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Digital competence of the university student. A systematic and bibliographic update

Competencia digital del estudiante universitario. Una actualización sistemática y bibliográfica

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Abstract

Society has experienced an essential technological revolution in recent decades, generating significant repercussions in the educational field, especially in higher education. This technological evolution demands the development of digital skills that allow us to face problems and situations in this environment.
In this sense, Higher Education Institutions (HEIs) have attached great importance to the training in digital skills of university students in their academic policies. Digital competence implies the knowledge, abilities, skills, and attitudes necessary to access, analyze, evaluate, reflect critically, create, and communicate in four key areas: technological, informational, multimedia, and communicative.
The objective of this article is to analyze documents related to the digital competencies of university students. To achieve this, a descriptive bibliometric study was carried out. Among the conclusions, the need to strengthen the training in digital skills of university students is highlighted so that they can take advantage of the communication tools available in the knowledge society.

Keywords: Digital competencies, higher education, higher education institutions, university students.

Resumen

La sociedad ha experimentado una importante revolución tecnológica en las últimas décadas, generando repercusiones significativas en el ámbito educativo, especialmente en la enseñanza superior. Esta evolución tecnológica demanda el progreso de competencias digitales que permitan afrontar problemas y situaciones en este entorno.
En este sentido, las Instituciones de Educación Superior (IES) han otorgado gran importancia a la formación en competencias digitales de los estudiantes universitarios en sus políticas académicas. La competencia digital implica la combinación de conocimientos, habilidades, destrezas y actitudes necesarios para acceder, analizar, evaluar, reflexionar críticamente, crear y comunicarse en cuatro áreas clave: tecnológica, informacional, multimedia y comunicativa.
El objetivo de este artículo es analizar documentos relacionados con las competencias digitales de los estudiantes universitarios. Para lograrlo, se llevó a cabo un estudio bibliométrico descriptivo. Entre las conclusiones se destaca la necesidad de fortalecer la educación en competencias digitales de los alumnos universitarios, para que puedan aprovechar las herramientas de comunicación disponibles en la sociedad del aprendizaje.

Palabras clave: Competencias digitales, educación superior, instituciones de educación superior, estudiantes universitarios.

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Introduction

University students' digital competency is crucial in an age of rapid technological advancement and widespread digitalization. Understanding students' digital capabilities is vital as educational institutions integrate digital tools, platforms, and methods into their curricula globally. This extensive systematic and bibliographic update examines the complex world of digital competence among university students, including the newest research, trends, and perspectives.

Digital literacy and proficiency are now required for academic success, employability, and lifelong learning in higher education. The term "digital competence" comprises digital literacy, information fluency, critical thinking in digital situations, ethical digital behavior, and the ability to adapt to new technology. Thus, this update tries to comprehend digital competence's many facets and its effects on students and instructors.

As the global workforce becomes more digital, university students need the ability to succeed. Inadequate digital competency can affect academic and occupational success. This update is crucial for educators, policymakers, academics, and stakeholders interested in comprehensive student development in the digital era.

This article presents the results of the bibliometric analysis of the digital competence of university students. Its objective is to contribute to an improved thoughtful of the study of Digital competencies of the university student, as well as their motivations in higher education.

Literature review

The university's substantive processes today are teaching, research, and community outreach. As an objective, the university must ensure the comprehensive training of its students. The increasingly accelerated development of technology requires fully prepared professionals and people to graduate, capable of responding to society's various problems.

In this sense, digital competence has become a fundamental skill in higher education. According to the European Parliament report, digital competence implies "the critical and safe use of Information Society Technologies for work, free time and communication" (European Parliament, 2006). This means not only the ability to use digital tools but also the ability to evaluate information and communicate effectively in virtual environments critically.

The importance of digital skills in higher education is not limited only to students but also affects teachers and professionals. As Pelgrum (2001) points out, "Digital skills are essential for teachers today, as they must be prepared to integrate technology effectively into their teaching practices and facilitate student learning in digital environments."

