Artículos científicos

Competencias digitales en profesores de educación superior de Iberoamérica: una revisión sistemática

Digital Competences in Higher Education Teachers in Iberoamerica: A systematic review

Competências digitais em professores de ensino superior na Ibero-América: uma revisão sistemática

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Resumen

El objetivo del presente trabajo fue realizar una revisión literaria en repositorios de documentos científicos sobre el tema competencias digitales de docentes universitarios de Iberoamérica. A partir de criterios de búsqueda establecidos, se encontraron en las bases de datos consultadas más de ocho mil artículos. Sin embargo, se eligieron únicamente aquellos con menos de cinco años de antigüedad, de corte empírico y escritos en español. Los artículos analizados (19 en total) mostraron que la mayor producción sobre el tema en Iberoamérica se ubica en España en comparación con el entorno latinoamericano. Asimismo, se concluye que los estudios se han enfocado más en el componente tecnológico de las TIC que en los aspectos de índole pedagógica. Por ello, cabe resaltar que el simple empleo de las TIC en el proceso de enseñanza-aprendizaje es insuficiente para fomentar cambios radicales en la educación formal, ya que lo más significativo es habilitar a los

docentes en el empleo de competencias digitales que potencien el aprendizaje real de los estudiantes.

Palabras clave: competencia digital, docente, educación superior, revisión sistemática, tecnologías de la información y la comunicación.

Abstract

The objective of this work was to carry out a literary review in repositories of scientific documents on the subject of digital competences of university teachers in Ibero-America. Based on established search criteria, more than eight thousand articles were found in the databases consulted. However, only those with less than five years old, empirical and written in Spanish were chosen. The articles analyzed (19 in total) showed that the highest production on the subject in Latin America is located in Spain compared to the Latin American environment. Likewise, it is concluded that the studies have focused more on the technological component of ICT than on aspects of a pedagogical nature. Therefore, it should be noted that the simple use of ICT in the teaching-learning process is insufficient to promote radical changes in formal education, since the most significant thing is to enable teachers to use digital skills that enhance learning real students.

Keywords: digital competence, teaching, higher education, systematic review, information and communication technologies.

Resumo

O objetivo deste trabalho foi realizar uma revisão literária em repositórios de documentos científicos sobre a temática das competências digitais de professores universitários da Ibero-América. Com base nos critérios de busca estabelecidos, foram encontrados mais de oito mil artigos nas bases de dados consultadas. No entanto, foram escolhidos apenas aqueles com menos de cinco anos, empíricos e escritos em espanhol. Os artigos analisados (19 no total) mostraram que a maior produção sobre o assunto na América Latina está localizada na Espanha em comparação com o ambiente latino-americano. Da mesma forma, conclui-se que os estudos se concentraram mais na componente tecnológica das TIC do que em aspectos de natureza pedagógica. Portanto, deve-se destacar que a simples utilização das TIC no processo de ensino-aprendizagem é insuficiente para promover mudanças radicais na educação formal, já que o mais significativo é capacitar os professores a utilizarem competências digitais que potencializem a aprendizagem de alunos reais.

Introduction

In this new century, information and communication technologies (ICT) have become essential in the educational field, as they offer multiple opportunities to attend to the diversity of students' learning styles and to promote communication and collaborative work inside and outside of the classroom (Agreda, Hinojo and Sola, 2016). A clear example of the use of ICT in education is observed in the access to different sources of information. A couple of decades ago, when the teacher asked his students a simple task on any subject, they had to go to libraries or specialists. This work involved, in most cases, a long time to travel to the place where the information was, which today has been simplified thanks to the internet and the use of electronic devices.

For this reason, the institutions have had to work on the digital literacy of their students (Marqués, 2012), which has demanded from the teacher a constant update in terms of teaching / learning methods based on ICT. In this sense, it is worth noting that the educational system, in general, and higher education institutions (HEIs), in particular, have made great efforts, most of the time unsuccessful, to adapt their educational systems to the pace set by the technological development. For this reason, the incorporation of ICT to education in Mexico, specifically, has been full of conflicts and contradictions, since it is often lost sight of what is the purpose of including such technologies in the academic field and what are the real advantages that provide to the educational community (Valerio and Paredes, 2008).

A very important part of the inclusion of ICT in education is strongly associated with teachers, since they are the facilitating agents of knowledge and direct contact between institutions and students. It is true that teachers can use ICT in the classroom in many ways, but this depends on the digital skills they possess. Indeed, according to Suárez, Almerich, Díaz and Fernández (2011), for the teacher to integrate ICT into their practice they must feel confident of mastering it at a technical and pedagogical level, that is, they need to be competent. Therefore, it is pertinent to delve a little more about the concept of digital competences.

