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### DIGITAL COMPETENCIES OF UNIVERSITY FACULTY IN LATIN AMERICA AND THEIR IMPACT ON PEDAGOGICAL INNOVATION: A SYSTEMATIC REVIEW

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**Abstract:** University faculty members' digital competencies are defined as an integrated set of knowledge, skills, and attitudes focused on information handling, information literacy, and knowledge management in digital environments. These competencies strengthen the faculty member's ability to locate, analyze, select, and use content critically, as well as to share resources online, actively participate in virtual learning communities, and promote collaborative work dynamics. Similarly, they involve the development of skills related to effective communication, proactivity, interpersonal relationships, professional responsibility, digital security, ethical data handling, and a commitment to continuing education. Within this framework, the present study aims to analyze the digital competencies of university faculty in Ibero-America and their impact on pedagogical innovation: a systematic review. To this end, a literature review was conducted following the PRISMA methodology guidelines, which ensured the transparency and rigor of the study selection process. The search was conducted in recognized databases, such as ScienceDirect, Scopus, ERIC, Dialnet, SciELO, and Google Scholar. In the first phase, 128 documents were identified; subsequently, after applying previously established inclusion and exclusion criteria, 23 articles were selected for analysis. The included studies were examined exhaustively, allowing for the identification of trends, theoretical approaches, and levels of development of university faculty members' digital competencies in the Ibero-American context. The results highlight the importance of integrating these competencies into higher education curricula, as they constitute a determining factor for improving educational quality and adapting educational pro-

cesses to the demands of the 21st century. Likewise, the study emphasizes the need to strengthen continuing professional development for faculty in these sub-competencies, in line with the European reference frameworks that guide the development of digital competence among educators.

**Keywords:** Digital competencies, higher education, information literacy, university faculty.

## 1. Introduction

The digital transformation has profoundly reshaped educational processes in higher education by fostering new forms of technology-mediated teaching and learning. In this context, the digital competencies of university faculty have emerged as a strategic factor in ensuring high-quality, relevant education that is aligned with contemporary challenges (Ramazanova and Kassymova, 2025). Their development responds not only to technological advances but also to the need to promote innovative, flexible, and sustainable teaching models capable of meeting the demands of an increasingly digitized society (Demissie, 2022).

From this perspective, teachers' digital competencies cannot be reduced to the instrumental use of technological tools but must be understood as a coherent set of knowledge, skills, attitudes, and dispositions oriented toward the critical, ethical, reflective, and pedagogically relevant use of technology. In this regard, university faculty require capabilities that enable them to select, adapt, design, and implement digital resources in accordance with specific educational objectives, fostering active, inclusive, and meaningful learning experiences.

Similarly, these competencies encompass information literacy, communication and collaboration in virtual environments, the creation of digital content, information security, and continuous professional development.

Within this framework, the European Framework for the Digital Competence of Educators (DigCompEdu) serves as a fundamental reference for guiding the pedagogical integration of technologies into teaching practice. According to the European Commission (2018), digital competence comprises an integrated set of knowledge, skills, and attitudes that enable the responsible, critical, and reflective use of technological environments. This concept goes beyond technical mastery of tools by incorporating dimensions related to information and data literacy, effective virtual communication, ethical data management, and the creation of digital content.

In this way, DigCompEdu not only strengthens teachers' professional performance but also fosters pedagogical innovation processes aimed at improving the quality of learning. Likewise, various reference frameworks have helped structure the understanding and assessment of digital competence at different levels. DigComp provides a general foundation for the development of citizens' digital competence; DigCompEdu is specifically aimed at teachers; and DigCompOrg guides educational institutions in integrating technology into their organizational structure and culture.

Complementarily, DigComp at Work relates these competencies to the professional sphere and employability, while the UK Digital Teaching Framework reinforces key dimensions such as digital literacy, security, and content creation. Together, these fra-

meworks provide a conceptual and operational basis for analyzing the development of university faculty members' digital competencies and their connection to pedagogical innovation processes.

