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DEVELOPMENT OF DIGITAL COMPETENCIES IN LATIN AMERICAN UNIVERSITY STUDENTS

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Abstract

The present research article aimed to analyze the production and publication of research papers concerning the study of the variable referred to the development of digital competencies in university students in Latin America and to know the main characteristics of the volume of publications registered in Scopus database during the period 2016-2021. A total of 245 publications were identified. The information provided by said platform was organized by means of tables and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics were described, the position of different authors regarding the proposed topic was referenced by means of a qualitative analysis. Among the main findings of this research, it is found that Mexico, with 76 publications, is the Latin American country with the highest production. The area of knowledge that made the greatest contribution to the construction of bibliographic material related to the study of the development of digital competencies in university students was social sciences with 158 published documents, and the type of publication that was most used during the period mentioned above was the journal article, which represents 63% of the total scientific production.

Keywords: digital competences, university students, Latin America.

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1. Introduction

The use of technological tools is increasingly becoming notorious in education, so the instruction in the development of the necessary skills to give them a correct use is of great importance in all educational actors. University students have this need because with the development of digital competences they can take advantage of technological resources in their professional training process, since they help access to an unlimited source of information which are essential in the construction of knowledge. These digital competencies are considered basic for the citizen of the 21st century (Calatayud et al., 2018), so it is necessary to develop them from the professional training process. University students have basic knowledge in technologies as they were born in the digital era and have been familiar with technological tools since childhood (Medina Romero et al, 2021). Now, this does not mean that there is no digital illiteracy within this generational group, because although they have knowledge in the digital field, these are focused on social networks and playful platforms, so they do not have a good instruction on how to use educational platforms, so it arises as a problem and forces educational institutions to provide students with knowledge that allows them to develop these skills, all this in order to have access to a quality education.

These digital competencies are very important in the formation of integral professionals, since these skills are a fundamental requirement in the labor market of the XXI century which is increasingly in line with the objectives and requirements of the industry 4.0 which is responsible for the automation and digitization of processes in order to make operations easier. These competencies became notoriously important at the beginning of 2020 when a health crisis was declared by COVID 19 which forced to change the traditional educational model, being by means of technological tools the only way to continue with the pedagogical processes. Therefore, it is important to know in terms of bibliographic resources, the current state of research related to the Development of digital competencies in university students, so a bibliometric analysis of the scientific production registered in Scopus database during the period 2016-2021 is proposed to answer the question How has been the production and publication of research papers related to the study of the variable Development of digital competencies in university students in Latin America during the period 2016-2021?

2. General Objective

To analyze from a bibliometric and bibliographic perspective, the production of high impact research papers on the variable Development of digital competencies in university students during the period 2016-2021.

3. Methodology

Quantitative analysis of the information provided by Scopus is performed under a bibliometric approach on the scientific production concerning the development of digital competences in university students. Also, from a qualitative perspective, examples of some research papers published in the area of study mentioned above are analyzed from a bibliographic approach to describe the position of different authors on the proposed topic.

The search is performed through the tool provided by Scopus and the parameters referenced in Table 1 are established.

3.1 Methodological design

Table 1. *Methodological design.*

	PHASE	DESCRIPTION	CLASSIFICATION
PHASE 1	DATA COLLECTION	Data was collected using the Scopus web page search tool, through which a total of 245 publications were identified.	Published papers whose study variables are related to the development of digital competencies in university students Research papers published during the period 2016-2021. Limited to Latin American countries. Without distinction of area of knowledge. Without distinction of type of publication.
PHASE 2	CONSTRUCTION OF ANALYSIS MATERIAL	The information identified in the previous phase is organized. The classification will be made by means of figures and tables based on data provided by Scopus.	Word Co-occurrence. Year of publication Country of origin of the publication. Area of knowledge. Type of publication

PHASE 3	DRAFTING OF CONCLUSIONS AND FINAL DOCUMENT	After the analysis carried out in the previous phase, the study proceeds to the drafting of the conclusions and the preparation of the final document.	