The issue of digital skills should also be focused on the teacher (Fernández, Fernández & Cebreiro, 2016), since, like students, they need to use ICT effectively and efficiently in their

respective professional activities (teaching, research , management, etc.) and personal (Chancusig, Flores and Constante, 2017). Specifically, teachers need instrumental skills to use Internet programs and resources. This implies developing didactic and methodological competencies in all roles associated with teaching, that is, counselor, advisor, tutor, prescriber of resources for learning, source of information, organizer of learning and even motivator. (Regalado, 2013).

Objective

Given the importance of this topic, and considering that the adequate level of digital skills by teachers is especially important to promote students' knowledge, this work attempts to describe the panorama of this line of research in the Ibero-American context, since from that In this way, the formative weaknesses of teachers in this area can be inferred.

Method

The specialized search for empirical references that cited the digital competence of teachers in higher education in various contexts allowed us to detect the state of the study of the digital competence of Ibero-American teachers.

Regarding the databases selected to undertake the search, Scopus (Elsevier), Web of Science (Clarivate analytics) and Redalyc (Network of Scientific Journals of Latin America and the Caribbean) were considered. The first two databases were included due to the rigorous quality criteria required for the indexing of journals and, in the case of the last, due to its extensive catalog of studies in the social, education and humanities areas. To carry out the research, digital competence was used as a keyword in each of the databases.

Subsequently, to narrow down the inquiry, only studies written in Spanish and that had been published for less than five years (2015-2020) were chosen. All the works that specialized in other actors (eg, students), focused on educational levels other than higher and those that did not adhere to the quantitative research approach were also omitted. Additionally, only empirical inquiries were considered, so those that made reflections on the subject, instrument design or other types of tests were discarded.

Results

As already noted, digital competence was used as the search keyword in each of the databases. In principle, 5089 articles were found in Scopus, 2,447 in Web of Science (WOS) and 609 in Redalyc, of which only those written in Spanish were selected. In this regard, it is worth noting that various meta-analyzes were found on the topic of digital competence (Delgado, Vázquez-Cano, Belando and López, 2019; Hernández, Gisbert and Fernández, 2018; Perdomo, González and Barrutia, 2020; Rodríguez and Martínez, 2018; Reiss, Pessoa and Gallego-Arrufat, 2019; Rodríguez, Raso and Ruiz, 2019; Rodríguez, Trujillo and Sánchez, 2019).

Later, in a more selective search, it was noticed that in Spanish there were also articles focused on the digital competence of other actors other than teachers; for example, university students (Castellanos, Sánchez and Calderero, 2017; Gutiérrez and Cabero, 2016; Vázquez-Cano, Reyes, Colmenares and López, 2017), as well as primary, secondary and special education. Even studies that analyzed the influence of the family environment on the development of these skills (Martínez, Vila and Gewerc, 2019; Sánchez, Andrés and Paredes, 2019) or from a qualitative approach (Padilla, Gámiz and Romero, 2020).

Likewise, in these first searches, another accumulation of inquiries about the digital competence of teachers was detected, but outside the context of higher education (Falcó, 2017; Muñoz and Cubo, 2019; Pérez and Rodríguez, 2016; Pozo, López, Fernández and López, 2020; Roblizo, Sánchez and Cózar, 2015).

Finally, after discarding the previous works, and considering only the criteria described in the methodological section, 19 articles were found focused on the digital competences of university-level teachers at the Ibero-American level. These publications were segmented by context and year. Table 1 shows the articles found according to the referred search criteria.

Tabla 1. Estudios empíricos y cuantitativos sobre competencia digital docente en el ámbito universitario iberoamericano (2016-2020)