In line with these approaches, Kluzer and Pujol-Priego (2018) identify five essential dimensions of digital competence: information and data literacy, communication and collaboration, digital content creation, security, and problem-solving. The latter two are considered cross-cutting, due to their presence across various areas of teaching practice.

Along the same lines, Guillén-Gámez et al. (2022) argue that teachers' digital competence involves the reflective and innovative integration of information and communication technologies with the aim of generating meaningful learning. For their part, Cabero-Almenara et al. (2020) conceive of it as a repertoire of knowledge and skills that facilitates the effective incorporation of technology into teaching and learning processes, which requires moving beyond a merely technical perspective to advance toward a critical and transformative pedagogical appropriation.

In the Latin American context, interest in the digital competencies of university faculty has grown significantly in recent years, driven by the expansion of virtual modalities, the digital transformation of universities, and the need to strengthen teaching capacity in the face of changing educational landscapes. However, this development has not been uniform.

National and institutional realities reveal significant differences regarding access to technological infrastructure, training opportunities, the pedagogical adoption of

digital tools, and the consolidation of university policies aimed at strengthening these competencies. These inequalities highlight the persistence of gaps that affect both faculty performance and the real possibilities for innovation in higher education.

In this regard, the relationship between digital competencies and pedagogical innovation takes on special relevance, given that innovation does not depend exclusively on the availability of technological resources, but rather on the faculty's ability to integrate them in a didactic, critical, and transformative manner. Possessing solid digital competencies can facilitate the adoption of active methodologies, the design of collaborative environments, the diversification of assessment strategies, and the creation of more flexible, learner-centered educational experiences.

However, when these competencies are insufficient or developed in a fragmented manner, there is a risk that technology will be used merely as a tool, without bringing about substantive changes in teaching practices or in the quality of learning.

Despite the growing body of research on this topic, the evidence available in Ibero-America remains scattered, with diverse approaches and results that do not always allow for a comprehensive understanding of the state of knowledge regarding university faculty members' digital competencies and their impact on pedagogical innovation.

Furthermore, much of the scholarly literature has focused on describing levels of competence or faculty perceptions, while broader analyses are still needed to identify trends, strengths, gaps, and challenges in the region. Consequently, a systematic review is relevant not only to organize and synthesize

recent academic literature but also to offer a critical perspective that helps guide future research, institutional policies, and faculty training programs.

In response to this need, the present study aims to analyze the scientific literature on the digital competencies of university faculty in Ibero-America and their impact on pedagogical innovation during the 2018–2024 period. Based on a systematic review, the study seeks to identify research trends, key findings, areas of strength and weakness, as well as the implications of these competencies for the transformation of teaching practice in higher education. In this way, the article aims to provide a more structured and critical understanding of the topic, highlighting the need to strengthen training processes, institutional strategies, and pedagogical approaches that enable a more equitable, reflective, and sustainable integration of technology.

## 2. Methodology

This study is based on a systematic literature review with a qualitative-descriptive approach, designed to examine the scientific literature on the digital competencies of university faculty in Ibero-America and their impact on pedagogical innovation: a systematic review covering the period 2018–2025. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach was applied, considered a widely recognized methodological procedure for guiding the conduct of systematic reviews and ensuring the transparency of the analytical process (Ciapponi, 2021).

## 2.1 Search Strategies

The search was conducted in the ScienceDirect, Scopus, ERIC, Dialnet, SciELO, and Google Scholar databases, prioritizing open-access studies in Spanish and English. The research questions guided the review toward identifying dimensions, methodological approaches, and research trends in the field of university faculty digital competencies.

## 2.2 Phase 1. Formulation of Research Questions

1. Which dimensions of digital competence have been addressed most frequently in Ibero-American studies?
2. What methodological approaches predominate in the literature on teachers' digital competencies?
3. What contributions and gaps have been identified in recent scientific research?

