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OF DIGITAL TEACHING SKILLS IN THE CONTEMPORARY UNIVERSITY

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EL PAPEL DE LAS COMPETENCIAS DIGITALES DOCENTES EN LA UNIVERSIDAD CONTEMPORÁNEA

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ABSTRACT

This article analyzes the fundamental role of digital teaching competencies in contemporary universities, highlighting that technological transformation has radically altered teaching, learning, and research processes. It emphasizes that digital competence is not limited to the technical use of tools but rather entails a set of skills, knowledge, attitudes, and values that enable teachers to integrate technology in a critical, ethical, and pedagogical manner. Models such as DigCompEdu and the HeDiCom Framework highlight six key areas, including digital pedagogy, student empowerment, assessment, resource creation, and academic leadership, establishing international standards adaptable to local contexts. The article emphasizes that these competencies facilitate active methodologies, such as project-based learning, the flipped classroom, and collaborative learning, promoting student motivation, personalized learning, and educational inclusion. It also points out that the pandemic highlighted gaps in digital literacy, infrastructure, and access, but also generated opportunities to rethink university teaching and strengthen communities of teaching practice. The integration of emerging technologies such as artificial intelligence, learning analytics, and immersive environments requires a thoughtful, strategic, and ethical approach that considers data protection, equity, and information reliability. Finally, it is concluded that the systematic development of digital competencies, supported by institutional policies, ongoing training, and academic leadership, is an essential requirement for ensuring educational quality, pedagogical innovation, and the development of critical and competent citizens in digital environments.

Keywords:

Digital skills, educational innovation, digital literacy, digital pedagogy.

RESUMEN

El artículo analiza el papel fundamental de las competencias digitales docentes en la universidad contemporánea, resaltando que la transformación tecnológica ha modificado radicalmente los procesos de enseñanza, aprendizaje e investigación. Se enfatiza que la competencia digital no se limita al uso técnico de herramientas, sino que implica un conjunto de habilidades, conocimientos, actitudes y valores que permiten al docente integrar la tecnología de manera crítica, ética y pedagógica. Modelos como DigCompEdu y HeDiCom Framework destacan seis áreas clave, incluyendo la pedagogía digital, el empoderamiento del alumnado, la evaluación, la creación de recursos y el liderazgo académico, estableciendo estándares internacionales adaptables a contextos locales. El artículo subraya que estas competencias facilitan metodologías activas, como el aprendizaje basado en proyectos, el aula invertida y el aprendizaje colaborativo, promoviendo la motivación estudiantil, la personalización del aprendizaje y la inclusión educativa. Asimismo, se señala que la pandemia evidenció brechas en alfabetización digital, infraestructura y acceso, pero también generó oportunidades para repensar la enseñanza universitaria y fortalecer comunidades de práctica docente. La integración de tecnologías emergentes como la inteligencia artificial, la analítica del aprendizaje y los entornos inmersivos requiere un enfoque reflexivo, estratégico y ético, que considere la protección de datos, la equidad y la fiabilidad de la información. Finalmente, se concluye que el desarrollo sistemático de competencias digitales, apoyado en políticas institucionales, formación continua y liderazgo académico, constituye un requisito esencial para garantizar calidad educativa, innovación pedagógica y formación de ciudadanos críticos y competentes en entornos digitales.

Palabras clave:

Competencias digitales, innovación educativa, alfabetización digital, pedagogía digital.

INTRODUCTION

In the current university context, technological transformations have redefined the ways of teaching, learning, and producing knowledge. Higher education faces the challenge of integrating digital technologies into all its educational processes, which requires university professors to develop a set of digital competencies that transcend the instrumental use of technological tools to achieve a pedagogical, ethical, and critical dimension. This process involves understanding technology not as an end in itself, but as a means that enables new forms of knowledge construction, social participation, and collaborative learning in digitally mediated environments (Cabero et al., 2020).