In addition, digital skills are essential for research and professional development in an increasingly globalized and connected world. Carretero et al., (2019) argued that "digital skills are necessary for researchers and practitioners in general, as they allow them to access online resources and tools, collaborate virtually with colleagues worldwide, and disseminate their research results more widely".

To address this panorama, it is necessary to work on training university teachers. Núñez-Canal et al., (2022) state, "It is essential to provide teachers with the necessary skills and knowledge to integrate digital technologies into their educational practices and make the most of the opportunities they provide to improve teaching and learning."

In addition, creating flexible and collaborative virtual environments in the university environment is required. Englund et al., (2017) state that "virtual learning environments can encourage active student participation, collaboration, and collective knowledge creation, which is especially relevant for digital natives, who have grown up immersed in technology and are more familiar with her".

In the current university context, digital skills have become essential for the comprehensive development of students, teaching practice, research, and professional development. University teacher training and creating collaborative virtual environments are vital aspects of promoting the effective use of technology and preparing students to face the challenges of a digital society.

In addition to digital skills, higher education must address students' motivations for developing these skills. According to studies by Krumsvik (2011) and Mateescu et al., (2021), university students are motivated to acquire digital skills due to their relevance in the labor

market and ability to improve employability. Employers highly value technology skills in an increasingly digitized world, prompting students to seek digital learning opportunities during their higher education.

Along with employability, students may be motivated by the need to adapt and fully participate in an increasingly digital society. As Bennett et al., (2008), digital competence has become a form of digital citizenship, which implies actively participating in social, political, and economic life through technology. Students recognize the importance of these skills for their participation in society and their ability to access information, services, and opportunities online.

On the other hand, the training of university teachers in digital skills is essential to guarantee quality education. According to a study by Ramírez-Montoya & García-Peñalvo (2017), teachers with well-developed digital skills can create rich and compelling learning environments, use digital resources efficiently, and encourage active student participation. Teacher training in digital skills allows for more innovative, collaborative, and student-centered teaching, which is aligned with the needs and expectations of digital natives.

Digital competence has become a fundamental skill in higher education, driven by labor market demand and the need to participate fully in the digital society. Students' motivation to acquire these skills is based on their employability and ability to adapt to a constantly evolving digital environment. Training teachers in digital skills is also crucial to provide quality education and making the most of the opportunities offered by technology in the university environment.

Digital competency is vital for students, professors, and professionals in higher education. It requires digital tools, interpreting information, and communicating in virtual spaces. These abilities help teachers enhance teaching, making students more employable and digitally active. Technology, teacher training, and collaborative virtual environments are essential to maximizing education. Overall, digital competence is necessary for success in higher education and society.

Methodology

The methodology used in this research combines a documentary approach of descriptive scope and a qualitative approach. According to Martínez-Corona et al., (2023), documentary research refers to a series of methods and techniques for searching, processing, and storing information in documents and systematically, coherently, and arguably presenting new information in a scientific paper. This definition supports using desk research to collect and analyze relevant scientific articles in the study area.

Regarding the choice of the unit of analysis and the selection criteria, the use of the Scopus database and the open-access journal is justified by its broad scope and recognition in the academic field. In this regard, Hiebl (2023) mentions that academic databases, such as Scopus, provide a wide range of reliable and updated sources for literature review.

The literature also supports using an Excel spreadsheet to collect and organize data from selected articles. For example, Chowdhury et al., (2023) mention that spreadsheets are practical for classifying and analyzing data in bibliometric studies and literature analysis.

In addition, using relevant keywords, such as "digital competence" or "digital competence", in searching for scientific articles is considered a common practice in documentary research. According to Ray (2023), keywords are essential to identify relevant literature in a specific area and maximize the effectiveness of the search.

Results

For the search for research articles, the Scopus database was used given its relevance since it not only collects bibliographic information but also analyzes the behavior of the citations received by the journals, thus allowing the generation of many bibliometric indicators. Obtaining the following results (See Table 1):

Table 1.
Articles associated to the object of study.