## 2.3 Phase 2. Information Sources and Eligibility Criteria

To identify scientific articles on digital competencies, an exhaustive review was conducted in ScienceDirect, Scopus, ERIC, Dialnet, SciELO, and Google Scholar. For the selection of studies, search criteria were applied in Spanish and English, using descriptors related to open-access research in the fields of education and the social sciences. The search process considered elements such as the title, abstract, study type, conclusions, and recommendations. To ensure the rigor of the analysis, inclusion and exclusion criteria were established for the final selection of articles.

Digital competencies	Digital competences	Digital technology
University teachers	University teacher	University teacher Latin America
Higher education Spanish-speaking	Higher education	University Education
Teachers	Professors	

Table 1. Keywords used in the systematic literature review

Table 1. Prepared by the author.

It is worth noting that Scopus is a bibliographic database widely used by the scientific community in Ibero-America and other countries around the world.

Its relevance lies in the fact that it provides access to articles published in indexed and open-access journals, with multidisciplinary coverage and in various languages. Furthermore, this platform offers multiple search dimensions and filters, making it an essential tool for the theoretical and methodological foundation of academic research. It publishes high-impact articles and studies with recognized scientific rigor (Codina et al., 2020).

### *Selection Process*

The selection criteria used to determine the eligibility of the articles included five major databases. In total, 128 articles in Spanish and English were identified. Of these, 74 were duplicates across the different platforms; therefore, the list was refined, and 54 documents relevant to the Ibero-American context for the 2018–2024 period were retained.

For the initial screening, a preliminary review was conducted of the articles with the highest citation counts in scientific

journals, examining the title, abstract, study type, and keywords. Subsequently, the full text was accessed to assess its relevance to the research objective. Following a detailed analysis, the established inclusion and exclusion criteria were applied. As a result, 74 preliminary articles were selected; however, 31 were discarded because they were unrelated to the field of university faculty or because they pertained to faculty in other areas not relevant to the study.

Finally, 23 documents that fully met the research objectives were selected and subjected to detailed review and analysis. (Figure 1).

### *Analysis of the selected articles*

The analysis of the 23 articles on university faculty digital competencies in the Ibero-American context identified various types of studies, both qualitative and quantitative. Qualitative studies focus on document analysis and the description of educational phenomena, with the aim of understanding and interpreting processes related to teachers' digital competence. Quantitative studies, on the other hand, are characterized by the use of surveys administered to university faculty to obtain numerical data that allow for the measurement of competence levels, perceptions, or attitudes.

Likewise, mixed-methods studies were identified, which integrate information from both qualitative and quantitative methods, incorporating in some cases cross-sectional designs that facilitate data triangulation. Finally, theoretical studies are based on literature reviews and conceptual analyses of digital competence in Ibero-American countries. Taken together, this methodological

diversity highlights the approaches used by researchers to study digital competence in the field of higher education. Based on the analysis, eight qualitative studies, eleven quantitative studies, two mixed-methods studies, and two theoretical studies were identified.

Regarding the geographical distribution of the articles, as shown in Table 1, the countries with the highest scientific output between 2018 and 2024 were Spain, Mexico, Peru, Chile, Cuba, and Argentina. In particular, Spain accounted for the highest percentage of publications, ranking as the country with the greatest research contribution to the topic within the Ibero-American context.

Chile (n = 2)	Colombia (n = 1)
Spain (n = 8)	Ecuador (n = 1)
Ethiopia (n = 1)	Mexico (n = 3)
Central Asia (n = 1)	Cuba (n = 2), Venezuela (n = 1)
Peru (n = 2)	Dominican Republic (n = 1)

Table 1. Methodological characteristics and geographical distribution of the included studies

## 3. Discussion and Results

The results show a sustained growth in research on teachers' digital competencies in Ibero-America in recent years, in line with the challenges that digital transformation has posed to higher education. The predominance of quantitative studies suggests an interest in measuring teachers' preparedness and performance in digital environments, which aligns with international research highlighting the need for objective indicators to assess institutional progress (Guillén-Gómez et al., 2022; Cabero-Almenara et al., 2020).