Autor(es)	Contexto (país)	Año	Nombre del artículo	Tipo de Estudio
Pozo, López, Rodríguez y López	España	2020	Competencia digital docente para el uso y gestión analítica informacional del aprendizaje invertido	Observacional
López, Moreno, Pozo y López	España	2020	Efecto de la competencia digital docente en el uso del *blended learning* en formación profesional	Observacional
Romero, Contreras y Pérez	España, Portugal, Brasil y Venezuela	2019	Las competencias mediáticas de profesores y estudiantes universitarios. Comparación de niveles en España, Portugal, Brasil y Venezuela	Observacional
Mirete	España	2016	El profesorado universitario y las TIC. Análisis de su competencia digital	Observacional
Fernández, Sánchez-Oro y Robina	España	2016	La evaluación de la competencia digital en la docencia universitaria: el caso de los grados de empresariales y económicas	Observacional
Sarango-Lapo, Mena, Ramírez-Montoya y Real	Ecuador	2020	La escala de Competencia Digital y uso de Recursos Educativos Abiertos (CD-REA): factores asociados a la competencia de los docentes universitarios bimodales	Observacional
Cejas, Lozada, Urrego, Mendoza y Rivas	Ecuador	2020	La irrupción de las tecnologías de la información y la comunicación (TIC): un reto en la gestión de las competencias digitales de los profesores universitarios en el Ecuador	Observacional
García, Villareal, Cuéllar, Echeverri, Henao y Botero	Colombia	2020	Competencia digital en docentes universitarios: evaluación de relación entre actitud, formación y alfabetización en el uso de TIC en entornos educativos	Observacional
Montoya y González	Colombia	2019	Competencias TIC en docentes de nivel técnico y tecnológico. Un estudio de caso en un centro de formación del SENA	Observacional
Tobar	Colombia	2017	Índice de competencias TIC en docentes de educación superior	Observacional

Solís de Ovando y Jara	Chile	2019	Competencia digital de docentes de ciencias de la salud de una universidad chilena	Observacional
Ríos, Gómez y Rojas	Chile	2018	Valoración de competencias TIC del profesorado universitario: un caso en Chile	Observacional
Pérez	República Dominicana	2019	Competencia digital docente en los institutos superiores de formación de maestros: caso de República Dominicana	Observacional
Sandia, Aguilar y Luzardo	Venezuela	2018	Competencias digitales de los docentes de educación superior. Caso Universidad de Los Andes	Observacional
Zambrano, Marquina, Araque y Mousalli	Venezuela	2016	Escuela de educación y la competencia digital de sus estudiantes y docentes	Observacional
Avello, López y Vázquez	Cuba	2016	Competencias TIC de los docentes de las escuelas de Hotelería y Turismo cubanas	Observacional
Zárate, Gurieva y Jiménez	México	2020	La práctica holística de las competencias digitales docentes: diagnóstico y prospectiva	Observacional
Araiza y Pedraza	México	2019	Discernimiento de los docentes por género en el uso de las TIC en el aula a partir de las competencias digitales	Observacional
Zempoalteca, Barragán, González y Guzmán	México	2017	Formación en TIC y competencia digital en la docencia en instituciones públicas de educación superior	Observacional

Fuente: Elaboración propia

Starting with the Spanish context, Pozo, López, Rodríguez and López (2020) carried out a study with 744 teachers entitled Teaching digital competence for the use and informational analytical management of flipped learning. This evidenced intermediate levels of teaching digital competence: the area of greatest strength was communication and collaboration, while the weakest were the creation of digital content and problem solving. The study found that teachers with lower skills avoid introducing modifications in their practice, such as the flipped classroom or the use of big data. Some of these authors also published the article Effect of teacher digital competence in the use of blended learning in professional training, with a sample of 627 teachers. In this, the deficit in the digital skills of teachers was evident. As in the previous study, they identified that innovative learning processes are avoided, such as the flipped classroom (López, Moreno, Pozo & López, 2020).

Along the same lines, Romero, Contreras and Pérez (2019) developed a study entitled The media competencies of university teachers and students. Comparison of levels in Spain, Portugal, Brazil and Venezuela, with 524 teachers and 1676 university students from those countries. The research showed that the two groups of participants had a low level of media competence, understood as the ability to use technology, tools and information available online in a critical and thoughtful way.

For his part, Mirete (2016) carried out a study entitled University teachers and ICT. Analysis of their digital competence, in which 50 teachers of Social and Legal Sciences from the University of Murcia collaborated. According to this study, the participants maintained a positive attitude towards the use of ICT in teaching, although their knowledge of software, information search engines and email was basic.

Likewise, in the Faculties of Economic and Business Sciences and Business Studies and Tourism of the University of Extremadura (Spain), an investigation was carried out with 84 professors entitled The evaluation of digital competence in university teaching: the case of business degrees and economic, to know the perception of teachers on the use of ICT in the professional field (Fernández, Sánchez-Oro and Robina, 2016). In this work it is concluded that a high percentage of teachers consider this competence as very important in the development of their subjects. In fact, participants use ICT resources in their subjects to promote it and propose activities through tools available on the virtual campus of the institution.