Author	Objective	Main Contribution
Boté-Vericad et al., (2023)	To analyze the balanced of digital teaching competence of university professors of health sciences in two Spanish autonomous communities: Andalusia and Catalonia.	In equally groups, teachers report a high command of technical skills, such as communication with other educators or contribution in online courses.
Gabarda-Méndez et al., (2023)	Develop digital competence from a transversal perspective in teachers.	The suggestion is to enhance the practical component of teacher training through increased experimentation, emphasizing the conscious, effective, and feasible utilization of technologies. Additionally, restructuring the curriculum to incorporate cross-cutting content would encourage students to use the internet and other technologies responsibly.
Fernández-Cerero et al., (2023)	To know the influence of technical teaching of college teachers concerning educational inclusion and cultivating the characteristic of life of students with disabilities.	Perpetual improvement of digital training for teachers and the exploration of innovative teaching methods are crucial. Furthermore, addressing the limited access to ICT prospects for students with disabilities is essential, as it contributes to the digital division and hampers equal approach to data and knowledge.
Marchwacka et al., (2023)	Describe the ways of teaching and learning used by teachers in the first semester of the COVID-19 pandemic.	The variation from face-to-face to digital teaching revealed the positive trend of digital education in health professions.
Kaloyanova et al., (2023)	The COVID-19 epidemic has highlighted the significance of digital health literacy while also presenting several challenges. Understanding the importance of digital health literacy has become crucial in effectively navigating the digital landscape for health-related information and services during these unprecedented times.	The report revealed that students from the Faculty of Mathematics and Informatics demonstrated a consistent and commendable level of health literacy across various health literacy scales. These encouraging findings can be attributed to the students' advanced digital skills, which contributed to their adeptness in navigating health-related information and resources.
Alonso-García et al., (2023)	To know the perception of students about digital competence in teaching.	They consider that college educator teaching processes should contain accreditation of digital skills.
Marimon-Martí et al., (2023)	This study aims to analyze the discernment of first-year scholars pursuing Education degrees in Catalonia and Andorra regarding their digital teaching capability. It further investigates potential differences in perception based on gender and degree program, contributing to the diagnosis and formative self-assessment of future teachers.	First-year scholars of Education degrees in Catalonia and Andorra generally hold a positive perception of their digital teaching competence. They tend to view themselves as highly proficient in virtuous characteristics, communication, and utilizing resources and applications. However, they perceive themselves as less experienced in pedagogical design, evaluation, and utilizing digital technologies for knowledge purposes.
Romero et al., (2023)	Identify how the digital challenges to promote lifelong learning through ICT in Higher Education (HE) are reflected in specific contexts and where digital transformation (DT) acquires particular relevance.	It stresses that technology should be a way to improve teaching, research, and knowledge sharing.
Area-Moreira et al., (2023)	To analyze to what extent the implemented HyFlex model was valued by the students and its effects on academic performance throughout a turbulent three-year period such as the years of the Covid-19 pandemic.	The HyFlex model has the potential to be transferred and applied to the subjects of face-to-face degrees that want to be digitally transformed.
Gutiérrez-Pequeño et al., (2023)	The implementation of the "Youth Social Media Lab" project was investigated as an exemplar of content creation that integrates multimedia elements (such as images, video, text, and audio) while fostering participatory	The study concludes that university classrooms undergo a transformative process, serving as spaces where students' creativity and ability to seek innovative solutions are challenged. This is evident in