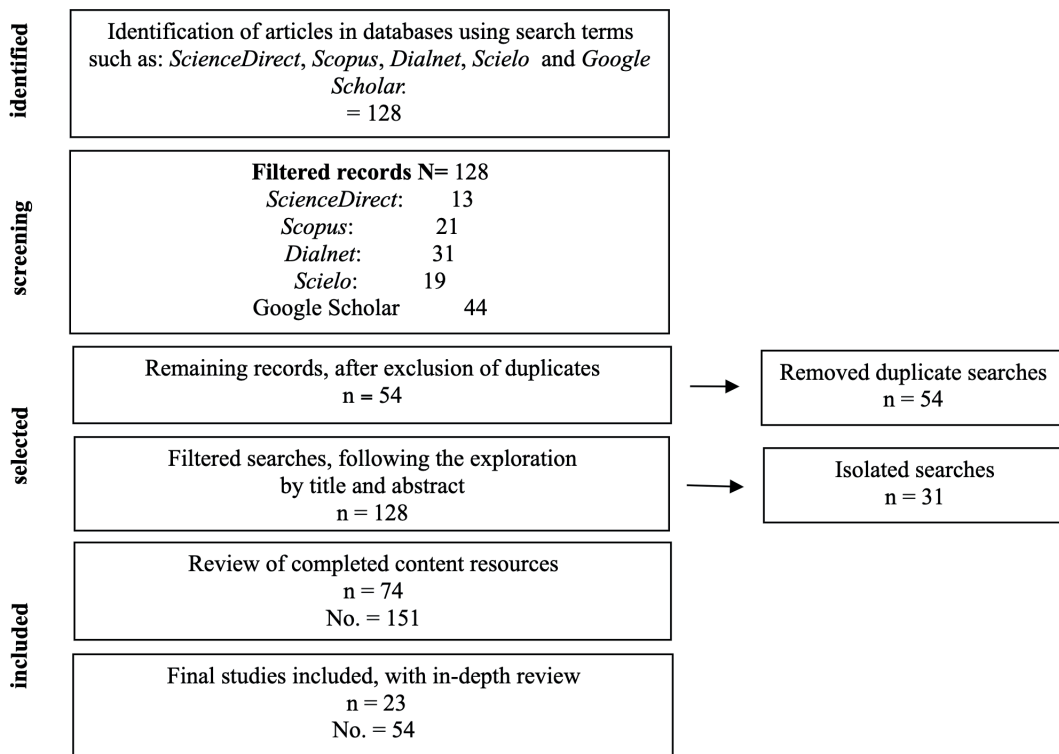


Figure 1. Flowchart of the study selection procedure according to PRISMA

However, the significant presence of qualitative studies indicates that digital competence cannot be reduced to the mere acquisition of technical skills. Perceptions, attitudes, institutional barriers, and socio-cultural contexts have a decisive influence on its development. In this regard, the findings align with critical perspectives that view digital competence as a complex, situated, and evolving construct (Kluzer & Pujols-Priego, 2018). Spain's leadership in scientific output is consistent with the early implementation of public policies related to DigCompEdu and other European frameworks, which contrasts with Latin American countries where institutional digital integration is progressing unevenly.

These regional gaps indicate the need to strengthen teacher training programs, technological infrastructure, institutional strategies, and educational policies that recognize the importance of digital competence as an essential professional skill. Furthermore, there is a shortage of longitudinal and evaluative studies, which limits understanding of the actual impact of training initiatives.

Most research focuses on descriptive assessments; therefore, it is recommended to expand studies that evaluate the effectiveness of training programs, institutional interventions, and innovative pedagogical models. Spain is the country with the highest number of publications identified during the period studied.

### 3.1 What are the sub-competencies or factors of digital competence that higher education faculty have developed in the Spanish-speaking context from 2018 to 2024?