Now, in the Latin American context, a couple of studies carried out in Ecuador were found. The first of them, developed by Sarango-Lapo, Mena, Ramírez-Montoya and Real (2020), is entitled The scale of digital competence and use of open educational resources (CD-REA): factors associated with the competence of teachers bimodal university students. This focuses on 271 teachers who teach in person and remotely. The research was able to confirm a link between the digital competences of the teaching staff and the following variables: years of teaching (the lower the seniority, the greater the competence), academic level (master's or doctorate with better competence), number of courses taken (more training is synonymous with greater competence) hours of Internet use in general (more time on the Internet, better skills), hours for communication with students (better communication equals better competence), skills possessed in the use of ICT (greater skill, better competence) and number of actions taken to innovate in the classroom (more actions taken equals greater competition).

The second study, carried out by Cejas, Lozada, Urrego, Mendoza and Rivas (2020), was called The irruption of information and communication technologies (ICT): a challenge in the management of teachers' digital skills university students in Ecuador. With a sample of 37 professors, the authors concluded that the participants use ICT only for information and communication, since there is a high deficiency in research training, despite the fact that the institution offers access to technology.

Following the same line, but now in Colombia, García, Villareal, Cuéllar, Echeverri, Henao and Botero (2020) developed a study called Digital competence in university teachers: evaluation of the relationship between attitude, training and literacy in the use of ICT in environments educational. Through an analysis of structural equations in a sample of 93 teachers, the authors concluded that literacy, training and attitude towards ICT influence their use in the classroom.

In this same country, Montoya and González (2019) carried out an investigation entitled ICT Competences in teachers of technical and technological level. A case study in a SENA training center, which allowed them to conclude that the various digital skills are linked to each other. In addition, a correlation was found between ICT competence and teacher attitudes. However, although the majority have a positive attitude, about 30% do not consider them necessary.

Also in Colombia, a study entitled Index of ICT competencies in higher education teachers was carried out. The results indicate that teachers have a good management of technological resources, although in pedagogical competence a low index is appreciated, for which the author of the research suggests that teacher training programs in ICT competences, in addition to the instrumental part , must have an epistemological foundation in educational models (Tobar, 2017).

On the other hand, in Chile, Solís de Ovando and Jara (2019) developed a study called Digital competence of health sciences teachers at a Chilean university, with a sample of 94 teachers from nursing, nutrition and dietetics careers. The research findings highlight that the area of greatest strength was technical use, while material design was the weakest. They also found an inverse correlation between digital skills and age (that is, the older the teaching staff, the lower the competence). Similarly, a link with years of experience in the dimension of didactic use was found. In terms of gender, men showed higher levels of competence, while academic degree had no influence on any dimension.

Another study carried out in Chile by Ríos, Gómez and Rojas (2018), entitled Assessment of ICT competences of university teachers: a case in Chile, found that the importance that teachers give to ICT is greater than the domain they have over are. In addition, it is highlighted that the

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teachers consider that they dominate the technological aspects of its use more than the pedagogical ones. The study ruled out a relationship with the teacher's gender, age, and type of faculty.

Next, in the Dominican Republic, an investigation developed by Pérez (2019) was found entitled Teaching digital competence in higher teacher training institutes: case of the Dominican Republic. In a sample of 121 university professors, they detected that the use of word processors, as well as access, navigation and internet search are the dimensions with the best level of competence, while the creation of digital content is significantly the weakest. In addition, they ruled out that the age of the teaching staff has a significant influence on their digital competence.

In Venezuela, Sandia, Aguilar and Luzardo (2018) carried out a study entitled Digital competences of higher education teachers. Case of the University of Los Andes. With a total of 116 professors from two different faculties (Engineering and Economic and Social Sciences), the research concluded that, on average, there is an integrated (intermediate) level of mastery of ICT. In addition, differences were found according to the assignment faculty, the type of contract and the level of studies, although the influence of age or gender on the level of digital competence was rejected.

In this same country, Zambrano, Marquina, Araque and Mousalli (2016) carried out a work called School of education and the digital competence of its students and teachers, which was developed to know the digital competence of teachers and students of the School of Education of the Faculty of Humanities and Education of the University of Los Andes. The results show that teachers use an average of 7 hours a week to plan their classes (75% use the internet from home). In addition, they have a higher level in the learning and creativity dimension, as they promote it more frequently, although the same does not happen with the rest of the dimensions. According to the authors, teachers must be protagonists and seek the integration of ICT to take advantage of its advantages.

