

Harrison (2018) stresses that activities associated with the use of ICT and new forms of communication create new functional and spatial relationships and interactions in university classrooms. Because of this, some of the pending tasks of the PELAD should be part of an improvement plan whose need can be seen from the analysis presented here and whose results are shown below.

Develop projects that respond to specific problems facing the student and in which they should demonstrate a significant degree of competence

These projects should be developed based on various didactic-pedagogical positions and include various learning units, so that the projects influence the comprehensive education of the students. The project-based learning methodology is a proposal that responds to this need, since a multimedia project involves the incorporation of diverse knowledge and the development of production mechanisms that involve visual, informational, and prepared content. This type of project can, therefore, promote the incorporation of PELAD teachers and the linking of their areas of disciplinary competence.

Link various areas of knowledge (programming, aesthetics, digital animation) through the regulated use of ICT

This initiative will promote the development of courses in remote modalities, in which teachers articulate some of their knowledge more efficiently through the design of learning objects that, on the one hand, involve the management of discursive content typical of the areas considered theoretical: theories of art and aesthetics, semiotics, philosophy of art; and, on the other, develop visual and audiovisual learning objects that promote cognitive trajectories, so that they are better directed and involve different cognitive channels in the appropriation of this contents by students.

Develop projects related to the development of personalized educational projects

This will allow the student to direct their learning based on emerging methodologies. Thus, in achieving learning, the student can participate in learning societies that allow them to relate to knowledge that comes from other students, as well as accessing digital platforms and specialized magazines, among other aspects of educational interest.

Create collaboration agreements with social and university entities

Based on the identification of social, technological, and educational problems, it is possible to establish collaborations where the teachers participate and ICTs are involved. Consolidation of these agreements is essential, since it would allow institutions that work with cultural organizations, such as museums, educational, and artistic institutes, to meet their needs and, at the same time, incorporate PELAD teachers and students.

Conclusions

Education in the 21st century requires professionals who are trained in the use of ICT. The acquisition of competences by teachers is a condition without which the act of education cannot develop effectively. In this context, digital teaching competences are a requirement for these professionals to design, produce, manage, and circulate an endless amount of information in a more agile and effective manner.

Thus, the new educational modalities identify the role of the teacher as a motivating agent in the teaching-learning process and because of this the teacher becomes a facilitator of learning who should put a large amount of educational content into circulation. This is why teachers currently need to increase their technological competences so that, by designing, developing, and assessing learning, they can reach higher levels of achievement among their students, promoting significant learning thanks to the fact that ICT makes contact with various educational contents more immediate.

The Bachelor's Degree in Digital Arts is an educational program with a technological and multidisciplinary vocation. This makes the development of digital teaching competences a fundamental element of teachers' work and an institutional priority.

That said, although the diagnosis and analysis carried out in this study indicates that the PELAD teachers have a good level in terms of digital competences, it is necessary to carry out actions that lead to greater specialization of these teachers in terms of handling and managing content that circulates via ICT. In other words, it is essential to encourage the development and expansion of digital competences among teachers, since this involves the optimal execution of a plethora of projects that encourage the acquisition of skills among students and promote transdisciplinarity based on ICT.

Similarly, as a result of this study, the need also emerges to develop learning objects that allow efficient management of ICT, as well as to implement actions aimed at the production of visual and audiovisual content that encourages the production of learning experiences and meets the educational needs of students in a more effective and immediate manner. In this sense, the implementation of projects that link students with real problems in the economic-work environment can be a significant element in developing plans and projects aimed at specialization and connection with research, while promoting the strengthening of academic bodies.

Finally, efforts to create academic communities that can circulate information, as well as projects that impact the education of students, are associated with managing technological resources that, from the perspective of digital teaching competences, will allow socially relevant needs in the current national and international context to be met.