The digitalization of contemporary society has modified the structures of knowledge production and circulation, giving rise to a hyperconnected global culture where information flows, artificial intelligence, and interactive virtual environments demand a new teaching profile. University professors can no longer limit their role to the transmission of content but must act as designers of learning experiences, facilitators of critical thinking processes, and guides in the responsible use of technology. In this sense, digital teaching competencies (DTCs) are emerging as an essential component of the professional identity of university professors, capable of responding to the demands of innovative, inclusive higher education adapted to the challenges of the 21st century (Acosta et al., 2025).

According to the European Commission (Redecker & Punie, 2017), digital teaching competences encompass the ability to use technologies effectively, creatively, and responsibly in teaching, learning, and professional development contexts. The DigCompEdu model proposes six areas ranging from professional engagement and the creation of digital resources to digital pedagogy and student empowerment. This perspective positions digital competence as a cross-cutting axis of teaching performance and not as an isolated technical skill. Consequently, the contemporary university professor is seen as a mediator of digital knowledge, capable of integrating technological resources into active methodologies, inclusive approaches, and hybrid learning environments that combine face-to-face learning with virtual learning (Silva et al., 2019).

post-pandemic context reinforced the need to strengthen these competencies. The 2020 health emergency highlighted the dependence of education on technological infrastructure and the level of digital literacy of educational stakeholders. The accelerated virtualization of teaching revealed significant gaps in teachers' capacities for the pedagogical use of technologies, as well as inequalities in student access and connectivity. However, it also created an opportunity to rethink university teaching models, promote flexible learning, and consolidate digital communities of teaching practice.

In this context, digital teaching competence is consolidated as an essential requirement for ensuring educational quality, inclusion, and pedagogical innovation. Various studies have shown that teachers with higher levels of digital competence tend to implement active methodologies, such as project-based learning, the flipped classroom, or online collaborative learning, which has a positive impact on student motivation and performance (Padilla & Ayala, 2021). Furthermore, mastery of digital competences contributes to the creation of accessible environments, universal design for learning (UDL), and the development of critical digital citizenship, all of which are priority aspects in contemporary university education (De la Fuente-González & Menéndez Álvarez-Hevia, 2024).

However, the development of digital competencies is not limited to the use of platforms or tools. It also requires an ethical and reflective dimension that considers the social impact of technology, responsible data management, privacy protection, and equitable access to digital resources. The university, as an institution that trains professionals and produces knowledge, has the mission to lead this process through digital literacy policies for teachers, assessment frameworks, and sustained pedagogical support programs.

In Latin America, progress toward a digital university culture still faces structural and contextual challenges. Technological inequality, a lack of infrastructure, and limited opportunities for ongoing training hinder the strengthening of digital competence among faculty. However, there is growing interest among institutions in adopting international reference frameworks such as DigCompEdu and the HeDiCom Framework (Tondeur et al., 2023), adapting them to local realities. These tools make it possible to diagnose faculty members' level of digital competence, establish personalized training paths, and promote educational innovation through the pedagogical use of emerging technologies.

The convergence between education and technology also requires a thorough review of curricular practices. Digital teaching competence is directly linked to teachers' ability to design meaningful learning experiences that integrate digital resources in line with pedagogical objectives. It also involves fostering student autonomy, stimulating online collaboration, and using digital tools for formative assessment and monitoring academic progress. As Cabero et al. (2020) argue, digitally competent teachers not only master technology but also redefine it through their educational practice, generating innovation and continuous improvement.

Furthermore, the impact of emerging technologies, such as artificial intelligence, learning analytics, augmented reality, and immersive environments, is redefining the skills required for university teaching. The challenge lies not only in incorporating these tools but also in understanding their epistemological, ethical, and pedagogical

implications. University professors must acquire critical criteria to evaluate the reliability of digital sources, avoid misinformation, and promote a responsible and humanistic use of technology.

In this context, university teacher training takes on a strategic role. Institutions must assume the task of designing professional development plans that include digital competence as part of academic quality standards, accreditation, and teacher evaluation. Strengthening digital competence cannot depend solely on individual initiative; it requires institutional commitment, adequate infrastructure, and sustained training support that promotes pedagogical transformation.