Analysis of the 23 selected articles revealed clear trends in research on the digital competencies of university faculty in Ibero-America. First, quantitative studies constitute the majority (n=11), indicating a preference for measuring levels of digital competence through structured questionnaires, primarily based on the DigCompEdu framework. These instruments are used to assess dimensions such as digital content creation, information literacy, digital safety, and communication in virtual environments.

Qualitative studies (n=8), on the other hand, delve into perceptions, teaching practices, and experiences related to the integration of technologies in teaching. Through interviews, document analysis, and case studies, they demonstrate that teachers' digital competence is not limited to technical mastery but is conceived as a continuous process of pedagogical appropriation.

Mixed-method studies (n=2) confirm methodological complementarity by integrating quantitative measurements with interpretive analyses, allowing for a broader understanding of teachers' digital reality. Finally, theoretical studies (n=2) provide conceptual reviews and analytical frameworks that contribute to the systematization of existing knowledge on the subject.

Likewise, significant trends were identified in the adoption of reference frameworks such as DigCompEdu and the INTEF Digital Competence Framework for Teachers (2017), although the degree

of implementation varies according to the national context and the technological development of each country. Spain continues to lead academic production in this field, followed by Mexico, Chile, and Peru.

In the Caribbean, research shows more recent growth, with emerging contributions from the Dominican Republic standing out (Gallur & Díaz-Lathulerie, 2023). The results indicate that university faculty generally possess an average level of digital competence. The greatest strengths are observed in the areas of communication and collaboration in virtual environments, while the most common weaknesses relate to the creation of digital content and security management.

Likewise, various studies highlight that institutional policies play a decisive role in strengthening these competencies, particularly through continuing education programs and faculty support strategies (Paz Saavedra & Gisbert, 2024). In the Dominican context, the National Digital Literacy Plan (MINERD, 2018) has promoted teacher training through ongoing professional development and the use of national technology platforms, such as SIGERD (2020).

The analyzed research also underscores the importance of linking teachers' digital competence with educational innovation and improved learning. Authors such as Ocaña-Fernández et al. (2020) emphasize that continuous professional development, together with institutional support, constitutes a key factor for the digital transformation of education higher education. Complementarily, Prendes-Espinosa et al. (2018) argue that teachers' digital literacy must respond to contemporary social and technological demands, fostering a teaching force capable of integrating technology in a critical, ethical, and creative manner.

In summary, the reviewed evidence confirms that strengthening digital competencies does not depend solely on access to technological resources, but on building a training culture oriented toward critical reflection, responsible use of information, and pedagogical innovation. Geographically, the research is led by Spain, followed by Mexico, Peru, Argentina, Chile, and Cuba. This concentration suggests greater institutional, academic, and technological development in these countries, as well as an earlier adoption of digital literacy policies in higher education.

## Conclusions and Recommendations.

The systematic review of university faculty members' digital competencies in Ibero-America and their impact on pedagogical innovation during the period (2018–2024) reveals a sustained growth in scholarly output and a gradual consolidation of reference frameworks such as DigCompEdu and INTEF, although their implementation remains uneven across different countries and institutional contexts. In general terms, the findings show that university faculty members exhibit average levels of digital competence, with strengths in the areas of virtual communication and collaboration, but with persistent weaknesses in digital content creation and security management.

Similarly, there is a predominance of quantitative studies of a descriptive nature, which limits the generation of solid evidence regarding the effectiveness of training interventions and the actual impact of policies and programs aimed at strengthening these competencies.

In this context, it is essential to promote more consistent institutional policies, as well as continuing education programs that go beyond technical mastery and foster critical, ethical, and pedagogical digital literacy. Furthermore, it is necessary to increase investment in technological infrastructure and applied research, especially in those regions with lower scientific output, with the aim of advancing toward a more equitable, contextualized, and sustainable technological integration in higher education.

