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Digital competence in scientific research in higher education

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Abstract---Background: Due to the current contingency due to covid 19, students and teachers have had to face new digital challenges in such a way that they seek to become aware of how important digital skills are for the learning process. However, it is evident that, in Peru, there is a digital divide due to inequality; therefore, there is no good university service due to the lack of Internet access in rural areas. The digital skills of university students allow the production of new knowledge and technological innovation from the development of digital skills. Objective: The general objective of the research was to identify the country with the most scientific production through a bibliometric and bibliographic review, to search for the production of research works on the construct of digital competence in scientific research in higher education during the period 2016- 2021.

Methodology: The research was developed under a qualitative approach based on a documentary review of the studies carried out in the period 2016-2021 in Latin American countries of the digital competence variable, 44 articles registered in the Scopus database were identified. **Results:** It was evidenced according to the results that Mexico is the country that has more productions of the theoretical construct, resulting in 18 articles on digital competence, Social Sciences was the area of knowledge that contributed the most with 30 published documents representing 68% of overall scientific productivity.

Keywords---Digital skills, research, higher education.

Introduction

The constant evolution of information and communication technologies (ICT) in the world has been generating favorable contexts for teaching-learning processes¹. Due to the context of the Covid 19 pandemic, digital skills became necessary, becoming facilitating tools for virtual educational continuity². ICTs are the tools that have been implemented as educational innovation in recent years as they allow access to a large amount of information that makes educational processes more efficient if used correctly; For this proper use, it is necessary to strengthen digital skills that allow you to access educational technology platforms and carry out a correct search for information. The importance of developing knowledge, skills and attitudes in the use of technology makes it a necessity and a learning resource for the acquisition of knowledge, where the university plays a fundamental role in its achievement³.

Research is an important component in university work, since it determines the application of the knowledge that is imparted in its social context, being a dynamic activity that must be in accordance with what happens in society, so that, in the last Over the years, new research tools have emerged that are used thanks to the strengthening of the digital skills of educational actors. Research is the basis of higher education since it fosters the emergence of new knowledge in specific areas of knowledge, therefore, for its correct application, digital literacy is necessary for both students and teachers. Investigative competencies are defined as a professional transversal component that provides guarantees on the ability to respond to the dynamics of constant changes and vertiginous advances with which society is characterized today; the ability to develop these skills helps in the autonomous learning process, critical thinking, writing and reading skills⁴.

Digital skills allow access to an unlimited amount of information that helps in the formulation of problems, thus giving way to a greater amount of research. The use of technology paves the way for virtual education, students must be increasingly accustomed to this digitized era in order to deal with the handling of technological devices by developing new digital skills⁵. It is a necessity in times of pandemic that university students are digitally literate, encourage the development of digital intelligence, promoting the care of the person to create a digital identity according

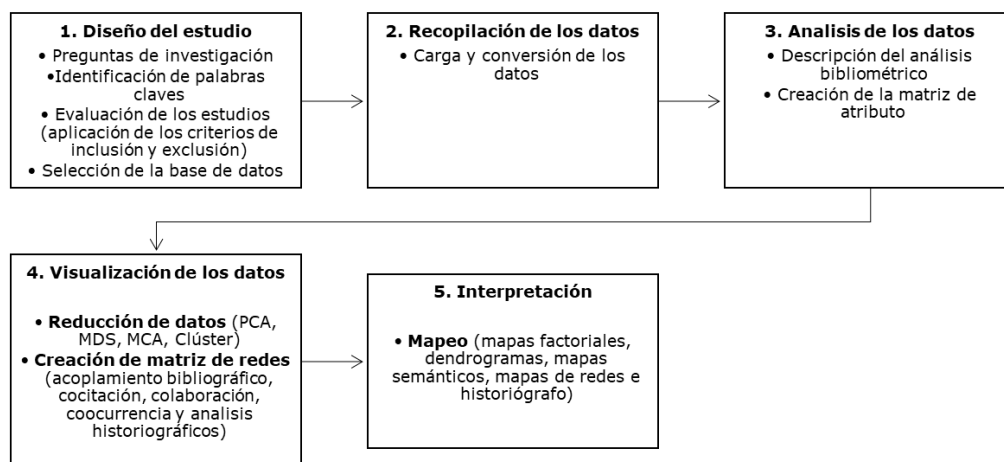
to their specific objectives, to privilege digital protection and security and respect towards the digital rights of others, developing digital and assertive emotional intelligence based on the construction of the social group.