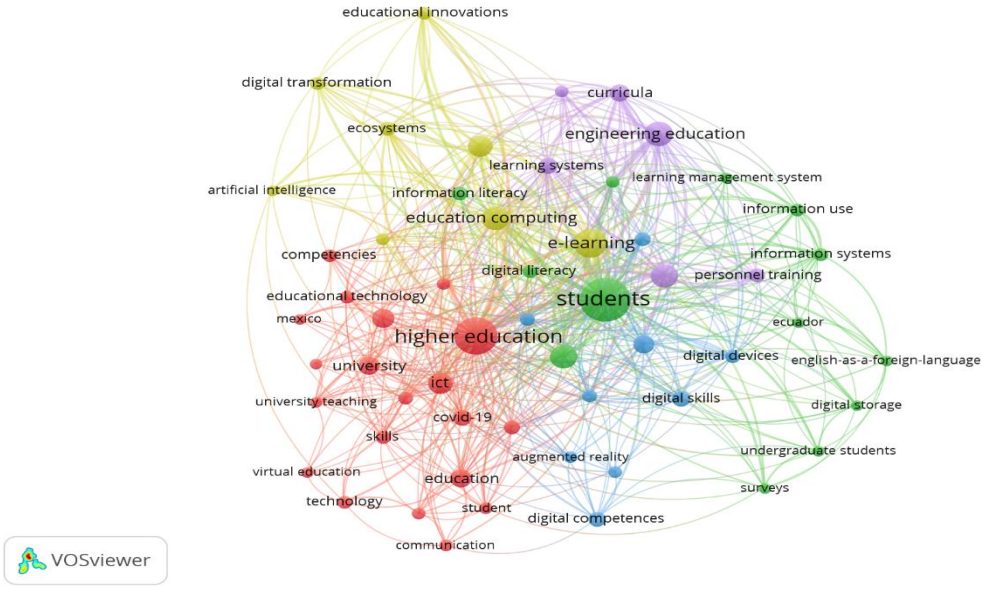
Source: Own elaboration (2022)

4. Results

4.1 Co-occurrence of words

Figure 1 shows the co-occurrence of keywords within the publications identified in the Scopus database.

Figure 1. *Co-occurrence of words*



Source: Own elaboration (2022); based on data provided by Scopus.

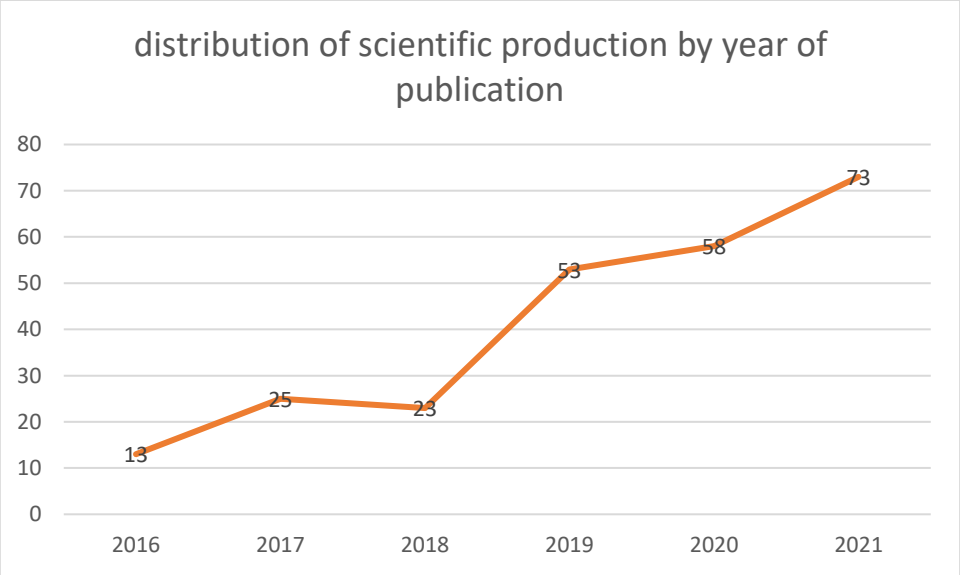
As shown in Figure 1, students and higher education are the most used keywords which are also part of the variables under study and refer to the group to which this study is applied being directed to know the development of digital competences of university students. Other keywords were also found, such as digital literature, e-learning, educational technology, digital devices and undergraduate students which refer to the new educational model which is mediated with ICT facilitating access to education