In short, the contemporary university is facing a paradigm shift that requires redefining teaching practice based on digital competence. This should not be understood as a technological fad, but rather as a transversal capability that supports meaningful teaching, collaborative research, and the development of critical and competent citizens in the digital world.

Within this framework, the objective of this article is to analyze the role of digital teaching competencies in contemporary universities, examining their conceptualization, their relevance to university educational practice, and the institutional strategies necessary for their development and consolidation as a central pillar of academic quality.

METHODOLOGY

This paper uses a documentary and analytical approach, grounded in a systematic review of recent scientific literature (2020–2024) on digital competencies for teachers in higher education. Databases such as Scopus, Scielo and Redalyc were consulted, prioritizing indexed articles and relevant institutional frameworks. Selection criteria included publications in Spanish and English, empirical studies and systematic reviews, as well as official educational policy documents.

The analysis was structured in three dimensions: a) conceptualization of digital teaching competencies; b) institutional and training strategies for their development; and c) pedagogical impacts and emerging challenges. The sources were coded thematically, comparing theoretical and practical convergences in different university contexts. This method allowed us to identify international and Latin American trends, as well as the gaps that persist between policies and pedagogical practice.

DEVELOPMENT

Today, digital teaching competencies constitute one of the central pillars of university professionalism. They are understood as the set of knowledge, skills, attitudes, and values that allow teachers to critically, creatively, and pedagogically coherently integrate digital technologies into their teaching, research, and management work (Instefjord & Munthe, 2017). This concept transcends instrumental digital literacy to situate itself within a more complex framework, where digital pedagogy, the ethics of technological use, educational innovation, and the social responsibility of knowledge converge (Cabero-Almenara et al., 2020). In this sense, being digitally competent not only implies knowing how to use tools, but also designing interactive learning experiences, promoting collaboration in virtual environments, evaluating using digital resources, and reflecting on the social, environmental, and cultural impact of technology.

The European Framework for Digital Competence in Teachers (DigCompEdu), developed by Redecker & Punie (2017), is the most influential international reference. This model identifies six areas of competence ranging from professional engagement and the use of digital resources to digital pedagogy, assessment, student empowerment, and the promotion of students' digital competence. Its structure has been adopted, with adaptations, by multiple university systems in Europe and beyond, allowing for the establishment of common standards for self-assessment and certification of teachers' digital competence. In turn, the HeDiCom Framework (Tondeur et al., 2023) extends the DigCompEdu perspective to the university context, highlighting key dimensions such as digital leadership, educational research with technologies, and the co-creation of digital knowledge in academic communities.

In a global environment marked by the expansion of hybrid learning and educational artificial intelligence, universities are reconfiguring their faculty development policies toward the consolidation of digital competence as an indicator of quality. Several institutions have implemented continuing education programs that combine microcredentials, online courses, pedagogical innovation workshops, and digital communities of practice. These programs not only seek to strengthen technical skills but also to foster critical reflection on the educational use of technologies. Silva et al. (2019) argue that the effectiveness of these initiatives depends on their ability to link technological learning with didactic transformation, authentic assessment, and the design of meaningful experiences for students.

The development of digital teaching skills is directly linked to the quality of university education. Recent research shows that professors with high levels of digital competence apply active methodologies, integrate learning analytics for personalized feedback, and promote interdisciplinary collaborative environments. These practices align with the principles of Universal Design for Learning (UDL), which seeks to ensure accessibility, equity, and educational inclusion through the flexible use of technological resources (De la Fuente-González & Menéndez Álvarez-Hevia, 2024). Thus, digital competence is not reduced to a functional resource but becomes a means to democratize knowledge and enhance pedagogical innovation in higher education.

Haleem et al. (2022) conduct a comprehensive review of the role of digital technologies in education, highlighting how technological integration can transform teaching and learning processes. The authors emphasize that the effective adoption of digital tools depends not only on the infrastructure but also on the technological and pedagogical competence of teachers, as well as their ability to adapt digital resources to diverse educational contexts. Furthermore, they point out that technology must be used critically and strategically to enhance student engagement, collaboration, and educational innovation.