	cultures and nurturing the acquisition of digital skills.	their selection of diverse topics within the field of social education and the development of scripts (storyboards) for creating videos. Moreover, the social media laboratory examined in this study becomes an inter-epistemic space that promotes the recognition of students' cognitive diversity, cultural hybridization, and the integration of different perspectives and approaches. The laboratory provides opportunities for experimenting with novel digital, multimedia, and interactive formats for content creation, as well as investigating a variety of topics concerning the contemporary role of youth in the laboratory.
Hernández-Sellés et al., (2023)	Present an analysis about the tasks and roles of teachers in collective work in virtual circumstances, recognizing its typology and the importance given by the scholars.	It made it possible to identify seven key responsibilities that a college professor should progress when applying an online collective work methodology: pedagogical, evaluator, social, technological, counselor/mediator, organizer/manager, and staff.,
Jugembayeva & Murzagaliyeva (2023)	The study purposes to examine the key methodical and academic factors that drive the evolution of educational formats in response to advanced technological trends. Specifically, the focus is on assessing the eagerness of physics scholars for digital knowledge within the University 4.0 model, which emphasizes technological integration and innovation in higher education.	Education 4.0 represents a crucial component for promoting inclusive and accessible higher education, aligning with the United Nations Sustainable Development Goals (SDGs). To ensure the integrity and sustainability of Education 4.0 in higher education, it is vital for educational technologies to be entirely incorporated, innovative, and scalable. First in this manner can they be deemed satisfactorily novel. A study investigating the innovative eagerness of physics scholars to engage in digital educational experiences within the framework of the University 4.0 standard divulges encouraging findings. Scholars exhibit a high level of inventiveness and possess a optimistic attitude towards novel didactic actions. These outcomes highlight their potential to actively participate in and benefit from the digital renovation of superior instruction.
Fuertes-Alpiste et al., (2023)	To study the perceptions of teachers and students concerning interactive synchronous videoconferences carried out by five teachers of 3 different subjects from the Faculty of Education of the University of Barcelona.	The study has allowed us to know the perceptions of mixed teaching by teachers and students, being those favorable, which will reinforce the implementation of these actions in the learning of Pedagogy studies.
Kuntadi et al., (2022)	Measure and analyze the level of digital skills students with industry experience possess.	It concludes that training students fall mainly on the university's role. However, it should be noted that universities must also collaborate with industry in developing benchmarks and standards to measure and establish what skill sets should be taught and prepared in academia.
Fernández-Jiménez (2022)	Analyze digital skills in higher education.	It considers the new need of the society created in the digital era, where all citizens, particularly future teachers, must acquire skills and abilities that allow them to function actively and adequately in the society of knowledge.

Abanades-Sánchez- (2022)	Know our students' perceptions about online classes and the teacher's interaction through them.	It concludes that the twelve must innovate in skills to develop their students and have a more guiding profile and leadership that allows them to empathize more with them. It must be permanently formed.
Merchán-Murillo (2022)	Analyze and address the use of technology for learning, its complexity, the teaching process, and the need for student support.	He considers that, in a digital and hyper-connected era, traditional ways of learning are complemented by the exponential increase in tools offered by ICT. Education is in a process of continuous change because the learning needs of students are changing. The skills necessary to develop jobs in companies are also changing. Therefore, the work and profiles required by them are increasingly different.
León Lizárraga et al., (2022)	To assess 114 university students' perception of themselves regarding their level of digital competence in communication in digital media and content creation.	It stands out as a contribution that, even when young university students grow and develop in a technological context, it is not a guarantee that they have sufficient digital competencies since their respective investigations show an absence of advanced levels of digital competence. In this sense, they reflect on the need to implement academic programs that promote the development of such skills with the condition of adapting them as technologies evolve.
Cerda González et al., (2023)	To analyze the frequency of digital technologies' academic, recreational, social, and economic uses in pedagogy students based on four variables: type of digital competence, gender, permanence in the program, and approval of subjects.	This study showed that when digital technologies are used for academic or recreational purposes, the use of skills depends on whether or not they have passed courses.
Kassymova et al., (2023)	To explore the opinions of master's students about their digital competence by identifying the frequency, experience, and satisfaction in the use of ICT in their knowledge method when they study at the university and teach English as a Foreign Language (EFL). in the environment of online instruction.	Digital competence is crucial in all domains of our contemporaneous living. You need to study, work and connect concurrently in a continuous technology: to improve the educational context. The COVID-19 pandemic and other present social and economic difficulties have through us go from conventional to blended, distance, and online education formats.
Latorre-Cosculluela et al., (2023)	To analyze the effects among a sequence of measurements connected to the discernment of university instruction team on the aptitude of ICT to answer to the distinctive desires of scholars, on the supposed effectiveness and positions concerning these tools, and, finally, on dynamic behavior about its use.	The effects of this analysis divulge the elevated grade of arrangement amongst university teachers concerning the aptitude of ICT to adjust to the step of work and learning of students, regardless of their descriptions. It also highlights the significance of design comprehensive educational simulations that offer the similar knowledge occasions to all scholars through the proper incorporation of ICT in the schoolroom.
Siri-Sollied et al., (2023)	Investigate the possibilities and limitations of student-teacher learning outcomes in an online collaborative learning activity.	They see the requirement for professional digital competence as central, as digital technology is not simply part of academic performs but is appropriate integral to communication and collaboration with colleagues and parents. Additionally, in connection with performing as a academic lead for a assumed group of staff, the scholar instructor increased knowledge, and respective of the expected education outcomes were attained concluded online practice.

