



# Virtual Education as an Enabler of Autonomous Learning

**Maribel Cecilia Rangel Magallanes**

Graduate School, School of Administration, Universidad Cesar Vallejo, Lima, Peru

**Email address:**

[rangelundc@gmail.com](mailto:rangelundc@gmail.com)

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**Abstract:** An analysis of the production and dissemination of research articles on the analysis of the variable virtual education as a facilitator of autonomous learning was carried out. The objective of the present bibliometric analysis work presented is to identify 1700 publications by identifying the key characteristics of the number of publications registered in the Scopus database for the period 2015-2020 in Latin American countries. The information compiled by this source has been organized by means of graphs and figures, with categories for the year of publication of the information, country of origin, field of knowledge and type of publication. After the elaboration of these characteristics, mention was made of the positions adopted by the different authors in relation to the topic in question through a quantitative analysis. One of the main findings of this research is that, with 694 publications, Brazil is the Latin American country with the highest production. The field of knowledge that contributed the most to the bibliographic collection for the study of virtual education as a facilitator of autonomous learning was the field of computer science, with 829 published works. The most popular form of publication during the period mentioned was the journal article, which represents 46% of the total scientific production.

**Keywords:** Virtual Education, Autonomous Learning, Scopus Database

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## 1. Introduction

Virtual education refers to all the pedagogical processes that are developed through digital tools and virtual educational platforms that allow access to education from anywhere at any time, promoting student autonomy in the construction of their knowledge. The implementation of online education was seen in a more accelerated way at the beginning of 2020 when the health crisis was declared by COVID-19 and that forced to change the way to relate with each other. Of course, education had its transformations going from a face-to-face and experimental methodology to an education mediated through digital tools that in turn helped students to be interested in autonomous learning since they had educational platforms where they always had access to the subjects studied. [7] Virtual education can be considered as an appropriate field to be able to analyze and understand the challenges imposed by the current culture in relation to its educational entities in the face of the information and knowledge society. [8] So online education is one of the ways to keep updated the methodologies of education depending on the advances that are made in society, in this case it is a transformation aimed at the digital era.

Self-observation and critical thinking are important elements for autonomous learning in students, since with these the student is able to learn thanks to previously assimilated knowledge that gives rise to new and more complex learning without depending on the teacher, thus becoming a support but not the source of student learning.[5] Promoting critical and reflective thinking, self-regulation and increasing meaningful learning are some of the advantages that the teachers interviewed perceive when promoting autonomous learning in students.

In this sense, it is important to analyze the current panorama of research on virtual education as a support for autonomous learning. For this purpose, a bibliometric analysis of the scientific production registered in the Scopus database between 2015 and 2020 has been provided as a way to provide an answer to the question: How has been the production and publication of research papers related to the study of virtual education as a promoter of autonomous learning in Latin America during the period 2015-2020?