In Cuba, an investigation carried out by Avello, López and Vázquez (2016), entitled ICT Competences of Teachers of Cuban Hospitality and Tourism Schools, focused on determining the training needs of teachers in relation to the ICT competencies framework. . The study concluded (regarding the technological dimension) that 50% of teachers do not use Web 2.0 tools, perhaps due to the access restrictions present in schools. Even so, it is worth noting the high percentage of teachers who manage computers and networks, manage devices and handle office automation packages, which is related to the number of introductory computer science courses offered at the same institution. Likewise, an element that was evaluated positively was the topic of information

search and organization. Regarding the pedagogical dimension, 86% apply new teaching strategies in the classroom that make it possible to take advantage of ICT resources. Regarding the research and professional development dimension, it was noted that the majority do not create or actively participate in virtual research networks.

Already in the Mexican context, Zárate, Gurieva and Jiménez (2020), in their study The holistic practice of teaching digital competences: diagnosis and prospective, analyzed the subject in a sample of 18 teachers. The results identify that the use of tools and the creation of content are the most consolidated digital skills, while collaboration represents the weakest point. Based on the results, the authors carry out an improvement plan by designing projects linked to the specific problems faced by the student.

On the other hand, Araiza and Pedraza (2019) published a study called Discernment of teachers by gender in the use of ICT in the classroom based on digital skills. In a sample of 224 teachers, significant differences were found between teachers, as women value more the importance of the use of ICT in the classroom, hence they use and integrate them more frequently.

Finally, Zempoalteca, Barragán, González and Guzmán (2017) in their study Training in ICT and digital competence in teaching in public institutions of higher education, carried out with 100 teachers, found that there is a relationship between the degree of digital competence and the ICT training, that is, the more the teacher is trained, the better they will be. The foregoing influences the academic performance of students and shows that the innovative use of ICT has a favorable effect on the academic practice of students.

Discussion

Taking into account the importance of the subject of digital competences of university professors in the current knowledge society, it is not very encouraging that in the Ibero-American context (except in Spain, where progress is already significant) there are relatively few empirical research works on the theme. For this reason, it is worth mentioning what was indicated by Perdomo, González and Barrutia (2020), who underline the need for researchers in this environment to strengthen this line not only to reflect on it, but also to prosper in the matter.

In this sense, it is evident that there is still a long way to go in terms of training and enabling digital skills in university teachers, since the results show intermediate and low levels in this area (Araiza and Pedraza, 2019; Romero, Contreras and Pérez, 2019; López, Moreno, Pozo and López, 2020; Pozo, López, Rodríguez and López, 2020).

On the other hand, it can be pointed out that most of the works reviewed in this research are predominantly observational, in the form of self-reports. Therefore, it is necessary to develop methodologies to consolidate the digital competences of university teachers.

Likewise, it should be noted - as a positive aspect - that significant relationships were found between ICT training and the levels of digital skills in teachers (Solís de Ovando and Jara, 2019; Zempoalteca, Barragán, González and Guzmán, 2017). This means that, gradually, the ICT training programs have had an impact on the teaching profession, which indirectly benefits students.

Another aspect to be considered in the works is that the relationship between the levels of digital skills enablement and variables such as age, seniority, experience and gender of the teachers is not yet clear, since some authors have found associations between some of them (Sarango -Lapo, Mena, Ramírez-Montoya and Real, 2020; Solís de Ovando and Jara, 2019), but others have not noticed it (Pérez, 2019; Sandia, Aguilar and Luzardo, 2018). These contradictions invite further investigation to clarify these aspects.

Conclusions

The present study concludes that in Latin America, in general, studies have focused more on the technological component of ICT than on aspects of a pedagogical nature. However, it should be noted that the simple use of ICT in the teaching-learning process is insufficient to promote radical changes in formal education, since the most significant thing is to enable teachers to use digital skills that enhance learning. real student learning.

Therefore, for future work it is recommended - in addition to carrying out more inquiries that address the level of digital skills in university professors - to deepen the impact that these have on the quality of teaching, and especially on the academic achievement of students.

Likewise, the possibility of developing lines of research that include educational interventions to increase the digital skills of university teachers could be considered. Likewise, it would be convenient to undertake qualitative studies to analyze the meanings that teachers have built towards the use of digital tools and to recognize the real motivations they have towards their employment or possible rejection.

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