Morra et al.. (2022)	Recapitulate the teaching and direction we provide to BLAs (Biology Learning Assistants) on how best to adjust digital instructive tools to engage scholars throughout their virtual terms.	He considers that digital tools have specific technological obligations, which include hardware, software, and sufficient Internet structure. When counselling their use, the requirement to increase the reasonable accessibility of these technologies to reduce the gap in the most neglected populations should be considered.
Anthonysamy (2022)	Contribute to helping scholars and professors use the appropriate motivational approaches to raise students' digital literateness.	Teachers must apply motivating strategies that promote the digital competence of students.
Silva-Quiroz, J. & Morales Morga-do (2022)	To determine first-year pedagogy students' digital competence (CD) level, crossed with two socioeconomic variables: the type of educational establishment where they attended high school and the territorial scope of their university.	They consider that university teaching should incorporate CD as part of student's academic training, especially students preparing to be teachers. On the other hand, other forms of exercise should be implemented for those students who do not have the financial resources so that their inclusion in the digital competence learning process can be guaranteed.

Source: Own elaboration.

Discussion

The table shows a common factor among multiple investigations is that digital skills positively affect students and teachers in the university environment. However, possibilities for reflections are opened based on the evidence of the articles that involve media literacy in the cognitive elements and, in this way, increase the experimentation of the practical component applied for the restructuring of the curriculum of the subjects.

Likewise, the use of the Hyflex model is reflected as a tool for ethical aspects, communication, use of multimedia resources, and specific applications, with an inclusive element that is part of ICTs for students with disabilities and accessible information as an opportunity for equality.

The trend of digital competence and the Hyflex model has an essential shift in the academic curriculum and the recognition of the cognitive plurality of students, cultural hybridization, and communication between evaluators, counselors, and educational managers.

Conclusions

The results show that studies on digital competence in the university represent an interest for the global scientific society due to its implications in academic, professional, and cultural life.

The current educational system cannot be understood without Information and Communication Technologies (ICT). In this sense, permanent training is required in teachers that allows them to guarantee inclusive, equitable, and quality education and promote learning opportunities during all life for all, as stipulated in the fourth Sustainable Development Goal Agenda 2030.

Given the ongoing development of technologies that bring information saturation, new text formats, and consequently different forms of communication which affect human activities and interpersonal relationships, they demand to integrate digital resources in their training processes, which must generate the development of digital skills in the student body.

Developing digital competence in students stimulates innovation and creativity, and they develop soft skills such as teamwork.

Using motivating strategies in the teaching process through ICT raises students' digital literacy.

Digital competence constitutes a transversal competence in training professionals at the undergraduate and postgraduate levels (master's and doctorate).

Information and communication technologies (ICT) allow access to shared documents, virtual teaching materials, and videoconferences at any time and place and in the search for updated and relevant information.

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