The applicability of ICT makes it possible for the development of digital skills to be increasingly frequent in higher education educational settings, allowing students and teachers to access databases of scientific literature that help in their training as professionals with a complete profile that seeks the application of their knowledge and the development of material regarding a topic, allowing them to share information about their area of study. The profile that is required of a professional today is that of a student with a high level of ICT management to adapt to a technological world with adaptive needs in digital issues ⁶.

Thanks to the above, it can be said that digital skills are applied in research in order to allow educational actors to access new sources of information, thus having a broad spectrum of research in a specific area of knowledge. For these reasons, there is a need to know the current state of research regarding digital competence in scientific research in higher education, so a bibliometric analysis of the scientific production recorded in the Scopus database is proposed to provide an answer To the question, how has the production and publication of research works related to the study of the digital competence variable in scientific research in higher education in Latin America been during the 2016-2021 period?

Methodology

The quantitative and qualitative approach of the information provided by Scopus was carried out under a bibliometric approach. First, an online literature search was performed in the Scopus database. This bibliographic database was created by the Elsevier publishing house in November 2004, and currently has 42,180 journals from more than 7,000 international publishers. Five rigorous steps have been described for its implementation, which include study design, collection, analysis, visualization and interpretation. In the present study, the five phases were considered.



Results

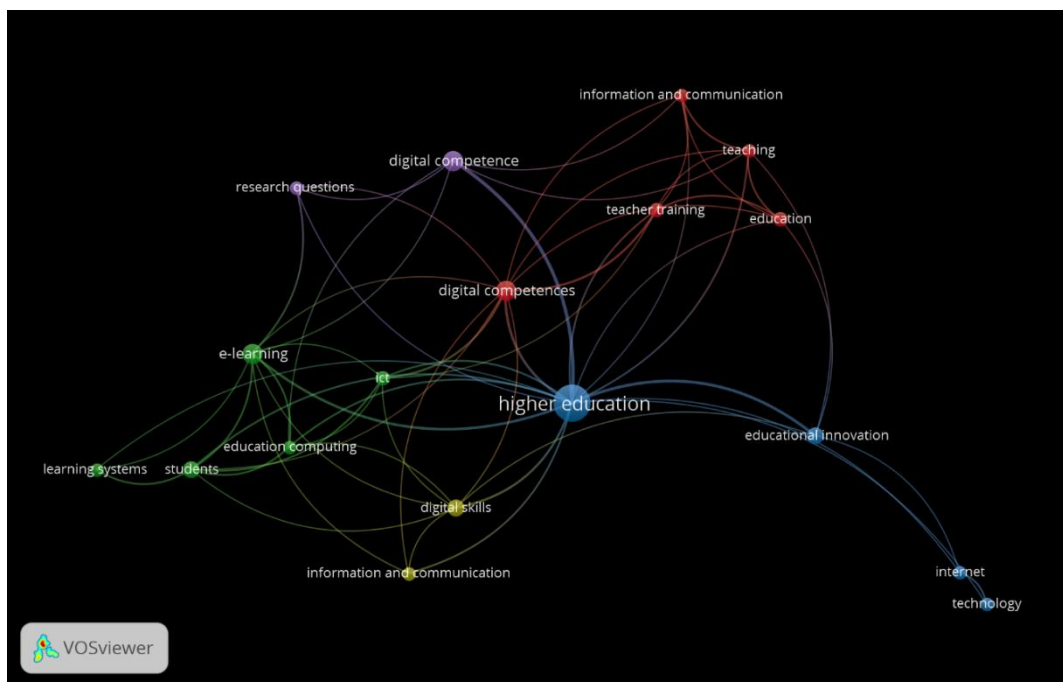


Figure 1. Co-occurrence of words

In figure 1, the most used keywords are higher education, which are the training of professionals in the different fields of knowledge and the population to which this study is directed. Secondly, there are digital skills, education and learning systems, which refer to the use of ICT in the academic research field, the need arises to strengthen digital skills in order to access information channels on the network. allowing to expand the sources of knowledge through technological supports; It is important that educational actors have good management of these

tools for a better use of resources. Virtual education, teacher training and learning are keywords that give birth to the most frequent application of ICTs; education in virtual mode allows access to education at any time and from anywhere, just as in the field of research it allows access to a large amount of information from any electronic device.

