Revista Latinoamericana de Tecnología Educativa, 22(2)
https://doi.org/10.17398/1695-288X.22.2.119

RELATEC
Revista Latinoamericana de Tecnología Educativa

Received: 2023-03-27
Reviewed: 2023-06-02
Accepted: 2023-06-15

Authors' addresses:

[1] Universidad Autónoma de Querétaro. Universidad 231, Cerro de las Campanas S/N, Las Campanas, 76010 Santiago de Querétaro, Qro. (Mexico)

[2] Centro de Estudios Avanzados e Investigación en Ciencias Sociales y Humanidades. Universidad Autónoma de Chiapas. Blvd. Belisario Domínguez Km. 1081, Sin Número, Terán, 29050 Tuxtla Gutiérrez, Chis. (Mexico).

E-mail / ORCID

rcenteno04@alumnos.uaq.mx

https://orcid.org/0000-0002-7815-0477

luis.gamboa@unach.mx

https://orcid.org/0000-0002-8609-4786

ARTICLE

Digital competencies for teachers and continuing education: A proposal from the qualitative paradigm

Competencias digitales docentes y formación continua: una propuesta desde el paradigma cualitativo

Rosendo Centeno-Caamal[1] and Luis Alan Acuña-Gamboa[2]

Abstract: The changes and transformations experienced in today's world have led to daily use of digital technologies shaping new ways of living and working, and the educational field has been no exception. Given the need to digitally enable teachers to improve their pedagogical practice in the society of the 21st century, this study sought to define the indicators that can serve as a basis for designing a model of continuous training in digital competencies for teachers using a qualitative research approach. A rigorous content analysis of institutional materials, semi-structured interview reports and focus group reports was carried out, with their triangulation leading to the design guidelines. The results indicate that the role of digital technologies in the educational process analyzed is meager; the participating teachers state that a continuous training strategy is required to meet their specific needs, and that the emerging digital competencies should focus on the creation of content and the implementation of the hybrid modality. Although these findings are not generalizable, as they do not relate to a specific environment, the analysis process is replicable and can be used in other environments. It is concluded that it is essential to have a continuous training model that makes use of a technology adaptable to the particular needs of the contexts in which it is to be implemented.

Keywords: Digital literacy, Inservice teacher education, Qualitative research, Teaching models, Teacher education programs.

Resumen: Los cambios y transformaciones que se viven en el mundo actual han llevado a un uso cotidiano de las tecnologías digitales conformando nuevas formas de vida y trabajo; el campo educativo no ha sido la excepción. Ante la necesidad de habilitar digitalmente a los maestros para mejorar su práctica pedagógica en la sociedad del siglo XXI, en este estudio se buscó definir los indicadores que pueden servir de base para diseñar un modelo de formación continua en competencias digitales docentes desde el enfoque de la investigación cualitativa. Se realizó un análisis riguroso de contenido de materiales institucionales, informes de entrevistas semiestructuradas y reportes de grupos de discusión, cuya triangulación llevó a concretar las guías para el diseño. Los resultados indican que el rol de las tecnologías digitales en el proceso educativo analizado es exiguo; los docentes participantes refieren que se requiere una estrategia de formación continua que atienda sus necesidades concretas; y, que las competencias digitales emergentes deben enfocarse en la creación de contenido y la implementación de la modalidad híbrida. Aunque éstos no son generalizables, por haberse realizado en un entorno específico, el proceso del análisis es replicable y puede emplearse en otros ambientes. Se concluye que es primordial tener un modelo de formación continua que haga uso de una tecnología adaptable a las necesidades particulares de los contextos en los que se desea implementar.

Palabras clave: Alfabetización digital, Formación de profesores en servicio, Investigación cualitativa, Modelos de enseñanza, Programas de formación docente.

1. Introduction

Currently, digital technologies are permeating everyday life, configuring new ways of living and working (@prende.mx, 2020). The educational field has been reached and has been forced to evolve (Contenidos MéxicoX, 2020a), but there are still many educational agents who lack adequate training in the use and application of information, communication, knowledge and digital learning technologies (ICKDLT) as technopedagogical tools within teaching and learning processes (Acuña-Gamboa, 2022), so it is imperative to articulate their integration into the classroom and ensure the quality of service offered by educational systems (Martínez-Garcés and Garcés-Fuenmayor, 2020).

In Mexico, studies on ICT in general basic education are scarce (Centeno-Caamal et al., 2022; Olivares et al., 2016) and, despite the fact that the educational use of digital technologies in this sector dates back to 1983 (Cruz and Ferra, 2019; Nieto et al., 2015), training has not kept pace with the advances introduced since then, nor has it been structured to cover the entire teaching population, leading to the existence of unequal technological training profiles, as well as different requirements and scenarios for their adoption due to the diverse exercising of knowledge and practices that respond to the existing educational diversity in classrooms (Acuña-Gamboa et al., 2023; Cabero et al., 2015; Valencia et al., 2016).

This situation became evident during the educational emergency produced by the Covid-19 pandemic, forcing the incorporation of ICKDLT and provoking hasty learning, without direction or formal planning, leading teachers to use their particular available resources, and make creative and innovative adaptations according to their needs, leading to scattered results (Comisión Nacional para la Mejora Continua de la Educación [Mejoredu], 2020; Casillas and Ramírez, 2021).

However, despite the fact that this singular circumstance prompted such integration, it is fair to say that this topic is nothing but a continuous training issue that has been studied with much interest for about two decades and may lose its importance if it continues to be associated with it, as is currently happening in many institutions that, faced with the return of face-to-face , have reduced or eliminated ICKDLT from their educational practices instead of consolidating its use, leaving aside the urgency of digital training for teachers (Carbonell et al., 2021).

Studies on digital competencies and their application to teaching have increased (Barbazán et al., 2021; Cabero et al., 2020; Casillas et al., 2014; Diaz, 2021; Domingo-Coscollola et al., 2019; Pech and Prieto, 2016; Perdomo et al., 2020; Rodríguez-Alayo and Cabell-Rosales, 2021; Torres et al., 2022) and several are handled in light of the Covid experience (Cárdenas-Contreras, 2022; Jiménez and Sánchez, 2022; Martínez-Garcés and Garcés-Fuenmayor, 2020), thereby continuing to demonstrate the urgency of achieving the digital empowerment of teachers to respond to the educational demands of today's world and to reduce the gap that prevents them from exercising and teaching digital citizenship (Casillas et al., 2014; Juvera, 2022; Pech and Prieto, 2016).