from anywhere if you have access to the Internet and availability of technological tools. University education, digital skills, learning systems, digital transformation and educational innovation are keywords that show the changes made in recent years in order to strengthen the digital skills of future professionals and to couple the educational processes according to what the labor field requires and the updates to the methodologies trying to make the knowledge better assimilated by students according to the particular needs and the social context in which they develop in order to help the development of the community and to give a use to the information learned.

4.2 Distribution of scientific production by year of publication.

Figure 2 shows how the scientific production is distributed according to the year of publication, taking into account the period from 2016 to 2021.

Figure 2. *Distribution of scientific production by year of publication.*



Source: Own elaboration (2022); based on data provided by Scopus.

2021 is the country with the highest number of publications registered in Scopus related to the variables under study presenting 73 publications in total within which is the title "*The experience of higher education students in Mexico during the COVID-19 pandemic confinement*" (Zapata-Garibay, et al, 2021). This document seeks to investigate the experiences of graduate and undergraduate students in relation to the change from face-to-face modality to ERT in the context of health emergency due to the outbreak of COVID-19 through surveys to 660 students from 38 universities and 22 states throughout Mexico where it was evidenced that Students from private universities declared a greater use of technological tools and students from public universities by experiencing more problems to access

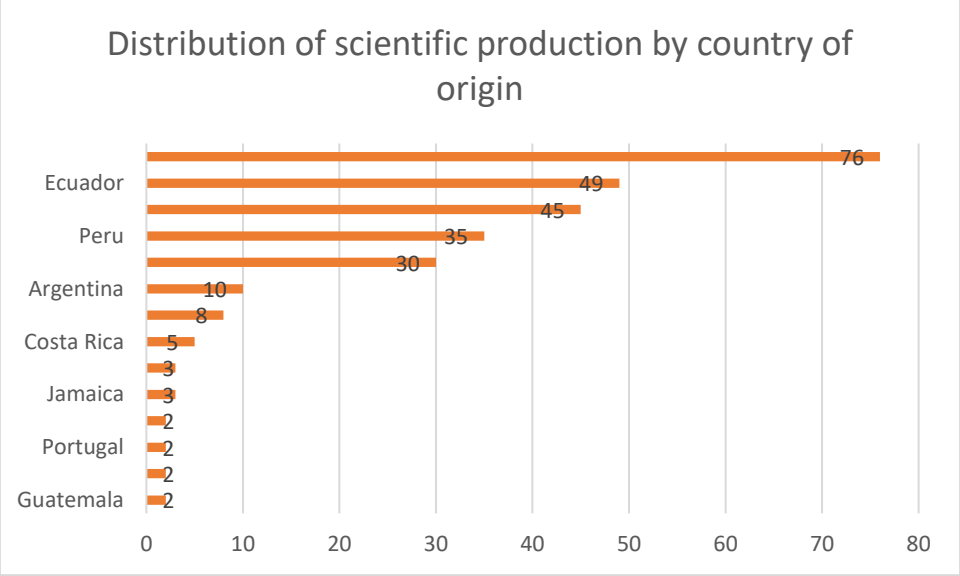
digital tools. Therefore, it is concluded that universities, teachers and students were not prepared to implement the distance learning strategy and training in the use of educational tools is necessary.