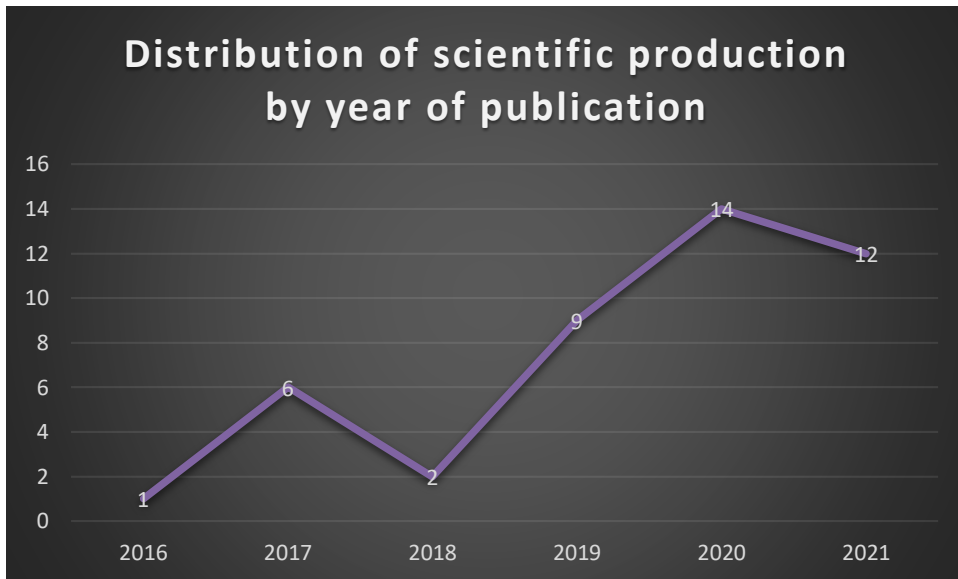


Figure 2. Distribution of scientific production by year of publication. between the years 2016 and 2021

2020 is the year with the highest number of publications related to the variables under study, presenting 14 documents in total, within which we can identify "The irruption of information and communication technologies (ICT), a challenge in the management of the digital competences of university professors in Ecuador" ⁷. This document seeks to assess the digital skills of university teachers in Ecuador during the 2019-2020 academic year at the National University of Education (UNE) during 2019-2020 in Ecuador. Therefore, a study was carried out with 37 teachers in order to determine how trained they are in the use of technological resources. As a result, it was evidenced that teachers use ICT for information and communication; but presenting deficiencies when using them in their investigative training, so training is necessary so that teachers can access multiple channels of investigative information.

On the other hand, 12 publications registered in Scopus were found, among which is "Research competences mediated by technologies: a systematic mapping of the literature". This document sought to analyze the scientific production related to the topic with the intention of identifying current research trends. This research was born from the need to identify the investigative skills mediated by technology. In this regard, the relationship of research strategies with digital literacy, information literacy and access to databases that allow promoting research in higher education ⁸ was determined.