To respond to this need, it is important to consider the digital competency frameworks that have been created to guide the ICT training of teachers so that it

transcends their teaching practice (Cabero-Almenara et al., 2020; García-Valcárcel, 2016; INTEF, 2017; Jiménez-Hernández et al., 2021; Valencia et al., 2016). Although each one varies in relation to the target audience, place of action and scope, they coincide in recognizing the interdependence between the technological, pedagogical and disciplinary, and group the digital knowledge that teachers must develop in different dimensions: technological, informational, pedagogical, communicative, educational management and research, among others. Likewise, those derived from the remote and distance work experienced as a result of the pandemic and its aftermath should be incorporated, as well as those produced by recent technological advances applicable to education (Barbazán et al., 2021; Casillas and Ramírez, 2021; Cejas and Navío, 2018; INTEF, 2022; Pozos, 2016; Rangel, 2015).

Since several reports highlight the importance of developing relevant institutional proposals to train educators with the intention of achieving a digital transformation that helps to successfully manage the vicissitudes of teaching (Rambay and De la Cruz, 2021; Viñoles-Cosentino et al., 2022), this paper will describe the analytical process that was carried out to obtain the indicators that will guide the proposal for the design of a model of continuous training in digital teacher competencies for basic education teachers in a particular context.

It is organized in four sections, which cover the following aspects: I) Methodology, where the context and methodological design followed to collect and examine the information are presented; II) Results, which shows what was found during the analysis; III) Discussion, where the findings are interpreted and contrasted with previous works; IV) Conclusions, where the resulting indicators and the possibilities for further research that can be derived from this analysis are expressed.

2. Method

What is presented in this article is part of a broader research work carried out under the qualitative-quantitative approach, with a descriptive-exploratory cut (Hernández et al., 2014). In this opportunity, we present the results of the qualitative analysis that helped to identify the necessary assumptions for the design of a model of continuous training in digital teacher competencies (Hernández et al., 2020). To collect, analyze and interpret the data, several strategies were used from the qualitative paradigm (see Table 1) and, given the nature of the inquiry, a sample size was defined based on contextual needs (Hernández et al., 2014). Likewise, we proceeded by means of relevant technological tools that helped us to implement, remotely, the techniques and instruments considered in the study (Arias, 2020).

From a population of 68 basic education teachers of the Adventist Educational System of Campeche (AESC), located in southeastern Mexico, a nonprobabilistic purposive sample of 20 elements was compiled, based on an open invitation, including teachers who consented to participate, by voluntary disposition and availability of time. The documents included in the study were selected for their essentiality in the AESC educational process. Demographic variables were not considered relevant in this analysis.

In the first part, the importance and role of ICT in the AESC educational process was investigated by examining the Educational Model of the Southeast Mexican Union

and the strategic plans of each of the institutions, as well as the didactic plans and video recordings of some classes. The data to be observed and recorded were defined, delimiting the unit of analysis to words, sentences or paragraphs.

Table 1. Data collection and analysis strategies

Aim	Sample	Technique	Instrument and Category	Tool	Interpretive Procedure
1) To investigate the importance and role of ICT in the AESC educational process.	20 didactic plans 20 video lessons AESC's guiding documents: educational model, institutional plans of the 3 colleges	Documentary	Category coding Hierarchy tab Category: Role of ICKDLT in the educational process	Google Drive	Document analysis
2) To assess the need for a continuous training strategy for the development of teachers' digital competencies and consider the characteristics required for its implementation.	20 teachers	Semi-structured interview	Interview guide Categories: - Need for a strategy for continuing education in digital teacher competencies - Characterization of the continuous training required	Zoom	Comparative analysis

Aim	Sample	Technique	Instrument and Category	Tool	Interpretive Procedure
3) To explore the digital teaching competencies that AESC basic education teachers put into practice during their teaching and which ones need to be developed or improved.	20 teachers	Focus groups	SOWT Development, integration and reelaboration of digital content, INTEF Framework individual and group version Category: Use of digital teaching competencies	Zoom Google Forms Google Docs	Element matrix analysis

The category was defined as "Role of ICKDLT in the educational process," and the concepts that were chosen because of their relationship with the research objective were: Digital competencies, ICT competencies, ICT use, Digital skills, Digital tools, ICT tools, Digital teaching, Teaching with ICT, Digital educational resources and Digital learning objects. Then, a "Category Coding Hierarchy Card" was elaborated where the terms were established as search codes and delimited through definitions that made it possible to clearly recognize when to use them. A search was also done for words that could be thematically and contextually related to the pre-established terms (skill[s], digital[s], technology[s]; technological[s]; tool[s]; resource[s] and competence[s]). The document analysis technique (Ñaupas et al., 2018) was implemented and the statistical packages ATLAS.ti, version 9 and MS Excel 2019 were used to manipulate the texts and concentrate the data (Rapley, 2014). Through hermeneutics, the ideas expressed in the materials were extracted to ponder the meaning of the words, themes or phrases related to the predefined codes in order to draw conclusions about them.

In the second part, we explored the need for a continuous training strategy in teachers' digital competencies and the desirable characteristics for its implementation. Semi-structured interviews were conducted with a representative sample of teachers, belonging to the different basic education levels of AESC: three preschool, six lower primary, four upper primary and seven secondary. A guide was used to help direct it towards the established purpose. The meetings were conducted through the Zoom platform, with the conversations being recorded so that they could be examined in the ATLAS.ti version 9 software and the information concentrated in MS Excel 2019. The data obtained were examined by means of analysis by comparison (Barrera, 2009) with the purpose of contrasting the participants' responses and making conclusive inferences about the statements made.

