

# Digital competencies of Latin American teachers in the context of higher education

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## Abstract

The research shows the results of an extensive study on the main findings of works related to digital competencies of teachers in Latin American higher education. The purpose of the text is to analyze the main characteristics of the publications registered in Scopus database during the period 2016-2021 in Latin American countries. 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. The methodological approach corresponds to a quantitative-descriptive study using the horizontal content analysis method. Among the main findings it can be highlighted that Mexico is one of the main countries with significant knowledge advances in this field and high impact scientific articles are the most relevant form of publication in this country.

**Keywords:** digital competences, teachers, higher education.

## 1. Introduction

The implementation of ICT in educational processes of vocational training involves the creation of new environments that facilitate access to education from anywhere, so in recent years these innovations have been much more noticeable, and educational institutions demand competent professionals in this area (Hernández-Suárez, Prada-Núñez, & Ramírez-Leal). The digital transformation is due to Industry 4.0, which seeks the digitization of most processes in order to make them easier and more accessible and to obtain information in real time, so that the university, in order to develop its role as a social transformer in society, must be in line with the technological era. Although this process has been taking

place in the last 10 years, it was seen to a greater extent at the beginning of 2020 when, due to the COVID 19 pandemic, face-to-face classes ceased and a remote emergency model was implemented, which consisted of carrying out all face-to-face activities through video conferences and educational platforms. Due to this situation, shortcomings in the management of information and communication technologies were evidenced in university teachers.

This transition implied the change of methodologies in order to guarantee a quality education in the midst of the health crisis, where digital competences in teachers are a determining factor since they are in charge of the knowledge transfer and must have a good

command of educational platforms. In Latin America, although teachers had notions about virtual education, they were not fully trained for this change, as they were not familiar with these platforms, besides having difficulties with the evaluation processes (Gamboa, 2016) (Medina Romero, 2020), as they had to be changed since through virtuality the same competencies are not evaluated, so the continuous training of teachers is important to strengthen technological skills and the use of digital tools. Therefore, it is important to know in terms of bibliographic resources, the current state of research related to digital competencies for teachers in higher education, so a content analysis is proposed with the rigor of the quantitative approach on the scientific production registered in Scopus database during the period 2016-2021 that allows to answer the question How has been the production and publication of research papers related to the study of the variable digital competencies for teachers in higher education in Latin America during the period 2016-2021?

## 2. Methodology

The study presents a descriptive quantitative horizontal analysis from a collection provided by databases such as Scopus where scientific production concerning the digital competences of teachers in higher education is addressed. Likewise, findings on some research papers published in the area of study mentioned above are investigated.

The search is performed through the tool provided by Scopus, developed in four phases:

**Phase 1. Data collection.** In this phase, the data collection is carried out by means of the Search tool in the Scopus web page, through which a total of 97 publications are identified. Their classification is based on published documents whose study variables are related to digital competencies for teachers in higher education, research papers published during the period 2016-2021, and limited to Latin American countries, without distinction of area of knowledge and without distinction of type of publication.