In second place is 2021, which presents 58 documents registered in Scopus within which is "*Disruptive innovation of educational digital tools and the achievement of communicative skills in university students*" (Mayuri et al., 2020). This document has as its main objective to contrast the relationship between digital tools and the achievement of communication skills in university students, giving them the tools and basic skills to develop a critical sense that allows them to choose the most suitable platforms for their training process, so this publication is based on a new paradigm of learning and teaching, generating access to innovation and autonomy in the use of digital spaces.

4.3 Distribution of scientific production by country of origin.

Figure 3 shows the distribution of scientific production according to the nationality of the authors.

Figure 3. *Distribution of scientific production by country of origin.*



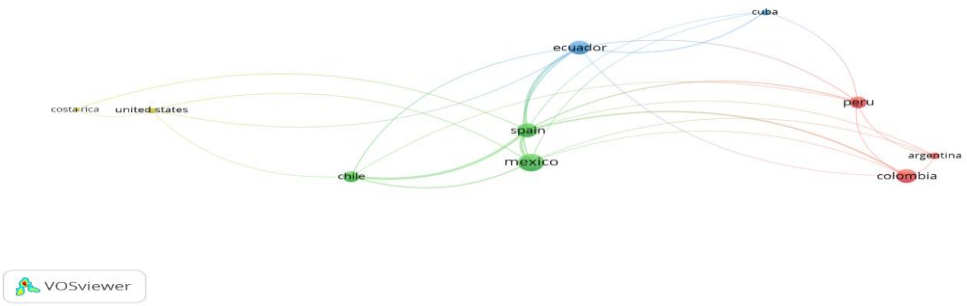
Source: Own elaboration (2022); based on data provided by Scopus.

Mexico is the Latin American country with the highest contribution to publications related to the development of communication competencies in university students, presenting a total of 76 documents, among which is "*Technological appropriation, digital skills and digital competencies of university students: Systematic mapping of the literature*" (Morales et al., 2021). This document has as its main objective to respond to some of these challenges, from the approach to the field of innovation and educational research through an analysis of 170 articles and a book in databases on Technological appropriation and digital competencies taking into account the great digital gap that is presented in Mexico for their access and knowledge. It concludes by highlighting the importance of these new

concepts since they are part of the reality of current educational models and how university students have been trained to understand them.

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, and these institutions can be from the same country or of different nationalities, so that the production of an article co-authored by different authors from different countries of origin allows each of the countries to add up as a unit in the overall publications. This is best explained in Figure 4, which shows the flow of collaborative work from different countries.

Figure 4. *Co-citations between countries.*



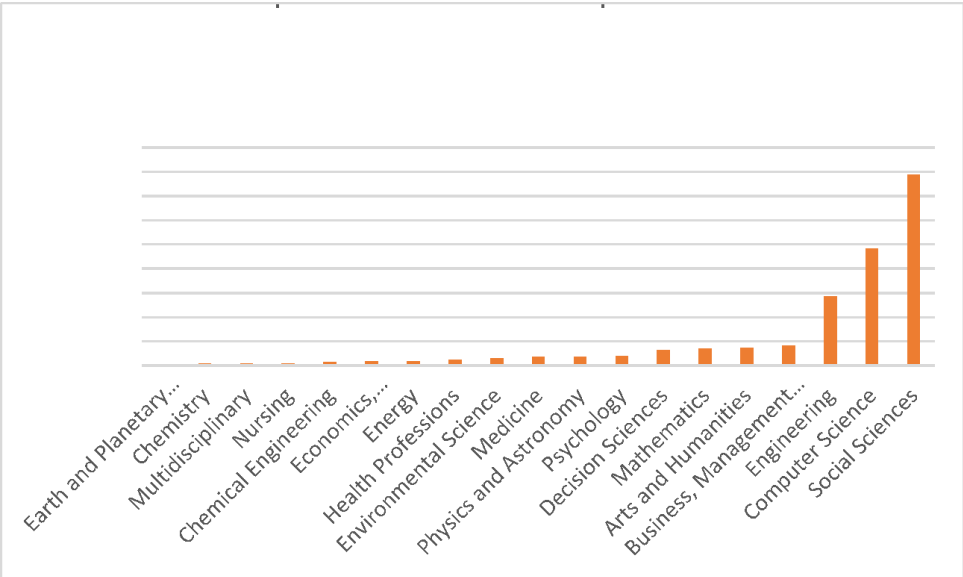
Source: Own elaboration (2022); based on data provided by Scopus.