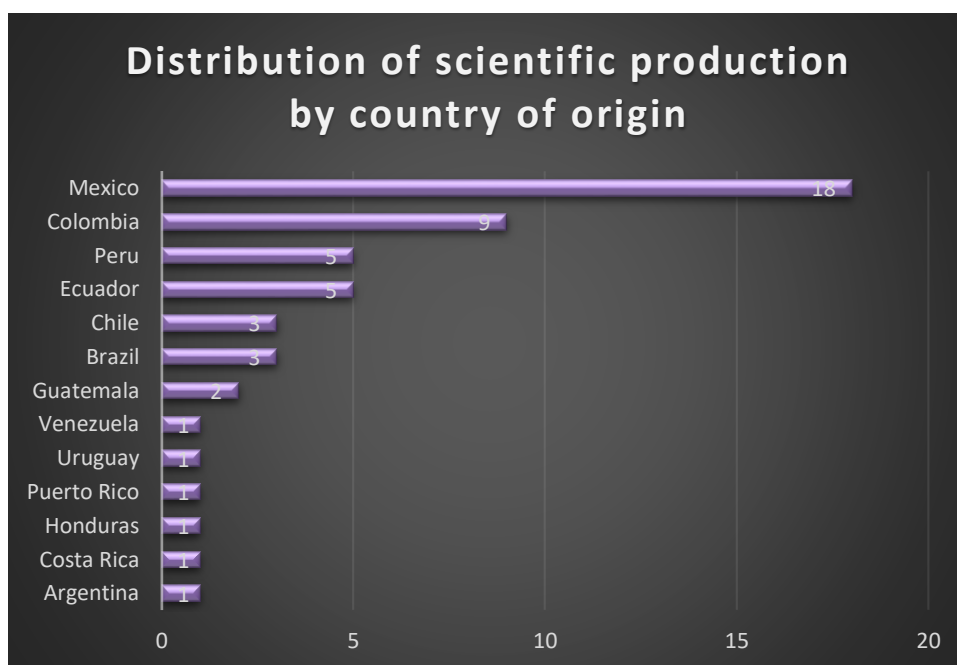


Figure 3. Distribution of scientific production by country of origin

Mexico is the Latin American country with the greatest contribution to research related to digital skills and their application in scientific research in higher education since it presents 18 documents within which we can identify "Technological appropriation, digital skills and digital skills of students University Students: Systematic Mapping of Literature" ⁹. This document was proposed to respond to some of these challenges from the approach to the field of innovation and educational research taking into account the training in digital skills, so it was concluded that the emerging concepts are associated with digital learning where, today, a high percentage of young university students are involved and it is necessary to guide them to the research field.

At this point, it should be noted that the production of scientific publications, when classified by country of origin, presents a special characteristic and that is the collaboration between authors with different affiliations to both public and private institutions; These institutions can be from the same country or from different nationalities, so the production of an article co-authored by different authors from different countries of origin allows each of the countries to add as a unit in the general publications.

As mentioned above, Mexico is the Latin American country with the greatest contribution to research related to the variables under study, presenting a document in collaboration with authors affiliated with organizations from countries such as Ecuador and Spain mainly. In second place is Colombia, which presents 9 publications during the 2016-2021 period in Scopus where we can find "Digital competence in university teachers: Evaluation of the relationship between attitude, training and literacy in the use of ICT in educational

environments" ¹⁰ . The objective of this document is to evaluate the attitude, training and level of technological literacy in the implementation of ICT-based methodologies for various academic curricula in higher education institutions, for which a study was carried out with 93 professors from a higher education institution in where the importance of a formative orientation of the teaching habitus as a preponderant factor in the improvement of the use of ICT was determined.

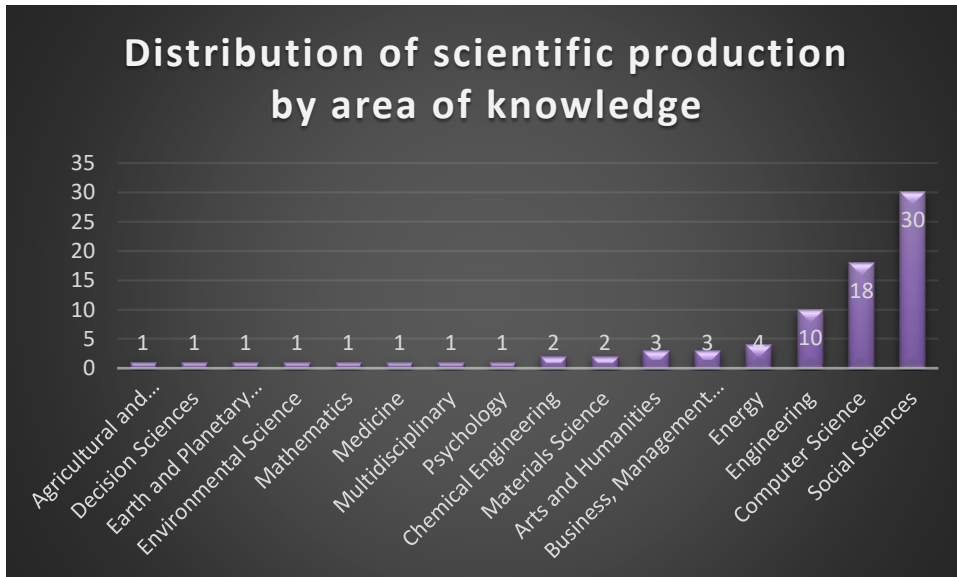


Figure 4. Distribution of scientific production by area of knowledge

Social Sciences is the area of knowledge with the highest number of contributions through the theories that are part of it, in the search for new knowledge about digital competence in scientific research in higher education, having a total of 30 documents registered in Scopus within which we can identify "Analysis of the Technological Resources Used by University Students of Education Studies" ¹¹. This document seeks to evaluate the digital competence of education students and analyzes the frequency of use of various technological resources, for which a study was carried out in which 425 students were evaluated and it was found that the most used resources were those related to research and search for information and as less used resources are social networks. Therefore, it is an institutional responsibility; but also staff increase opportunities for the development of digital skills of teachers in order to increase research skills.