In the third and final part, the digital teaching competencies that the participating teachers put into practice during their teaching and those that required acquiring or improving were examined, basing the activity on what was detected in the diagnostic phase, where it was found that competency area 3 "Creation of digital

content" of the INTEF 2017 framework obtained a mean of 3.75, with the others obtaining a mean above 4 (Centeno-Caamal, 2021). This was done through the four groups in the sample and the discussion was organized by means of a Topic Guide in order to coordinate the participations and achieve the objective of the meeting.

This phase consisted of three parts: (a) Resolution of an online questionnaire, which was called "SOWT Development, integration and reelaboration of digital content," based on the INTEF 2017 Common Framework of Digital Teaching Competence for a preliminary individual exercise of choice of items, in order to contextualize teachers in the digital competencies covered by dimension 3 of this framework, punctuating those related to the design, adaptation or modification of teaching resources; this consisted of marking, for each item, 1) if they had this competency [S]; 2) if they needed to reinforce it [O]; 3) if they needed to learn it [W]; or 4) if they considered it out of their reach [T]; and, subsequently, obtaining their strengths, opportunities, weaknesses and threats (SOWT) of the digital competencies they indicated. (b) Completion of an adaptation of the previous questionnaire in the collaborative tool Google Documents for group discussion. (c) Analysis by matrix of elements (Barrera, 2009) of the reports of each group, in MS Word 2019 and MS Excel 2019, to specify a list of topics to be considered in the intervention proposal.

To conclude, an exploration based on methodological triangulation (García et al., 2016; Feria et al., 2019; Forni and De Grande, 2020) was carried out to interpret the results of the contextual analysis and generate the indicators that will serve as the basis for the design of the model of continuing education in digital teacher competencies. This is specified in the Discussion section.

3. Results

As a result of the analysis carried out, the results obtained in each of the categories explored are presented below.

3.1. Role of ICKDLT in AESC's educational process

After examining the information contained both in the didactic texts and in the institutional documents, focusing the search on the terms, phrases, paragraphs, concepts and codes defined within this category, it was found that, compared to the word with the most mentions in the whole corpus of titles analyzed (students, 309), the codes that could be related to the assessment of the importance and role of ICKDLT in the educational process of AESC add up to only 127 mentions, which constitutes only 41.1% (see Table 2).

3.2. The need for a continuous training strategy in digital teacher competencies

With regard to the information obtained from the semi-structured interviews, after conducting a comparative analysis in order to contrast the data obtained from the participants and make interpretations of what they said, it was found that it is important to establish a training strategy to help develop teachers' digital skills. The participants stated that it should be official or formal, that there should be a plan or methodology to pursue the same objectives or goals and that it should have a continuous or permanent character to follow up. They also revealed that it would be

beneficial to have their own training scheme because it would give system workers the opportunity to improve professionally, which would lead them to lead in this area and improve academically; it would also help them to know where they are heading, to be competitive and to improve educational quality; in short, according to the interviewees, they would be at the forefront, would have support and would be open to reflection on the potential of using ICKDLT.

Table 2. Comparison of vocabulary and code mentions in the analyzed documents.

Most frequently used terms in teaching and guiding documents		Mentions of category coding hierarchy terms	
students	309	ICT teaching	33
God	212	ICT use	25
development	202	ICT Competences	22
minutes	196	Digital competences	12
life	179	Digital tools	12
activities	162	Digital teaching	10
education	152	Digital skills	7
learn	140	ICT tools	3
subject	131	Digital learning objects	3
service	124	Digital educational resources	0
		Total	127

3.3. Characteristics of the required continuing education strategy

With regard to the desirable features of the training strategy, it was found that the most convenient modality would be one that allows interaction; questions and offers accompaniment, support and feedback; handles participation forums and provides a clear presence of the trainer and humanizes. If it is at a distance that combines theory with practice and adapts to the level, it does not matter if it is extended. Those who collaborated also mentioned that it should have synchronous and asynchronous parts and may not necessarily be face-to-face but online or virtual. They also said that they expect it to have content adapted or designed for the environment in which they work, balancing the academic with the spiritual, allowing them to manage their personal pace, time and deliveries; and above all, that it should not be left to personal initiative, but should be institutional, that is, a formally established program that helps to implement digital tools for student learning.

Among the factors that, in their opinion, would favor participation in continuing education programs are: an accessible schedule, topics that interest them, that their multiple responsibilities are contemplated, that it is flexible, that it has a platform with free access, that it is scheduled in time. In addition, it should be attractive, useful, practical, innovative, dynamic and motivating, and simple but profound. Additional

factors include: that the availability and willingness of the participants is considered, that the effort is recognized, that there are incentives, stimuli and, as far as possible, that there is economic support, that they produce authentic learning, are self-managed and, preferably, are taught by specialists, taking into account the different levels of technological training and seeking to improve knowledge in pedagogical aspects.

3.4. Use of digital teaching competences

Finally, an analysis was carried out through a matrix of elements of the results of the SOWT questionnaire Development, integration and reelaboration of digital content obtained in the different groups (Preschool, Lower Primary, Upper Primary and Secondary), which coincided with the implementation of remote or distance learning because of the Covid-19 pandemic, which directly influenced the activity. The most relevant digital competencies for each teacher were chosen, then ordered according to the priority assigned, and it was agreed to establish the following interpretation, as part of the training needs: 1) I search and find tutorials on the network on how to use applications for the creation of digital educational content. 2) I know the PLE (Personal Learning Environment) concept and I use it for learning when editing digital content; I represent it in a detailed, orderly way and I apply it in my teaching practice. 3) I store resources or files that I have selected for my students in an organized way in my devices and in the cloud. 4) I have a channel or personal space in online services or applications where I publish throughout the course text files, videos, presentations and/or recordings of audio and video programs in which the students have been involved. 5) I encourage students to create digital educational material involving the design and editing of texts, presentations, videos and audios, helping them to create their own PLE. 6) I edit texts and presentations in an advanced way in my teaching practice and I bear in mind that they are attractive to my students.

Additionally, the participants pointed out that, in order to continue to adequately address the educational situation generated by the pandemic, they needed to develop skills for virtual or hybrid teaching and were concerned about having to implement this modality without having worked in this way before; they recognized that they lacked the tools to speed up learning activities, capture the students' attention, promote collaborative work, simultaneously visualize the resources used and form virtual groups. They said they were unaware of some relevant technological aspects, such as: searching and downloading of specific programs, verification of reliable sites, attention to specific technical issues, identification of minimum characteristics of an appropriate piece of equipment or device, acquisition of equipment compatible with, and adequate for, their needs, techniques for copying or downloading information, maintenance, Internet connectivity, use of Antivirus and security in downloads. All these represent digital knowledge that a teacher of the twenty-first century must have.