As mentioned above, Mexico is the Latin American country with the largest number of publications related to the variables under study, within these publications there are documents in collaboration with authors from countries outside Latin America, such as Spain and the United States, which shows the interest of other countries in the existing literature on digital competencies in university students in Latin America. In second place is Ecuador with 49 documents among which is "*Innovation in the university classroom through augmented reality. Analysis from the perspective of Spanish and Latin American students*" (Cabero-Almenara et al., 2021). This document analyzes the experiences of university innovation with inverse technologies, so they conduct a study with 202 students in relation to the advantages and disadvantages of AR and Augmented Reality apps used in Emerging educational models. In conclusion, students perceive the development of cognitive skills and the development of competencies as the main advantages of augmented reality but also evidence one of the major disadvantages of this methodology and that is the digital divide.

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows how the production of scientific publications is distributed according to the area of knowledge through which the different research methodologies are executed.

Figure 5. *Distribution of scientific production by area of knowledge.*



Source: Own elaboration (2022); based on data provided by Scopus.

Social sciences is the area of knowledge with the largest number of contributions through the theories that are framed in it, in the search for new knowledge on the development of digital competencies of Latin American university students presenting 158 documents in total within which is "*Analysis of the digital competence of university students using latent classes*" (Burgos-Videla et al., 2021). This document has as main objective to characterize the Latent Classes that arise from the analysis of the level of digital competencies, use and consumption of applications and/or services through the Internet. Therefore, a survey was conducted to 4762 undergraduate and graduate students where it was shown that there are four groups or classes clearly differentiated in the use and consumption of ICT in different ways for their activities, both personal and academic, which allows to identify different development of digital skills which do not depend on factors such as gender and age. Therefore, this study is the initial part for projects that seek to determine the technological skills needed in university students.

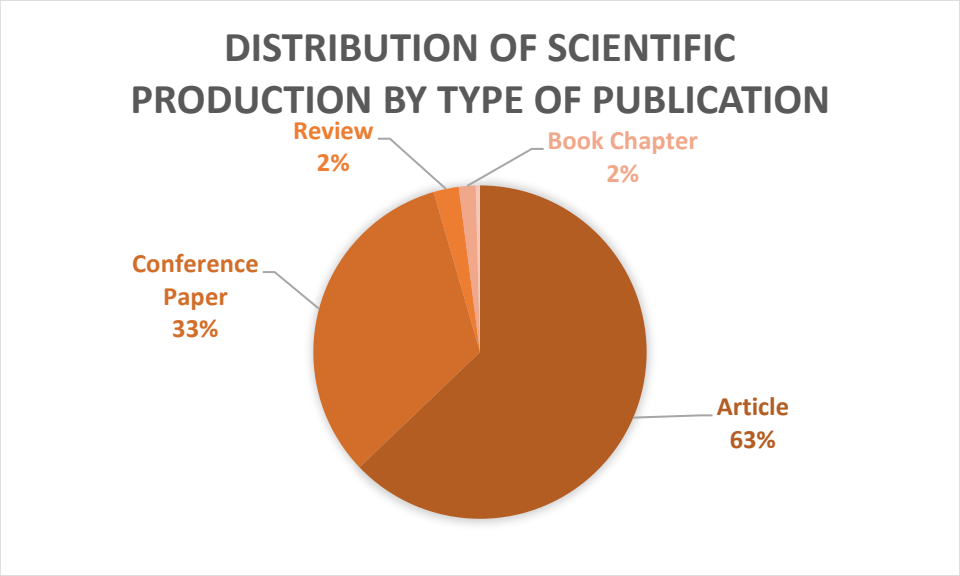
In second place is computer science where 97 documents were written following the guidelines of the topics related to this area within which is "*Análisis de los Recursos Tecnológicos que Utiliza el Alumnado Universitario de Estudios de Educación*" (García-Martínez et al., 2021). In this publication, the authors propose the main objective of evaluating the digital competence of education students and analyzes the frequency of use of various technological resources by students in their last year of education (González, 2021). In this publication, the authors' main objective is to evaluate the digital competence of education students and analyze the frequency of use of various technological resources by students in the last year of their education degree in a Latin American university. 425 students were