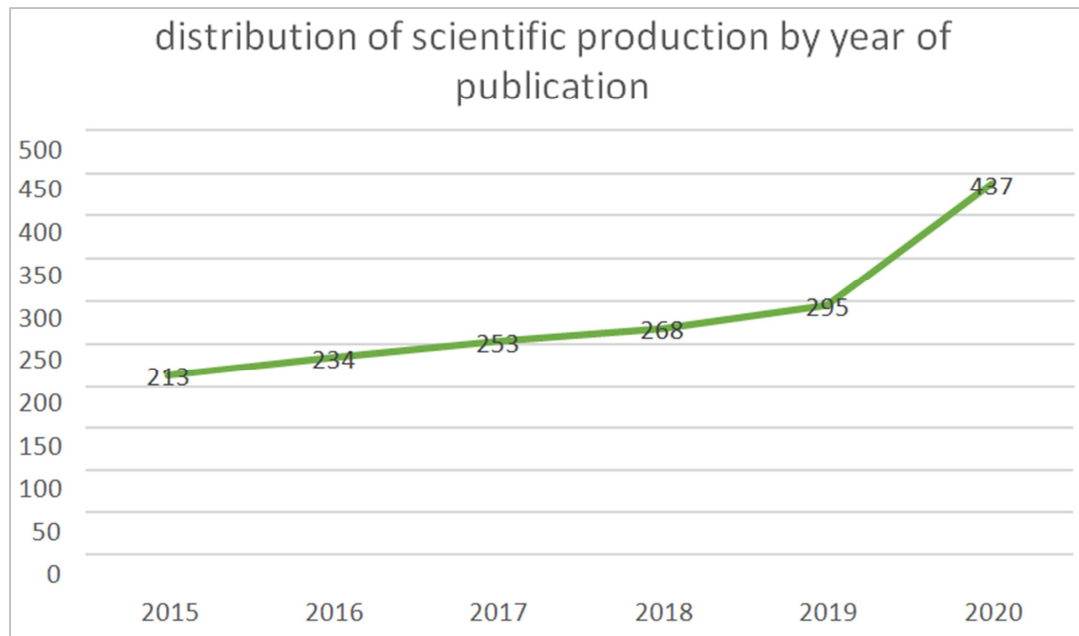
## 2. General Objective

To analyze from a bibliometric and bibliographic



to the platforms used in the implementation of digital tools for the innovation of methodological processes favoring education in a virtual reality environment in mediated education. In the human component there are keywords such as teacher, students, adolescents, children and personalized learning; these keywords are related to the actors, involved in

the pedagogical processes and their purpose of achieving autonomy in the construction of learning, turning it into an autonomous teaching from their own experiences and previous knowledge that will help to teach more complex knowledge, all this with the accompaniment of the teacher aimed at students to develop critical thinking.



Source: Own elaboration (2021); based on data provided by Scopus.

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

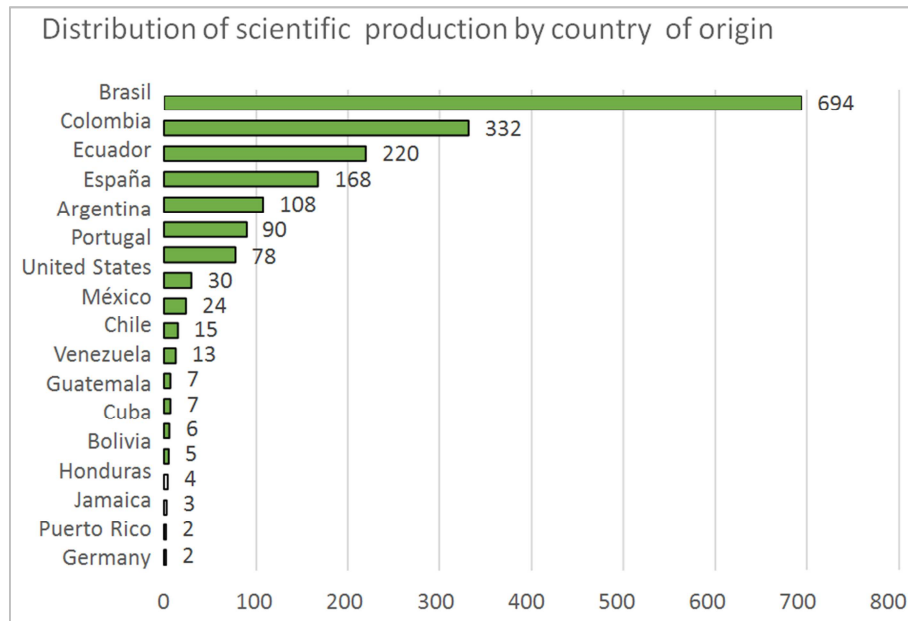
The year 2020 is the year with the highest number of publications registered with a total of 437 documents, among which is *"Teaching strategies for remote teaching implemented in the Degree in Information Systems at the Universidad Nacional del Nordeste"* [1, 2] "It is recognized that the COVID-19 Pandemic scenario had an impact on the traditional teaching modality, causing the implementation of actions to ensure the continuity of the educational process, so virtual education was incorporated." Therefore, this study presents the aspects related to the pedagogical strategies that should be taken into account to design them with the objective that students seek their own construction of knowledge. It was concluded with the strategies developed by LSI teachers, recognizing some strengths and limitations and, based on this, proposing some lines of future work.

In second place is 2019 with 295 publications within which is entitled *"A proposed model of acceptance of e-learning tools among university students in developing countries"* [9, 10] "In this research, A confirmatory factor analysis was developed in order to establish the relationship between the set of observed variables and the latent variables or factors." This analysis led to the conclusion that there was a strong relationship between the factor Perceived Usefulness and the variables Instructor Training and Autonomy in Learning. factor and the variable Perceived Self-Efficacy

Perception, "taking into account the teacher's training and its influence on the ability to generate autonomous learning." [4, 5]