References

Cano García, M. Elena, (2008). La evaluación por competencias en la educación superior. *Profesorado. Revista de Currículum y Formación de Profesorado*, *12*(3), 1-16. Retrieved from http://www.redalyc.org/articulo.oa?id=56712875011

Castañeda, L. E., Esteve, F., & Adell, J. (2018). ¿Por qué es necesario repensar la competencia docente para el mundo digital? *RED. Revista de Educación a Distancia*, *56*(6), 1-20. http://dx.doi.org/10.6018/red/56/6

Gisbert Cervera, M., González Martínez, J., & Esteve Mon, F. M. (2016). Competencia digital y competencia digital docente: una panorámica sobre el estado de la cuestión. *Revista Interuniversitaria de Investigación en Tecnología Educativa, 0*, 74-83. http://dx.doi.org/10.6018/riite/2016/257631

Goodfellow, R. (2011). Literacy, literacies, and the digital in higher education. *Teaching in Higher Education, 16*(1), 131-144. https://doi.org/10.1080/13562517.2011.544125

Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks*. Luxemburg: Publications Office of the European Union. https://.doi.org/10.2791/82116

Hall, R., Atkins, L., & Fraser, J. (2014). Defining a self-evaluation digital literacy framework for secondary educators: The DigiLit Leicester project. *Research in Learning Technology, 22*, 1-17. http://dx.doi.org/10.3402/rlt.v22.21440

Harrison, M. (2018). Space as a tool for analysis: Examining digital learning spaces. *Open Praxis, 10*(1), 17-28. https://doi.org/10.5944/openpraxis.10.1.782

Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado, INTEF. (2017). *Marco común de competencia digital docente.* Retrieved from http://educalab.es/documents/10180/12809/Marco+competencia+digital+docente+2017/afb07987-1ad6-4b2d-bdc8-58e9faeeccea

Lankshear, C. & Knobel, M. (Eds.) (2008). Introduction. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 1-16). New York: Peter Lang Publishing.

Lázararo-Cantabrana, J. L., Gisbert-Cervera, M., & Silva-Quiroz, J. (2018). Una rúbrica para evaluar la competencia digital del profesor universitario en el contexto latinoamericano. *EDUTEC. Revista Electrónica de Tecnología Educativa, 63*(3), 1-14. https://doi.org/10.21556/edutec.2018.63.1091

Martínez Ruiz, M. A. & Sauleda Pares, N. (1997). El aprendizaje colaborativo situado en el escenario universitario. *Enseñanza, 15*, 101-113. Retrieved from http://hdl.handle.net/10045/24841

Niemeyer, B. (2006). El aprendizaje situado: una oportunidad para escapar del enfoque del déficit. *Revista de Educación, 341,* 99-121. Retrieved from http://www.ince.mec.es/revistaeducacion/re341/re341_05.pdf

Pérez Gómez, Á. (2010). Aprender a educar. Nuevos desafíos para la formación de docentes. *Revista Interuniversitaria de Formación del Profesorado, 68*(24,2), 37-60. Retrieved from https://dialnet.unirioja.es/descarga/articulo/3276044.pdf

Perrenoud, P. (2004). *Desarrollar la práctica reflexiva en el oficio de enseñar.* Barcelona: Graó.

Ramírez Martinell, A. C. & Casillas, M. A. (2014). *Háblame de TIC: tecnología digital en la educación superior.* Córdoba: Editorial Brujas.

Rangel Baca, A. (2015). Competencias digitales docentes: un perfil. *Píxel-Bit. Revista de Medios y Educación, 46,* 235-248. http://dx.doi.org/10.12795/pixelbit.2015.i46.15

Universidad de Guanajuato. (2014). *Programa Educativo Licenciatura en Artes Digitales (PELAD).* Guanajuato: Autor.

Vera, J. A., Torres, L. E., & Martínez, E. E. (2014). Evaluación de competencias básicas en TIC en docentes de educación superior en México. *Píxel-Bit. Revista de Medios y Educación, 44,* 143-155. http://dx.doi.org/10.12795/pixelbit.2014.i44.10