questioned and it was found that in the educational field the most used tools are those designed for collaborative work and information storage, as well as those that facilitate the search for information and with minimal use of social networks.

4.5 Type of publication

Figure 6 shows how the bibliographic production is distributed according to the type of publication chosen by the authors.

Figure 6. *Type of publication.*



Source: Own elaboration (2022); based on data provided by Scopus.

As shown in Figure 6, within the different types of publications, 63% of the total number of documents identified through Phase 1 of the Methodological Design, correspond to Journal Articles, among which is the one entitled "*Centennial generation: Epistemic challenges for university education*" (Guevara et al., 2021). This document aims to specify the epistemological and pedagogical challenges posed by educating the generation of digital natives or centennials by analyzing them in 3 large groups which are the characteristics of the centennial generation, the profile of the teaching staff for centennial education and the new methodologies and technological innovations. Therefore, it was concluded that it is necessary to specify the epistemological and pedagogical challenges posed by educating the generation of digital natives or centennials in order to guide their education starting from the construction of a comprehensive professional profile.

In second place are the conference proceedings which represent 33% of the total number of documents identified in this study, within these documents is "*Taking advantage of digital tools for a better virtual*

teaching-learning process in a private university in Lima" (Andrade-Arenas et al., 2021). This document analyzes the impact of the use of digital tools in the teaching-learning process for which surveys were conducted to 51 students and 19 teachers of the computer science career of the University of Sciences and Humanities where it was evidenced that before 2020 both students and teachers did not have the necessary knowledge to use educational platforms and videoconferencing and that at the beginning of 2020 where they were trained could see the improvement in their digital skills.

5. Conclusions

Thanks to 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 Scopus database during the period between 2016 and 2021 with a total of 76 documents. The scientific production related to the study of the Development of digital competencies in university students has presented an important growth during the period previously indicated, going from 13 publications in 2016 to 73 units in 2021, that is, it was possible to increase in a great way the creation of bibliographic records in a period of 5 years, which indicates the importance of researching on how university students obtain technological skills for the correct use of educational platforms that make possible to have a quality education through the new educational model of mediated education which is based on ICT.

Communication skills are already an essential part of students and future professionals as they are necessary for most of the procedures performed on a daily basis, so developing these skills from the academic training is of great importance. This is a key factor in the latest educational innovations by implementing educational models through the use of technological tools, an educational model used at the beginning of 2020 due to the health crisis caused by COVID 19 and to ensure compliance with biosafety protocols, which forced educational institutions to change their methodologies.

Due to this situation, the development of these competencies became even more necessary to evidence digital illiteracy, since although university students were born in the digital era, they were not familiar with educational platforms, which leads to shortcomings when it comes to consolidating knowledge. This digital illiteracy is also given by the digital divide that exists in Latin America where not everyone can access the Internet or digital tools.

All of the above, allows to conclude highlighting the importance of knowing the theory or bibliographic resources that seek to awaken the students in strengthening their technological skills as they help access a quality education and also to form them in an integral way allowing the development of skills that are currently in high demand by the labor field. That is why it highlights the need for studies such as the one presented in this document, which make a tour of those texts that address the above topic, in order to give the reader a broad view of the current situation of the literature on the Development of digital skills in college students in Latin America.

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