Zou et al. (2025) analyze the trends and challenges of digital learning in the 21st century, emphasizing the importance of thoughtful, student-centered technological integration. Their study shows that, although educational digitalization offers opportunities for personalized learning and access to global resources, it also poses challenges related to digital literacy, ongoing teacher training, and the assessment of digital competencies. The authors highlight the need for institutional frameworks that guide technological implementation and foster sustainable pedagogical innovation.

Zhang & Wu (2025) investigated the impact of digital teaching skills on the quality of university teaching, showing that professors with more developed digital skills apply active methodologies, integrate technological resources effectively, and improve student learning. The study shows that digital teaching skills directly influence the ability to design meaningful educational activities, provide innovative assessments, and encourage student participation, thus strengthening the relationship between technology and academic excellence.

Markauskaite et al. (2023) explore the transition from digital competencies to post-digital capabilities in sustainable universities. The authors argue that teacher training must go beyond technical mastery and address ethical, critical, and reflexive dimensions of technology. In this approach, teachers act as mediators of digital knowledge and agents of educational sustainability, capable of integrating technology into teaching, research, and inter-institutional collaboration in a strategic and responsible manner.

Samarguliani (2016) highlights that contemporary digital learning redefines education by offering flexibility, accessibility, and opportunities for independent learning. The author emphasizes that teachers need to develop skills that allow them to integrate digital tools pedagogically, facilitating interaction and personalized learning. She also emphasizes the importance of ongoing training and technological updating to address changes in modern educational environments.

McKinnon (2023) emphasizes the relevance of digital skills in modern education, arguing that teachers' technological competence is crucial to improving pedagogical efficiency and learning quality. She emphasizes that digital skills involve not only the use of tools, but also the ability to critically evaluate digital resources and design educational experiences that foster active student participation and critical thinking.

Chávez-Cárdenas et al. (2025) highlight that the integration of artificial intelligence and web technologies in contemporary education transforms learning processes, allowing for personalized teaching, immediate feedback, fostering student autonomy, and improving teacher-student interaction. Furthermore, they emphasize that the ethical and critical use of artificial intelligence is essential to ensuring responsible and sustainable learning, promoting cognitive and metacognitive skills that prepare students for the challenges of the 21st century.

Martin & Xie (2022) propose seven key areas for strengthening digital learning in higher education: institutional leadership, pedagogical innovation, technological integration, faculty professional development, course design, digital assessment, and collaboration. The authors show that a comprehensive approach enables not only the adoption of technologies but also the transformation of educational practices toward more flexible, personalized, and student-centered models.

Dang et al. (2024) investigated teachers' digital competence and its impact on student learning outcomes. Their results show that digital teacher training significantly improves educational quality, student motivation, and the ability to implement innovative methodologies. The authors highlight the need for institutional strategies to systematically and sustainably strengthen teachers' digital skills.

Lohr et al. (2024) address the digital competencies needed in school settings, emphasizing that teachers must develop technical, pedagogical, and strategic skills to effectively integrate digital devices and resources. They also point out that the success of digital learning depends on teacher preparation, student autonomy, and consistency between pedagogical objectives and the technology used, underscoring the importance of clear educational policies and ongoing training.

Finally, Acosta-Servín et al. (2025) emphasize the importance of systematically developing digital competencies in university professors as a prerequisite for innovation in teaching practice. They point out that digital training encompasses not only technical skills but also the ability to design effective teaching activities, assess with digital tools, and foster collaboration in virtual environments. They also highlight that teacher development programs must be continuous, integrating reflection on educational practice and technological updating, so that professors can implement innovative methodologies and adapt to changes in the global educational ecosystem.

After analyzing the contributions of these authors, it is clear that digital teaching competencies are essential

for critically, creatively, and pedagogically integrating technologies into higher and school education. Their development is not limited to the technical management of tools but encompasses the ability to design meaningful learning experiences, foster collaboration, personalize teaching, and innovatively assess in digital environments. These competencies directly impact the quality of learning, student motivation, and educational inclusion, ensuring that technology is used strategically and responsibly.