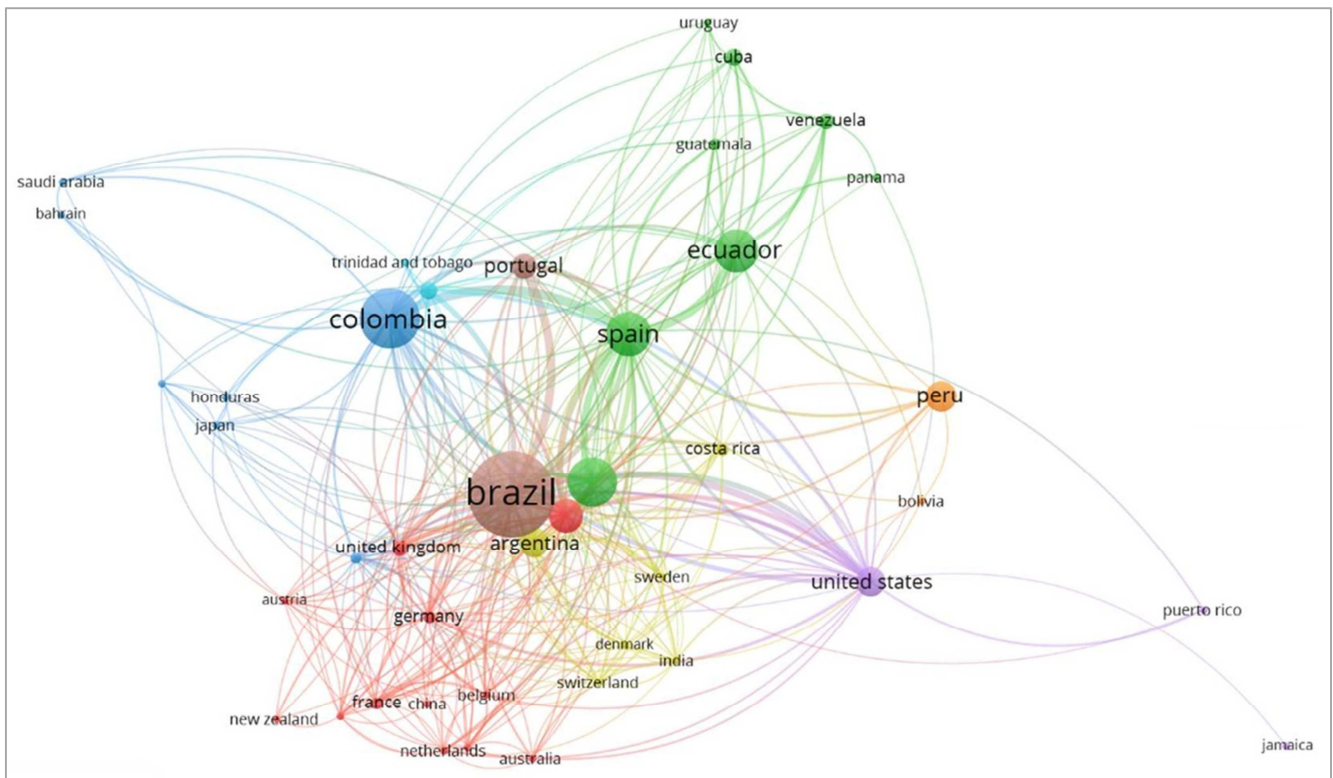
As shown in Figure 3, "The Latin American country with the highest contribution in research related to the variable under study with a total of 694 published documents, among which we can identify *A real-time multimodal feedback platform based on spoken interactions for remote active learning support*" [3, 6] where a multimodal system platform is presented, providing real time visualizations for the verbal interactions of students when working in groups, thus promoting their own search for knowledge where the teacher can monitor the learning process at each stage, making possible the search for autonomous knowledge during education mediated by digital tools. [13]

Firstly, It should be noted that the dissemination of scientific publications, classified by country of origin, has a particularity and that is to have the collaboration between authors with various affiliations in both public and private entities, and these can be from the same country or from different countries, so that the dissemination of an article co-authored by several authors from different countries allows each of them to be incorporated as a unit in the set of publications..



Source: Own elaboration (2021); based on data provided by Scopus.