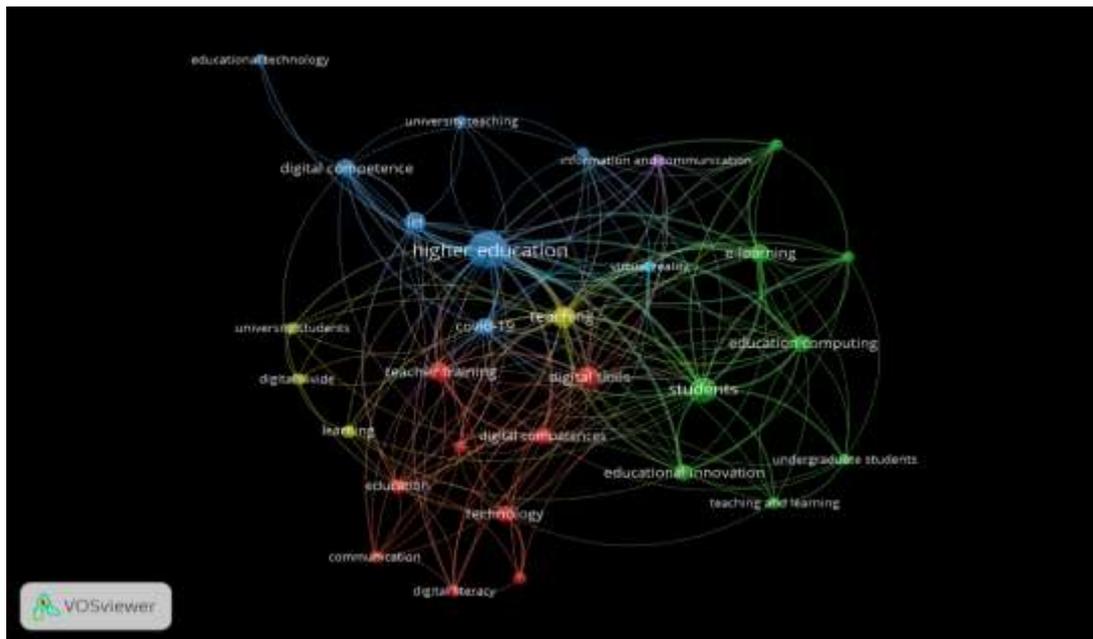
**Phase 2. Construction of analysis material.** The information identified in the previous phase is organized. The classification will be made by means of figures and tables based on data provided by Scopus, taking into account: Co-occurrence of Words; Year of publication; Country of origin of the publication; Area of knowledge; and Type of Publication.

**Phase 3. Drafting of conclusions and final document.** After the analysis carried out in the previous phase, the conclusions are drawn up and the final document is prepared.

## 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.** Word co-occurrence

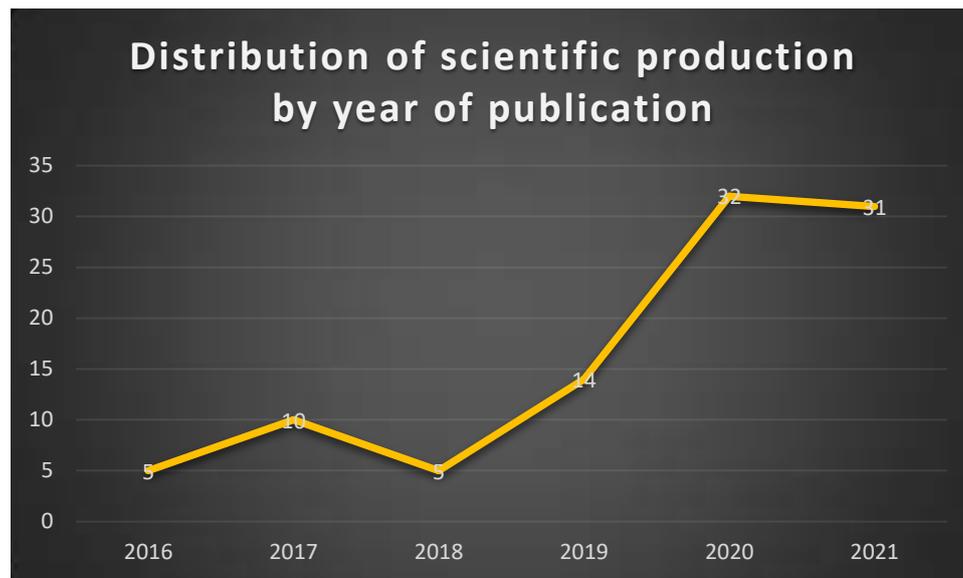
**Source:** Own elaboration (2022); based on data provided by Scopus.