4. Conclusion-Discussion

In this work, a qualitative analysis has been carried out to define the indicators that will serve for the design of a model of continuous training in digital competencies for teachers of basic education of the AESC, which corresponds to a proposal that, when put into practice, would lead to strengthening the digital citizenship of those who have to procure it in their students. Each category analyzed represents different contextual

aspects that led to discovering the indicators for the intended design (see Figure 1), since it is from this trench that we can respond to the demands of today's society, seeking a comprehensive training that includes digital competencies (@prende.mx, 2020; Contenidos MéxicoX, 2020b).

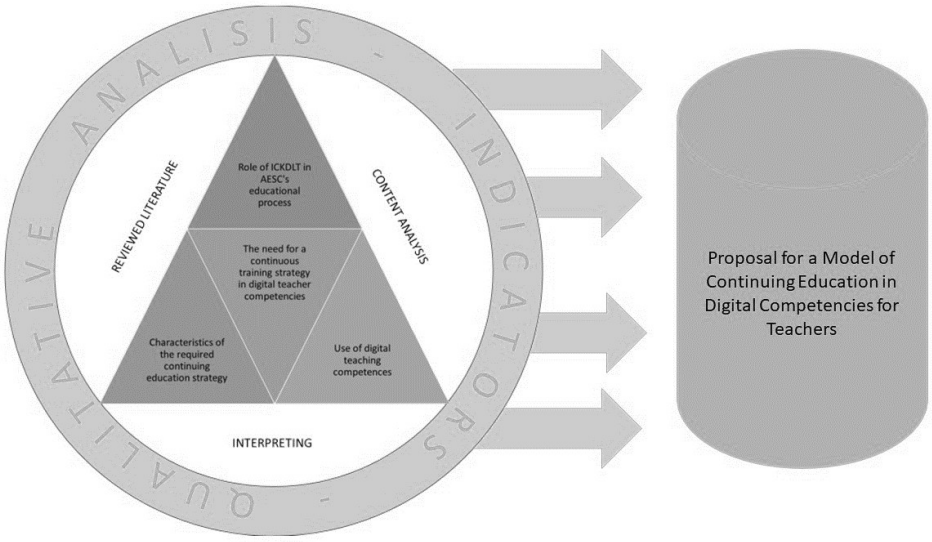

Figure 1. Qualitative analysis process to define the base indicators for the design of a Model of Continuing Education in Digital Competences for Teachers.

Thus, the conclusions and the discussion that lead to the identification of the indicators derived from the analysis carried out in the categories are presented below:

1) In the guiding and didactic documents, the main guides of the AESC educational service, the mentions of the predefined codes related to the role of ICTs in the formative process, compared to those of the word that was most evoked in the corpus of texts analyzed, are relatively few, constituting only 41.1%, which reveals the low importance and role of ICTs in the context studied. This differs from the findings of Jiménez et al. (2016), Flores et al. (2021), Mendo (2021) and Zambrano et al. (2021), who discovered that the use of new technologies in the educational field is highly relevant and topical. The first indicator proposed, therefore, increasing the importance and role of ICTs in education.

2) When examining the participants' perceptions about the need for a continuous training strategy for the development of teachers' digital competencies, it was found that they believe it is needed and that it would have a positive impact on their practice, which reinforces what is revealed in the literature reviewed (Acuña-Gamboa et al., 2023; Arellano, 2021; Delgado et al., 2022; Segura et al., 2022), and is congruent with the findings of Morales et al. (2015), who assert that the attitude of educational actors regarding ICT integration in instructional processes is positive because they consider it important to do so due to the possibilities they offer. Thus, the second indicator is obtained, which corresponds to the recognition of the usefulness of ICT training.

3) In the information obtained from the interviews on the particular characteristics they consider such a strategy should have, it was found that it should be adapted to the use of ICKDLT in pedagogical work and include the development of knowledge related to applications, platforms and tools that support the learning process; it should also contain interactive, dynamic, interesting, attractive and eye-catching activities that are properly integrated into didactic strategies and enrich the current educational models. In line with Gargallo (2018), Valbuena et al. (2021) and Véliz and Gutiérrez (2021), it can be said that it must provide coherence between the technological and the educational to achieve better results (Centeno-Caamal et al., 2022), establishing a congruent process that links the technical and pedagogical with the training needs of those who will participate in it. Therefore, the third indicator is coherence with educational work (versatile, integrating and enriching).

4) Among the modalities that the participants find most useful are those that allow close interaction with the trainer, offering practical application contents, especially in the AESC field. If possible, it should be synchronous, although it can also be carried out asynchronously; it should be formal, flexible and self-managed, but, although it allows self-regulation of learning, it should be possible to receive accompaniment and timely feedback, when necessary, since this encourages enhanced learning (Cruz et al., 2019). Here we can add what was suggested by Lalangui et al. (2017), who stated that teacher training, as a continuous process, "must start from the contextualization and systemic approach of the actions that are projected, the collaborative learning of the participants and the multidimensionality of the actions that are executed" (p. 30). In this way, a coherent development of the teacher can be achieved, because the strategy would be based on the problems expressed and the needs that have been diagnosed (Rivero and Soria-Valencia, 2021; Sibaja, 2021; Vera et al., 2021).

   Therefore, it can be inferred that the strategy should have the design of a digital learning environment (García and Pérez, 2015). Thus, it will be sought to design a continuous training model based on virtual learning environments with an andragogical approach because they promote autonomous learning and imply a critical appropriation of knowledge (Maliza et al., 2021; Rodríguez and Barragán, 2017), attending to the peculiar learning needs of teachers as professional adults (Collazos and Molina, 2018), and likewise because they are an open opportunity for training as they offer a teaching model based on flexibility, effectiveness, appropriateness and rigour, which considers the particular situation of the user (Blanco and Anta, 2016), as well as an option of adaptability to the existing differences in the digital transformation of organizations (Campuzano et al., 2021). It follows, therefore, as a fourth indicator that a virtual environment adapted to the context is built (semi-open, andragogic and ubiquitous).