The integration of technology into contemporary education requires institutional frameworks and continuing education policies that promote the sustainable development of digital skills. Digital literacy for teachers includes not only the acquisition of technical knowledge, but also ethical and critical reflection on the use of digital resources, data protection, and equity in access to technological tools. This enables teachers to act as mediators of digital knowledge and agents of pedagogical transformation in their institutions.

Digital learning in the 21st century is characterized by its flexibility, accessibility, and potential to personalize the educational experience. Effective implementation of technology depends on teacher preparation, institutional leadership, pedagogical innovation, and consistency between educational objectives and the technological resources used. Furthermore, the integration of emerging technologies, such as artificial intelligence, learning analytics, and immersive environments, offers opportunities to improve teaching, but also requires critical, ethical, and strategic skills to maximize educational value and avoid risks.

Overall, strengthening teachers' digital skills has a positive impact on educational quality, fostering active methodologies, online collaboration, personalized learning, and the creation of inclusive and sustainable environments. Systematic and reflective teacher training, accompanied by appropriate institutional policies, is key to ensuring that educational digitalization contributes to the comprehensive development of students and pedagogical innovation in universities and schools.

The contemporary challenges of teaching digital competence are related to rapid technological evolution and the ethical demands arising from its use. Artificial intelligence, augmented reality, data analytics, and adaptive learning offer new possibilities for personalizing university education, but they also pose dilemmas regarding privacy, intellectual property, and the dehumanization of the educational process. Therefore, teachers must assume the role of critical mediator capable of assessing the reliability of digital sources, ensuring the protection of students' personal data, and guiding the ethical and responsible use of technology.

Globally, universities face a significant gap in the digital readiness of faculty. Although technological access has improved, inequalities persist in training and in the pedagogical adoption of digital tools (Instefjord & Munthe, 2017). Furthermore, the overabundance of information and technological acceleration generate cognitive tensions that require the development of an institutional digital culture based on continuous training, interdisciplinary cooperation, and technological resilience (Redecker & Punie, 2017). The consolidation of this university digital culture requires institutional leadership, supportive policies, and a humanistic vision that places meaningful learning at the center of digital transformation.

The development of digital teaching skills in contemporary universities is not an end in itself, but a necessary condition for relevant, inclusive, and innovative education. Higher education institutions must promote learning environments that integrate technology in critical and creative ways, recognizing teachers as key agents of change and digital competence as a structural component of overall educational quality.

CONCLUSIONS

The development of digital teaching skills is an essential pillar of contemporary university professionalism. These skills are not limited to the technical management of tools, but encompass the ability to design meaningful learning experiences, foster collaboration in virtual environments, conduct innovative assessments, and critically reflect on the social and ethical impact of technology. Their consolidation directly impacts the quality of learning, student motivation, and educational inclusion, ensuring that technology is used strategically, responsibly, and pedagogically coherent.

The effective integration of technology in higher education requires strong institutional frameworks and continuing education policies that sustainably promote teacher digital literacy. Faculty training must include not only the development of technical skills, but also ethical reflection, data protection, and the promotion of equity in access to digital resources. In this way, teachers become mediators of digital knowledge and agents of pedagogical innovation capable of transforming teaching and learning in their institutions.

The opportunities offered by emerging technologies such as artificial intelligence, learning analytics, and immersive environments demand critical, strategic, and ethical skills from university professors. Consolidating an institutional digital culture, based on ongoing training, interdisciplinary cooperation, and academic leadership, is essential to ensuring that educational digitalization contributes to relevant, inclusive, and innovative education, focused on meaningful learning and the development of critical and competent citizens in the 21st century.

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Sahand Mahdavi Zargari: Concepción y diseño del estudio, adquisición de datos, análisis e interpretación, redacción del manuscrito, revisión crítica del contenido, análisis estadístico, supervisión general del estudio.