As shown in Figure 1, higher education is the most used keyword in research related to the variables under study, which represents studies at the professional level, and in this study the technological skills of teachers at this educational level will be analyzed. Keywords such as teaching, ICT and digital competences were found, which refer to innovative methodologies in the educational model in order to implement information and communication technologies to offer a higher quality education. Educational innovation, COVID 19, and virtual reality are keywords used to talk about the rapid transition to online education in the early 2020s due to the

pandemic decreed by COVID 19, which exposed the shortcomings of teachers in the use of digital tools for educational purposes. E-learning, teacher training and digital divisions refer to the importance of instruction in digital competencies of teachers in order to be in line with the 4.0 era which represents a great technological innovation of which education cannot fail to be part.

#### **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 that the period from 2016 to 2021 is taken.



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

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

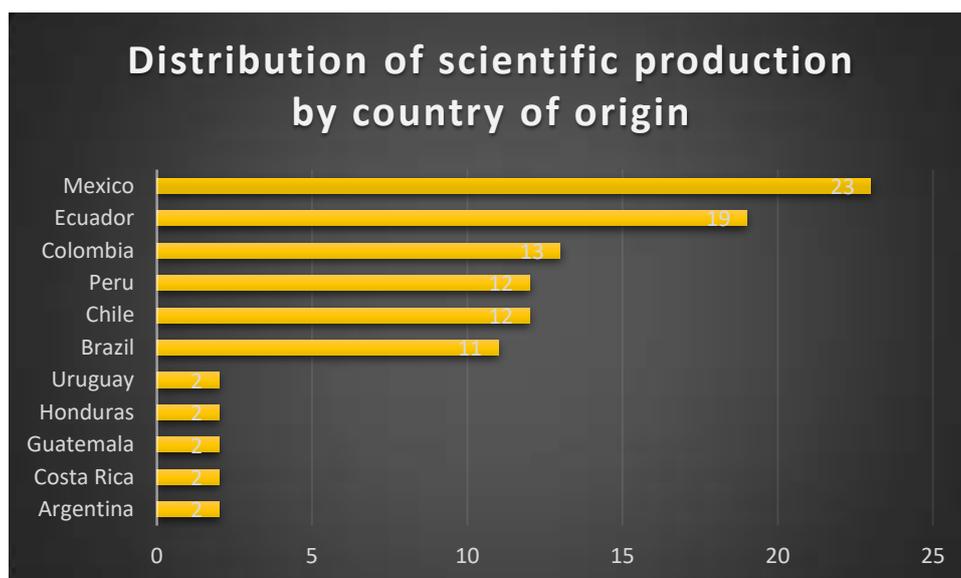
2020 is the year with the highest number of publications registered in Scopus, presenting 32 publications in total, among which is the title “*Teaching Strategies for a Multimodal Teaching Model in Higher Education*” (Porta, Motz, & De Queiroz, 2020). This document presents the simulation of a project in higher education with the educational actors of first semester of social and human sciences, starting from the point of the need for a system that integrates ICT in these careers, so they are combined and a follow-up of face-to-face classes, videoconferences and Moodle platform is done in order to measure its effectiveness. It was found that teachers were involved in the effort to build digital competences required to guarantee a correct pedagogical process, thus helping the continuous redesign of the courses.

In second place is 2021, with 31 documents related to the variables under study within which is “*Evaluation of the digital*

*competencies of university faculty and their conditioning factors: A case study in a context of technological adoption*” (Jorge-Vázquez, Náñez, Fierro, & Pacheco, 2021). The main objective of this article is to examine the level of digital competences of university professors and to identify their conditioning factors. Therefore, a study was conducted in which 216 university professors from different regions of Ecuador were surveyed, through this study it was determined that university professors have a mostly intermediate level of digital skills, independent of gender, but dependent on the generational cohort, i.e., teachers belonging to the millennial generation have a better command of these skills, concluding with the need to create educational policies that prioritize actions that promote the development of digital skills in university faculty.