5) In the discussion groups, it was found that the digital competencies that need to be developed or improved are those corresponding to the development of digital content (INTEF, 2017); in addition, the need to implement the hybrid modality was revealed. This phase helped to define the content of the training paths of the strategy to be implemented. Thus, it is believed that continuous teacher training will be a key factor in the

educational integration of ICT and a school challenge in this digital era (Aparicio et al., 2021; Escudero et al., 2018; Valbuena et al., 2021). Thus, the last indicator is about having a formative path according to the needs of the participants.

In conclusion, the results of this study led to the establishment of indicators that provided the guideline for the preliminary outline of a Model for Continuing Education in Digital Competencies for Teachers (see Figure 2), which can serve as a perfectible example for public and private education systems to face the challenge of overcoming the existing unequal situation in this area (@prende.mx, 2020; Contenidos MéxicoX, 2020b). They also contribute to affirming that structuring a training program in this sense is essential to offer a formal, permanent professional development for those who will educate the citizens of the present century in this area (Segura and Escudero, 2017), so the design, implementation and evaluation of this program are proposed as emerging research axes.

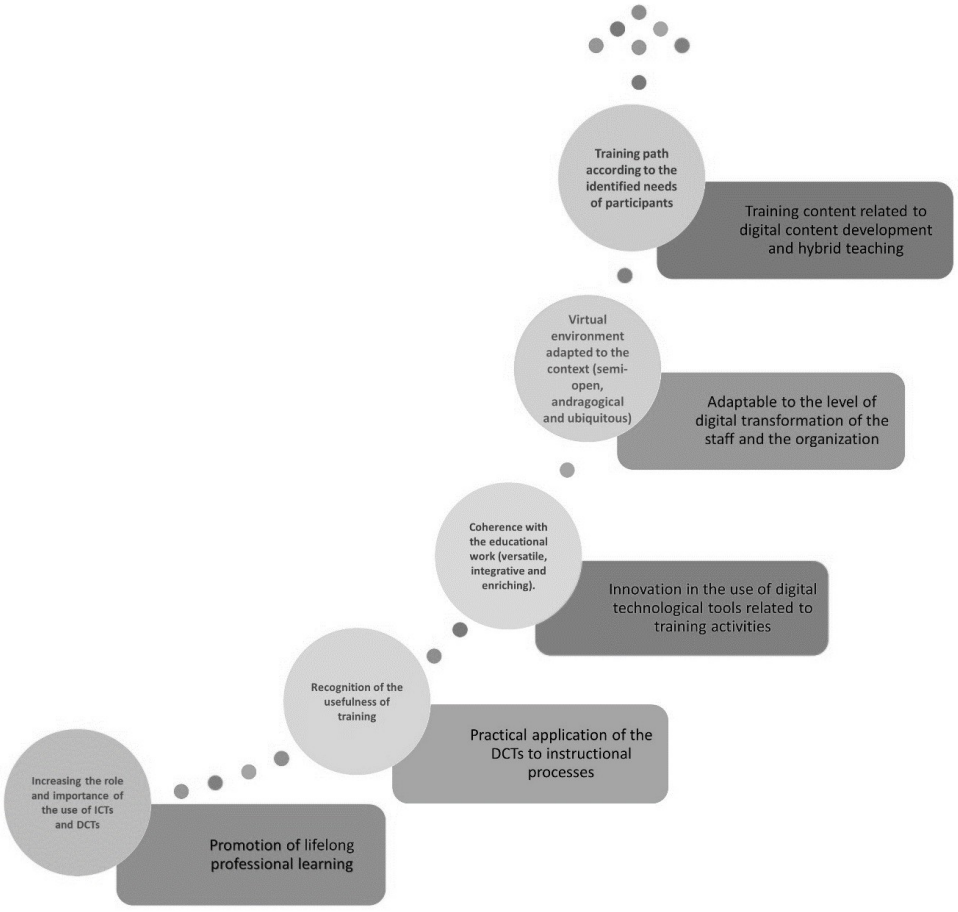

Figure 2. Indicators for the preliminary design of the model based on the analyzed categories.

Finally, they help to emphasize that the resulting training paths must be adapted to the pedagogical use of ICKDLT, so that through them continuity is provided and the educational service offered is enriched; it is proposed that the most profitable modalities for implementing them are those that allow adaptability and take into account the particular needs of the participants, with the framework of virtual learning environments being the most highly recommended for their flexibility, which would also lead to supporting another study based on this line of research.

5. References

Acuña-Gamboa, L.A., Mérida-Martínez, Y. y Pons-Bonals, L. (2023). Covid-19, competencias digitales docentes y educación especial en México. *Siglo Cero, 54*(2), 29-51. https://doi.org/10.14201/scero20235422894 5

Acuña-Gamboa, L.A. (2022). Aprendizajes basados en la incertidumbre: Construyendo escenarios educativos post-covid en México. *Revista de Investigación en Educación, 20*(2), 127-139. https://doi.org/10.35869/reined.v20i2.4220

Aparicio, S., Flores, M.E. y Sosa, M. (2021). *La integración de las TIC en las prácticas docentes: una mirada desde la enseñanza de la física y de la química en la educación secundaria uruguaya*. REDI, ANII. https://hdl.handle.net/20.500.12381/275

Arias, J.L. (2020). *Métodos de investigación online: herramientas digitales para recolectar datos*. Recuperado de: https://bit.ly/3svzwLs

Arellano, A.I. (2021). *Formación de competencias digitales docentes en profesores de educación superior* [Tesis doctoral, Universidad Autónoma de Querétaro]. http://ri-ng.uaq.mx/handle/123456789/2741

Barbazán, D., Ben, K. D. M. y Montes, C. M. (2021). La competencia digital docente en educación superior: Estado del arte en España y Latinoamérica. *Etic@net. Revista científica electrónica de Educación y Comunicación en la Sociedad del Conocimiento, 21*(2), 267-282. https://doi.org/10.30827/eticanet.v21i2.20837