The analyzed studies agree that the development of teachers' digital competence is a key factor for educational innovation, the transformation of pedagogical practices, and the improvement of learning. Although emerging progress is identified in regions such as the Caribbean, challenges related to training, access to resources, and alignment with international reference frameworks still persist.

Consequently, strengthening these competencies requires not only sustainable institutional strategies but also a comprehensive educational vision that enables a critical response to the demands of contemporary digital society. The digital transformation of higher education will not be possible without a teaching faculty capable of turning technology into a critical, ethical, and transformative pedagogical tool.

## Recommendations for Future Research:

- Strengthen continuing teacher education through updated programs that integrate technologies from a pedagogical, ethical, and critical perspective.

- Adopt competency frameworks such as DigCompEdu and INTEF to plan, assess, and improve faculty members' digital competence.
- Promote the design and creation of digital content as a key competency that remains underdeveloped.
- Ensure equitable access to technological infrastructure, connectivity, and institutional platforms, along with clear security and data protection policies.
- Encourage applied research projects and longitudinal studies that assess the impact of training policies and generate evidence for decision-making.
- Foster an institutional culture oriented toward educational innovation, collaboration among teachers, and the adoption of emerging technologies.
- Expand research in Caribbean contexts, particularly in the Dominican Republic, to strengthen the regional empirical base.

## Implications for Teaching Practice

The implications of this review for teaching practice in Ibero-American higher education are clear: the development of faculty members' digital competencies must not be limited to the instrumental use of technological tools, but rather be understood as a comprehensive process that integrates pedagogical, ethical, critical, and contextual dimensions. From this perspective, university teaching is called upon to transition from a functional use of technology toward intentional didactic integration that enriches teaching, fosters active student participation, and responds to the demands of the digital society.

The results highlight the need to strengthen faculty members' capacity to design, adapt, and evaluate digital resources with pedagogical purpose. The weaknesses observed in content creation and security management highlight limitations that may affect the quality and sustainability of technology-mediated educational experiences. Consequently, teaching practice must be oriented toward innovative methodologies that promote autonomous, collaborative, and meaningful learning, as well as the responsible, safe, and ethical use of digital environments.

Likewise, the findings underscore that ongoing teacher training must be established as a structural component of academic professional development. This process requires ongoing, context-specific actions aligned with reference frameworks such as DigCompEdu and INTEF, which enable teachers to reflect on their practice, identify areas for improvement, and incorporate technology as a resource for innovation and educational inclusion.

Finally, the pedagogical adoption of technology depends not only on the individual willingness of faculty but also on favorable institutional conditions, including adequate infrastructure, equitable access to digital resources, technical support, and academic leadership. Within this framework, strengthening teachers' digital competencies is a strategic prerequisite for transforming educational practice and moving toward a more innovative, inclusive, and relevant higher education. Rather than simply incorporating technology into the classroom, the challenge of contemporary university teaching lies in endowing it with pedagogical meaning to make it a true agent of educational transformation.

## Study Limitations

The analysis has certain limitations that are important to consider when evaluating the findings. First, the review focused solely on studies published between 2018 and 2024, which may exclude relevant research conducted before or after the analyzed period. Furthermore, although widely recognized databases such as Scopus, ERIC, SciELO, and ScienceDirect were used, it is possible that some unindexed or restricted-circulation articles may not have been identified.

## Future Research Directions

Based on the findings, several areas of opportunity for future research are identified. It is recommended to conduct longitudinal studies to analyze the evolution of teachers' digital competencies over time, as well as experimental research to evaluate the impact of specific training programs. It is also pertinent to delve deeper into less developed dimensions, such as digital content creation and security management, given their crucial role in current educational environments.

Likewise, it is necessary to expand research in other countries; similarly, it is suggested to explore the use of emerging technologies such as artificial intelligence, learning analytics, and augmented reality and their influence on university teaching practices. Finally, it is proposed to investigate the link between teachers' digital competence and educational innovation, as well as its impact on students' academic outcomes.

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