#### **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.



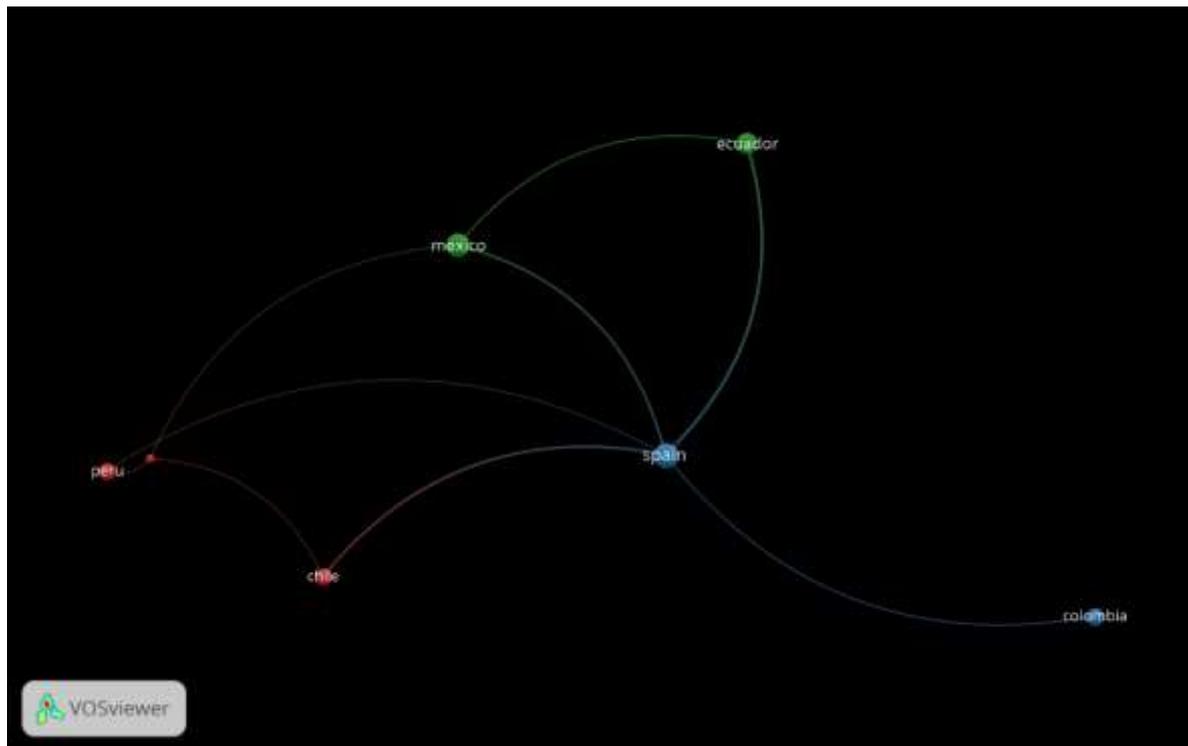
**Figure 3.** Distribution of scientific production by country of origin.

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

Mexico is the Latin American country with the greatest contribution in research related to the development of digital competencies in university teachers, presenting 23 publications in Scopus, among which is “*Preparation of the teaching staff for a digital education model: a self-assessment of educators in health sciences*” (Olivares, Martinez, Alvarez, & Valdez-García, 20). This document has as its main objective to assess the skills of teachers to continue educational services through a digital education model at the beginning of confinement. So, through a survey of 497 participants, it was determined that Evaluation remains a competence that teachers must strengthen and achieve an exclusive methodology of virtual

learning, so institutions should consider a planned and structured educational solution that is beyond the distance between students and teachers, but an attractive environment for learning that incorporates different technologies and active pedagogies.

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 from 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.