Barrera, M. (2009). *Técnicas de análisis en investigación. Técnicas de análisis cualitativo: análisis semántico, de signos, significados y significaciones*. SYPAL-Quiron. Recuperado de: https://bit.ly/3C0Oufs

Blanco Martínez, A. y Anta Fernández, M.D.P. (2016). *La perspectiva de estudiantes sobre los entornos virtuales de aprendizaje en la educación superior*. Innoeduca: international journal of technology and educational innovation. Recuperado de: https://bit.ly/3svfSik

Cabero, J., Marín, V. y Castaño, C. (2015). Validación de la aplicación del modelo TPACK para la formación del profesorado en TIC. *@ tic. revista d'innovació educativa, 14*, 13-22. http://dx.doi.org/10.7203/attic.14.4001

Cabero-Almenara, J., Romero-Tena, R., Barroso-Osuna, J. y Palacios-Rodríguez, A. (2020). Marcos de competencias digitales docentes y su adecuación al profesorado universitario y no universitario. *RECIE. Revista Caribeña de Investigación Educativa, 4*(2), 137-158. https://doi.org/10.32541/recie.2020.v4i2.pp137-158

Campuzano Paniagua, G., Rivera Monroy, G. y Valverde Viesca, K. (2021). Nuevos retos en México para la construcción de entornos virtuales de aprendizaje en tiempos de pandemia. *Academia y Virtualidad, 14*(2), 75-88. https://doi.org/10.18359/ravi.5391

Carbonell García, C.E., Rodríguez Román, R., Sosa Aparicio, L.A. y Alva Olivos, M.A. (2021). De la educación a distancia en pandemia a la modalidad híbrida en pospandemia. *Revista Venezolana de Gerencia, 26*(96), 1154-1171. https://doi.org/10.52080/rvgluz.26.96.10

Cárdenas-Contreras, G.E. (2022). Docencia Universitaria y Competencias para la Era Pospandemia: Un Proceso Hacia la Alfabetización Digital. *Revista Tecnológica-Educativa Docentes 2.0, 14*(2), 5–14. https://doi.org/10.37843/rted.v14i2.299

Casillas, M. A., Ramírez, A. y Ortiz, V. (2014). El capital tecnológico una nueva especie del capital cultural. Una propuesta para su medición. *Háblame de TIC: Tecnología Digital en Educación Superior,* 23-38. https://www.uv.mx/personal/mcasillas/files/2016/05/20.pdf

Casillas, M. y Ramírez Martinell, A. (2021). *Saberes digitales en la educación: una investigación sobre el capital tecnológico incorporado de los agentes de la educación*. Brujas. https://www.uv.mx/personal/mcasillas/files/2021/02/Libro.pdf

Cejas-León, R. y Navío, A. (2018). Formación en TIC del profesorado universitario. Factores que influyen en la transferencia a la función docente. *Profesorado, Revista de Currículum y Formación del Profesorado, 22*(3), 271-293. https://doi.org/10.30827/profesorado.v22i3.8002

Centeno-Caamal, R. (2021). Formación Tecnológica y Competencias Digitales Docentes. *Revista Tecnológica-Educativa Docentes 2.0*, 11(1), 174-182. https://doi.org/10.37843/rted.v11i1.210

Centeno-Caamal, R., Acuña Gamboa, L.A. y Rodríguez Gómez, J. (2022). La formación continua en y para las competencias digitales docentes: un estado de la cuestión. En Comité organizador 1er CIVE 2021 (Comps.) *Primer Congreso Internacional Virtual de Educación, Retos y horizontes de la educación en tiempos de incertidumbre* (pp. 583-607). Grupo Compás Guayaquil-Ecuador. http://142.93.18.15:8080/jspui/handle/123456789/795

Collazos Alarcón, M.A. y Molina Carrasco, Z.C. (2018). *Modelo andragógico para optimizar las competencias profesionales del docente universitario* [Tesis de Maestría, Universidad César Vallejo]. Recuperado de: https://hdl.handle.net/20.500.12692/51794

Comisión Nacional para la Mejora Continua de la Educación [Mejoredu] (2020). *Experiencias de las comunidades educativas durante la contingencia sanitaria por COVID-19. Educación básica*. Cuadernos de Investigación Educativa, Gobierno de México. https://editorial.mejoredu.gob.mx/Cuaderno-Educacion-a-distancia.pdf

Contenidos MéxicoX (2020a, 7 de abril) *Educación 4 0 Emanuel Merchán pt2.* [Archivo de Video]. Youtube. Recuperado de: https://bit.ly/3McVZEA

Contenidos MéxicoX (2020b, 7 de abril) *Educación 4 0 Emanuel Merchán pt4.* [Archivo de Video]. Youtube. Recuperado de: https://bit.ly/3IwmYJe

Coordinación General @prende.mx [@prende.mx] (2020, 19 de marzo). *La digitalidad en la formación profesional del docente Edgar Sánchez Linares* [Video]. Youtube. Recuperado de: https://bit.ly/3C29kec

Cruz, B.E. y Ferra, G.E. (2018) *Video educativo en la articulación pedagógica y tecnológica en la enseñanza de las ciencias* [Conferencia]. Debates en Evaluación y Currículum. Congreso Internacional de Educación: Evaluación 2018. Tlaxcala, México. Recuperado de: https://bit.ly/3ssZgrF

Cruz-García, C., Silva-Rodríguez, A., Guarneros-Reyes, E., Espinoza-Zepeda, A. J., Sánchez-Medina, R. y Enriquez-Negrete, D. J. (2019). Sistema de evaluación del aprendizaje de un curso en línea autogestivo de estadística para universitarios. *Revista Digital Internacional de Psicología y Ciencia Social, 5*(2), 238-258.