Secondly, there is Computer Science where 18 documents were written following the guidelines of the topics related to said area; Within these documents, we can identify "Teaching Strategies for a Multimodal Teaching Model in Higher Education" ¹² . This document aims to provide a systematic account of this process experienced by this particular community of teachers, since they have gone through a process of appropriation of technology and have committed themselves to the continuous redesign of the courses, for which a study was carried out in the classrooms. in which it was sought to determine the most used

educational methodologies and models by analyzing face-to-face classes, videoconferences and the Moodle platform.

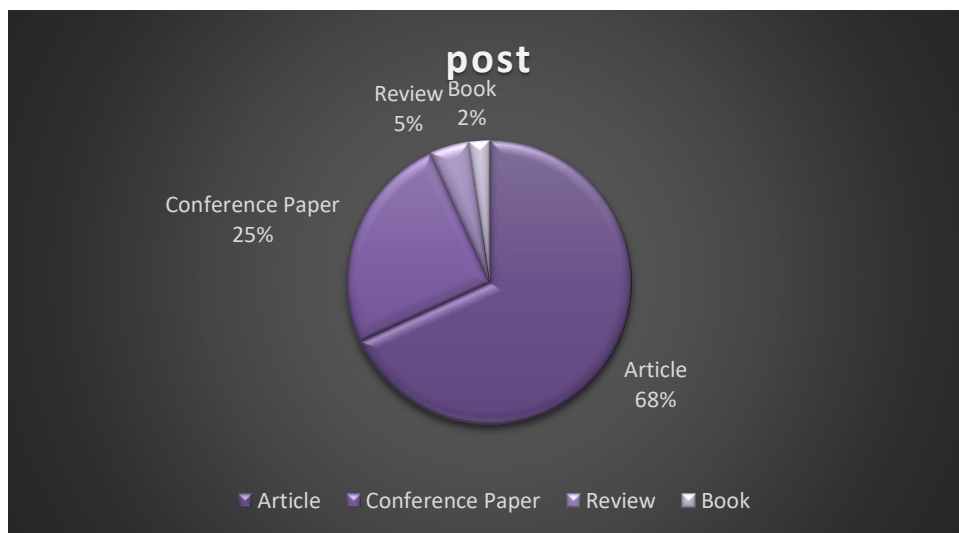


Figure 5. Post Type

As Figure 5 shows, within the different types of publications, 68% of the total documents identified through phase 1 of the methodological design correspond to journal articles, among which is the one entitled "Influence of active methodologies : projects and cases in the development of digital skills with mobile devices" ¹³ . The objective of this document is to analyze the influence of two active methodologies in the development of digital skills using mobile devices, for which questionnaires were carried out on 178 students in 5 months in order to determine the use of these methodologies. This article concludes by stating that the rapid advance of technology and the results of various investigations make the need for the development of digital skills evident.

Likewise, the conference proceedings, which represent 25% of the total documents identified in this study, within these documents we can identify "On the Reliability and Validity of the Evaluation of Digital Competences in Higher Education" ¹⁴ . The objective of the validity and reliability procedures seeks to reveal the internal consistency of the items and that the instrument measures the one that has to measure the digital competence variable in higher education, for which an analysis was carried out with 60 primary studies published in the period 2018-2020. That sought to identify the use of ICT in research. We found that studies published in low-quality journals or focused only on management are more likely not to report these psychometric assessments, and papers published in well-known journals speak more to the theory.

Conclusions

The bibliometric analysis proposed in this research, it can be determined that Mexico is the Latin American country with the largest number of bibliographic

records in the Scopus database during the period between 2016 and 2022 with a total of 18 documents. Scientific production related to the study of digital competence in scientific research in higher education has shown significant growth during the aforementioned period, going from 1 publication in 2016 to 12 units in 2021, with 2020 being the year with the highest number of publications. registered documents presenting 14 documents in total; that is, it was possible to double the creation of bibliographic records in a period of 5 years, which indicates the importance that digital skills represent for the strengthening of investigative processes in higher education.

The strengthening of digital skills is of great importance in the field of education since it has presented a digital transformation in the last decade that allows the use of digital media for the apprehension of knowledge; Of course, the investigative part is not the exception, being it is cataloged as the basis of higher education and thanks to ICT it allows access to multiple sources of information. Digital skills, the work done by educational actors have a greater scope of diffusion since, being uploaded on the network, all people can have access to it, which helps to generate new knowledge and determine the common problems of each social context. All of the above allows this article to conclude, highlighting the importance of strengthening digital skills through technological literacy that allows educational actors to develop investigative skills, because in these times information and communication technologies (ICT) expand global interconnection, and this stimulates scientific knowledge.

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