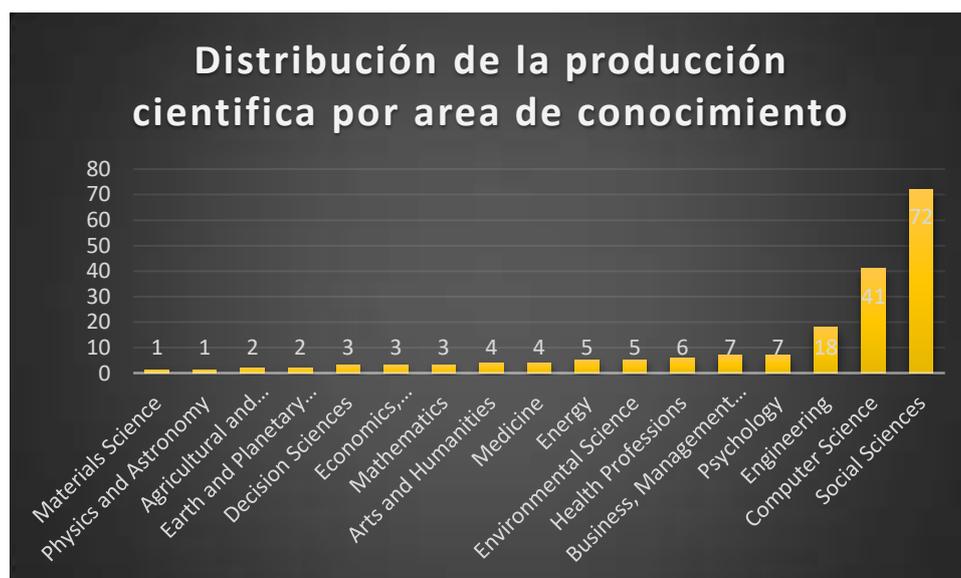
**Source:** Own elaboration (2022); based on data provided by Scopus.

As mentioned above, Mexico is the Latin American country with the greatest contribution in research related to the variables under study, presenting publications with countries that do not belong to Latin America, such as Spain, which demonstrates the importance of knowing how Latin American university teachers have developed technological competencies in recent years. In second place is Ecuador, which has 19 publications registered in Scopus, some of them co-authored with Chile, Mexico and Spain, among which is “*University teachers facing the change to virtual education imposed by the coronavirus*” (Tejedor, Cervi, Tusa, & Parola,

2021). This document studies how teachers interpret the transition to virtual classes in pandemic, for this a study was conducted by applying 196 surveys to professors of Journalism, Communication and Education. It was found that teachers, for the most part, value negatively the transition to virtuality, since it is associated, recurrently, with an increase in workload. They suggest the need for training in technological skills both for themselves as teachers and for university students.

#### **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.

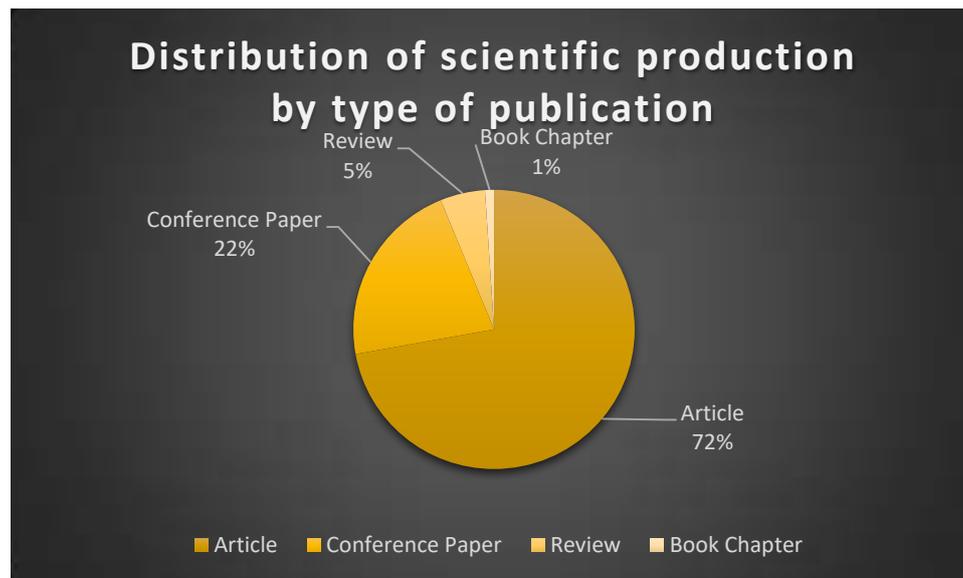
Social sciences is the area of knowledge with the largest number of contributions through the theories that are framed in it, in the search for new knowledge about technological competencies in university teachers in Latin America presenting 72 publications in total within which is “*Digital competencies, methodology and evaluation in teacher trainers*” (Cateriano-Chavez, Rodríguez-Rios, Patiño-Abrego, Araujo-Castillo, & Villalba-Condori, 2020). This document has as main objective to analyze the development of digital competencies of teachers of a professional school of Education of a private university based on 5 essential items which are Computer Literacy, Communication and Collaboration, Digital Content Creation, Security and Problem Solving. Therefore, it was determined that teachers know and use their digital skills above average and therefore a greater development of planning skills and instructional management