Delgado, D.S., Martínez, T.M. y Tigrero, J.W. (2022). Desarrollo de competencias digitales del profesorado mediante entornos virtuales. *Revista Latinoamericana de Estudios Educativos, 52*(3), 291-310. https://doi.org/10.48102/rlee.2022.52.3.512

Diaz Quilla, J.P. (2021). *Programa «capacitaTics» en la mejora de las competencias digitales de los docentes de un instituto tecnológico de Lima Metropolitana, 2021* [Tesis doctoral, Universidad César Vallejo].

https://hdl.handle.net/20.500.12692/67940

Domingo-Coscollola, M., Bosco-Paniagua, A., Carrasco-Segovia, S. y Sánchez-Valero, J.A. (2019). Fomentando la competencia digital docente en la universidad: Percepción de estudiantes y docentes. *Revista de Investigación Educativa, 38*(1), 167–182. https://doi.org/10.6018/rie.340551

Escudero, J.M.; Martínez-Domínguez, B. y Nieto, J. M. (2018). *Las TIC en la formación continua del profesorado en el contexto español: ICT in continuing teacher training in the Spanish context*. Ministerio de Educación. Recuperado de: https://bit.ly/3JUeegi

Feria, H., Matilla, M. y Mantecón, S. (2019). La triangulación metodológica como método de la investigación científica. Apuntes para una conceptualización. *Didasc@ lia: didáctica y educación, 10*(4), 137-146. Recuperado de: https://bit.ly/33YcDqi

Flores Cuevas, F., Vásquez Martínez, C.R. y González González, F.A. (2021). El uso de las TIC en la enseñanza de conceptos geométricos en la educación básica. *RIDE. Revista Iberoamericana para la Investigación y el Desarrollo Educativo, 12*(23). https://doi.org/10.23913/ride.v12i23.1024

Forni, P. y De Grande, P. (2020). Triangulación y métodos mixtos en las ciencias sociales contemporáneas. *Revista mexicana de sociología, 82*(1), 159-189. Recuperado de: https://bit.ly/3sr81CD

García, N. E. y Pérez, C.A. (2015). *Creación de ambientes digitales de aprendizaje*. Editorial Digital UNID. Recuperado de: https://elibro.net/es/ereader/bibliouaq/41158?page=10

García, T., García, L., González, R., Carvalho, J. y Catarreira, S. (2016). *Revisión metodológica de la triangulación como estrategia de investigación*. CIAIQ2016, 3. Recuperado de: https://bit.ly/3IuwhcL

García-Valcárcel Muñoz-Repiso, A. (2016). *Las competencias digitales en el ámbito educativo*. https://gredos.usal.es/handle/10366/130340?show=full

Gargallo Castel, A. F. (2018). La integración de las TIC en los procesos educativos y organizativos. *Educar em Revista, 34*, 325-339. https://doi.org/10.1590/0104-4060.57305

Hernández, R., Fernández, C. y Baptista, P. (2014). *Metodología de la investigación*. (6ª ed.). McGraw-hill. Recuperado de: https://bit.ly/3vGK8ZZ

Hernández, E. A., Paz, L. E. y Tunal, G. (2020). Indicadores para el diseño de recursos multimedia. *Tecnología Educativa, 5*(1), 26-32. https://hcommons.org/deposits/item/hc:49547

Instituto Nacional de Tecnologías Educativas y Formación del profesorado [INTEF] (2017). *Marco Común de Competencia Digital Docente 2017*. Recuperado de: https://bit.ly/33Z7FJW

Instituto Nacional de Tecnologías Educativas y Formación del profesorado [INTEF] (2022). *Marco de Referencia de la Competencia Digital Docente 2022.* Aprende INTEF. http://aprende.intef.es/mccdd

Jiménez Hernández, D., Muñoz Sánchez, P. y Sánchez Giménez, F. S. (2021). La Competencia Digital Docente, una revisión sistemática de los modelos más utilizados. *RiiTE Revista Interuniversitaria de Investigación en Tecnología Educativa*, (10), 105–120. https://doi.org/10.6018/riite.472351

Jiménez Palmero, D., Mora Núñez, M. y Cuadros Muñoz, R. (2016). La importancia de las nuevas tecnologías en el proceso educativo. Propuesta didáctica TIC para ELE: mELEndien7dias. *Revista Fuentes, 18* (2), 209-223. Recuperado de: https://bit.ly/3C1JPtJ

Jiménez, R. y Sánchez, S. (2022). Competencias digitales: Fundamentación para la práctica docente en el contexto pospandemia. *Diversidad Académica, 2*(1), 241-260. https://diversidadacademica.uaemex.mx/article/view/19651

Juvera Avalos, J. (2022). Alfabetización digital en universitarias(os). De la incertidumbre a la ciudadanía digital. En R. E. López Martínez (Coord.), Hacia la ciudadanía transdigital (pp. 63–75). Editorial

Transdigital. https://doi.org/10.56162/transdigitalb8

Lalangui, J.H., Ramón, M.A. y Espinoza, E.E. (2017). Formación continua en la formación docente. Revista *Conrado, 13*(58), 30-35. Recuperado de: https://bit.ly/3hnPild

Maliza, W. F., Medina León, A., Medina Nogueira, Y. E. y Vera, G. R. (2021). Moodle: Entorno virtual para el fortalecimiento del aprendizaje autónomo. *Revista UNIANDES Episteme, 8*(1), 137-152. http://45.238.216.13/ojs/index.php/EPISTEME/article/view/1971

Martínez-Garcés, J. y Garcés-Fuenmayor, J. (2020). Competencias digitales docentes y el reto de la educación virtual derivado de la covid-19. *Educación y humanismo, 22*(39), 1-16. https://doi.org/10.17081/eduhum.22.39.4114

Mendo Flores, A.J. (2021). *Uso de las TIC para el aprendizaje del idioma Inglés en estudiantes de educación básica* [Tesis doctoral, Universidad César Vallejo]. https://hdl.handle.net/20.500.12692/55748

Morales Capilla, M. Trujillo Torres, J.M. y Raso Sánchez, F. (2015). Percepciones acerca de la integración de las TIC en el proceso de enseñanza-aprendizaje de la universidad. *Píxel-Bit. Revista de Medios y Educación, 46*, 103-117. Recuperado de: https://bit.ly/3hqk5h7

Ñaupas, H., Valdivia, M.R., Palacios, J.J. y Romero, H.E. (2018). *Metodología de la investigación Cuantitativa - Cualitativa y Redacción de la Tesis.* (5ª ed.). Ediciones de la U. Recuperado de: https://bit.ly/3vpBPRX