are better developed than the skills of interaction and evaluation.

In second place are the computer sciences where 41 documents were written following the guidelines of the topics related to this area. Within these documents is “*Digital competencies of teachers in the online classroom modality: Case study in the context of health crisis*” (Ruiz-Ramirez, Tamayo-Preval, & Montiel-Cabello, 2020). This document analyzes how the pandemic intervened in the training of teachers in technological tools for the development of classes in Monterrey, Mexico, proving that the adaptation to the unforeseen change in online classes favored the development of digital competencies of teachers through an emerging process of self-training that contributed to the fulfillment of the criteria to ensure educational quality in the context of health crisis.

#### 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, 79% of the total number of documents identified through Phase 1 of the Methodological Design, correspond to Journal Articles, among which is the one entitled “*Digital competencies of teachers. A systematic review in the Latin American context*” (Vásquez, Roig-Vila, & Peñafiel, 2021). This document states that the change of modality from face-to-face to virtual education cannot only be a decision to replace the first one by using some computer tools such as videoconferences, so new methodologies adapted to education through ICTs must be used to guarantee quality education, so the scientific literature on training in digital tools for teachers is reviewed and this study is proposed as preliminary information to determine the training needs of teachers to face the crisis.

In second place are the conference proceedings which represent 22% of the total number of documents identified in this study, within these publications we can identify “*Self-perception of digital competencies in Peruvian teachers*” (Tomás-Rojas, Freundt-Thurne, Gallardo-Echenique, & Bossio, 2021). This research analyzes the self-perceived digital competence of teachers at a private university in Lima, Peru. By means of checklists, it was possible to

determine the factors on which the development of technological competencies in teachers depended and which interventions in informal environments help teachers to develop their digital competence.

## 5. Conclusions

Based on the quantitative content analysis it can be determined that Brazil is the Latin American country with the largest number of bibliographic records in the Scopus database during the period between 2016 and 2021 with a total of 97 documents. The scientific production related to the study of digital competencies for teachers in higher education, has presented a significant growth during the above mentioned period, going from 5 publications in 2016 to 31 units in 2021 being 2020 the year with the highest number of scientific material, i.e. it was possible to increase in large proportions the creation of bibliographic records in a period of 5 years, which indicates the importance of knowing the development of digital competencies in university teachers in order to ensure that these innovations, lately implemented abruptly, do not affect the quality of higher education.

The new information and communication technologies have a great role in educational spaces, as they are increasingly implemented in order to improve the quality of education provided. This digital transformation was mostly seen at the beginning of 2020 in times

of pandemic which forced to change the educational model based on the new needs of the university 4.0 and its alignment with the digital era. This transition must take into account the adequacy of virtual evaluations and the appropriation of knowledge, since they are not the same as those presented in face-to-face classes.

All of the above allows this article to conclude by highlighting the importance of knowing the development of digital competencies in higher education teachers in order to ensure quality education. That is why it highlights the need for studies such as the one presented in this paper, which make a tour of those texts that address the aforementioned topic, in order to give the reader a broad view of the current situation of the studies on digital competencies for teachers in higher education.

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