Nieto, I., Aguilar, J.C. y Álvarez, T. K. (2015). *M-learning para favorecer la enseñanza de las matemáticas en docentes de educación básica* [Conferencia]. IX Congreso Internacional de Innovación Educativa. Veracruz, México. Recuperado de: https://bit.ly/3C4e6lu

Olivares, K., Angulo, J., Torres, C. y Madrid, E. (2016). Las TIC en educación: metaanálisis sobre investigación y líneas emergentes en México. *Apertura, 8,* (2). pp. 100-115. doi: http://dx.doi.org/10.18381/Ap.v8n2.866

Perdomo, B., Gonzalez Martinez, O. y Barrutia Barreto, I. (2020). Competencias digitales en docentes universitarios: una revisión sistemática de la literatura. *EDMETIC, 9*(2), 92–115. https://doi.org/10.21071/edmetic.v9i2.12796

Pech, S.J. y Prieto, M.E. (2016). La medición de la competencia digital e informacional. En T. De León, J. García y E. Orozco, *Desarrollo de las competencias para el Siglo XXI*, (pp. 26-50). Alexandria Library Publishing House. https://www.researchgate.net/publication/304538264_Desarrollo_de_Competencias_para_el_Siglo_21

Pozos, K. (2016). *Evaluación de necesidades de formación continua en competencia digital del profesorado universitario mexicano para la sociedad del conocimiento* [Tesis doctoral, Universitat Autònoma de Barcelona]. https://hdl.handle.net/10803/382466

Rambay, M.G. y De la Cruz Lozado, J. (2021). Desarrollo de las competencias digitales en los docentes universitarios en tiempo pandemia: Una revisión sistemática. *In Crescendo, 11*(4), 511-527. https://doi.org/10.21895/incres.2020.v11n4.06

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

Rapley, T. (2014). *Los análisis de conversación, de discurso y de documentos en investigación cualitativa* (Vol. 7). Morata. Recuperado de: https://bit.ly/3ppgILO

Rivero Panaqué, C. y Soria-Valencia E. (2021). Percepciones sobre el aprendizaje virtual con microlearning: estudio de caso de una experiencia de formación profesional en una organización privada. En Arboleda, J. C. (Ed.) *Educación, desarrollo humano y valores (Tomo 27, pp. 260-279)*. Redipe

[Internet]. https://redipe.org/wp-content/uploads/2021/04/tomo-xxvii-educacion-desarrollo-humano-y-valores.pdf#page=262

Rodríguez-Alayo, A.O. y Cabell-Rosales, N.V. (2021). Importancia de la competencia digital docente en el confinamiento social. *Polo del conocimiento, 6*(1), 1091-1109. https://polodelconocimiento.com/ojs/index.php/es/article/view/2210

Rodríguez, M.D.L.C. y Barragán, H. M. (2017). Entornos virtuales de aprendizaje como apoyo a la enseñanza presencial para potenciar el proceso educativo. *Killkana sociales: Revista de Investigación Científica, 1*(2), 7-14. Recuperado de: https://bit.ly/3K00yjO

Segura, C.E. y Escudero, A. (2017). *Ejes de desempeño y competencias digitales para docentes en una institución mexicana de educación superior* [Conferencia]. IV Jornadas de TIC e Innovación en el Aula. La Plata, Argentina. https://bit.ly/3C13euD

Segura Rondan, L.C., Primo De la Torre, R.M., Romero Azuero, R.I. y Tapia Flores, Z.R. (2022). Competencias digitales docentes en tiempos de pandemia por Covid-19. *Sinergias Educativas*. https://mail.sinergiaseducativas.mx/index.php/revista/article/view/241/708

Sibaja, D. (2021). La educación virtual durante la pandemia COVID-19: realidades y retos. *PsicoInnova, 5*(1), 1-11. https://www.unibe.ac.cr/ojs/index.php/psicoinnova/article/view/39/37

Torres Barzabal, M.L., Martínez Gimeno, A., Jaén Martínez, A. y Hermosilla Rodríguez, J. M. (2022). La percepción del profesorado de la Universidad Pablo de Olavide sobre su Competencia Digital Docente. *Pixel-Bit: Revista de medios y educación*, (63), 35-64. https://doi.org/10.12795/pixelbit.91943

Valbuena Duartea, S., Medina Güette, A.P. y Teherán Barranco, V.S. (2021). Empoderamiento docente para la integración de las TIC en la práctica pedagógica, a partir de la problematización del saber matemático. *Academia y Virtualidad, 14*(1), 41-62. https://doi.org/10.18359/ravi.5161

Valencia, T., Serna, A., Ochoa, S., Caicedo, A.M., Montes, J.A. y Chávez, J.D. (2016). *Competencias y estándares TIC desde la dimensión pedagógica: una perspectiva desde los niveles de apropiación de las TIC en la práctica educativa docente*. Sello Editorial Javeriano. Recuperado de: https://bit.ly/3Hs74Ov

Véliz Salazar, M.I. y Gutiérrez Marfileño, V.E. (2021). Modelos de enseñanza sobre buenas prácticas docentes en las aulas virtuales. *Apertura, 13*(1), 150-165. http://doi.org/10.32870/Ap.v13n1.1987

Vera, J.L., Pirela, J.E. y Erreyes, S.V. (2021). Sistematización de la enseñanza virtual: modalidades y características. *Mundo Recursivo, 4*(1), 149-160. https://www.atlantic.edu.ec/ojs/index.php/mundor/article/view/67

Viñoles-Cosentino, V., Sánchez-Caballé, A. y Esteve-Mon, F.M. (2022). Desarrollo de la Competencia Digital Docente en Contextos Universitarios. Una Revisión Sistemática. *REICE, 20*(2), 11-27. https://doi.org/10.15366/reice2022.20.2.001

Zambrano Acosta, J.M., Chávez Lucas, T.E. y Quiroz Fernández, L.S. . (2021). Estrategia didáctica y el empleo de TIC para el desarrollo de la comprensión lectora en los estudiantes de 6to año de la Educación Básica General en Ecuador. *Revista Científica Sinapsis, 2*(20). https://doi.org/10.37117/s.v2i20.515