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



Source: Own elaboration (2021); based on data provided by Scopus

**Figure 4.** Co-citations between countries.

As shown in Figure 4, Brazil is the country with the greatest contribution in research in collaboration with authors affiliated to organizations outside Latin America, offering a broader vision of virtual education and autonomous knowledge in Latin American countries such as Spain, the United States, Switzerland and Denmark. In second place is

also Colombia, in collaboration with authors affiliated to organizations in Portugal, Japan and Switzerland, with a total of 333 publications, among which we can identify "*Challenges and possibilities of ICT-mediated evaluation in virtual teaching and learning processes*". This research raises the transformations in educational environments due to the



immersion of information and communication technologies (ICT) and their limits in virtual education processes, which also creates the need for digital literacy to achieve autonomy in learning in educational processes.” [15, 16, 18]

#### 4.2. Distribution of Scientific Production by Area of Knowledge

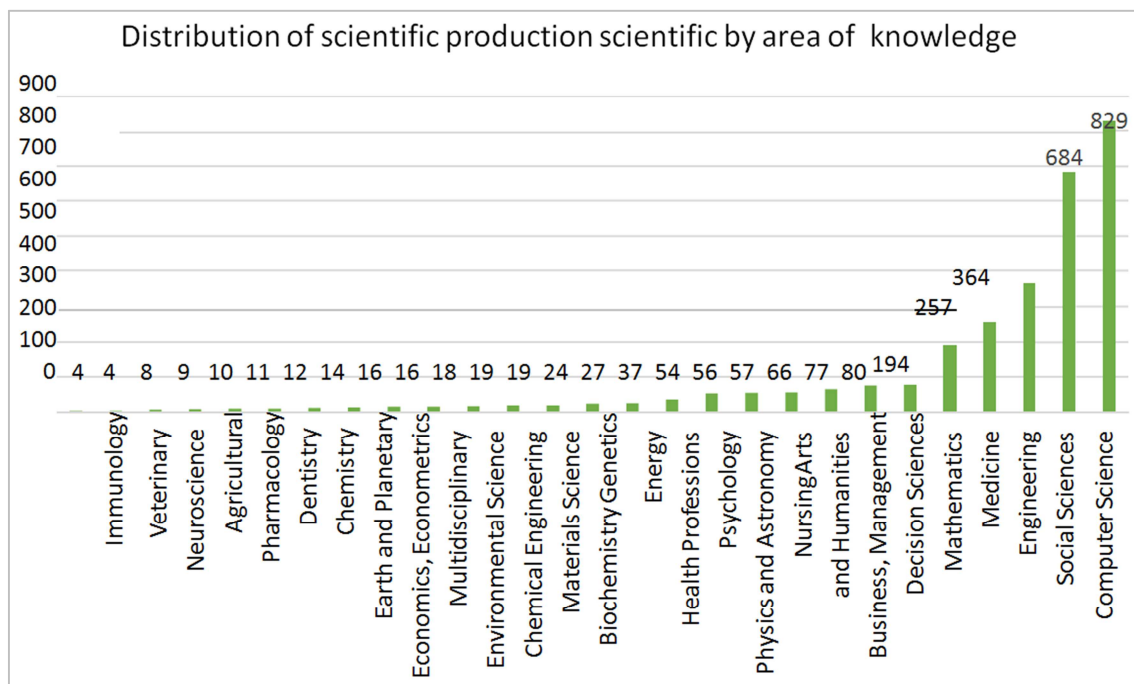
Figure 5 shows how the production of scientific publications is distributed according to the area of knowledge through which the different research methodologies are executed.

“Computer Science is the field of knowledge with the largest number of contributions, through the theories that are framed in it, in the search for new knowledge about virtual education as a driver of autonomous learning” [7], A total of 829 articles were registered, among which the following stand out *“Technical and didactic knowledge of LMS moodle in higher education. Beyond the functional use”* “where the implementation of information and communication technologies in education is studied, thus creating Learning Management Systems whose functionalities support flexible and active learning under a constructivist approach using the Moodle platform.” [12] For this study, the perception of 640

teachers about this platform was evaluated to determine whether they use it in a didactic way focused on achieving student autonomy; it was concluded that teachers make an instrumental and functional use of the platform as an aid in the syllabus while its pedagogical use is still limited. [14] As the second area of knowledge with the highest number of publications is social sciences with a total of 684 publications, within these we can identify *“Appropriation of competencies in students who migrated from the traditional education model to an online education model, derived from COVID-19”* [4] where the implications that the health crisis of COVID19 had on the accelerated digital transformation of education are studied, thus creating problems in the performance of students in online education. [11, 20]

Thus, this study points out the differences between face-to-face education and virtual education by evaluating certain aspects in the development of these two methodologies in order to determine whether online education helps in the self-management of pedagogical processes.

In third place is Engineering with 364 publications, followed by Medicine with 257 publications registered in the search for new knowledge on virtual education as a promoter of autonomous learning.



Source: Own elaboration (2021); based on data provided by Scopus.

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

#### 4.3. Type of Publication

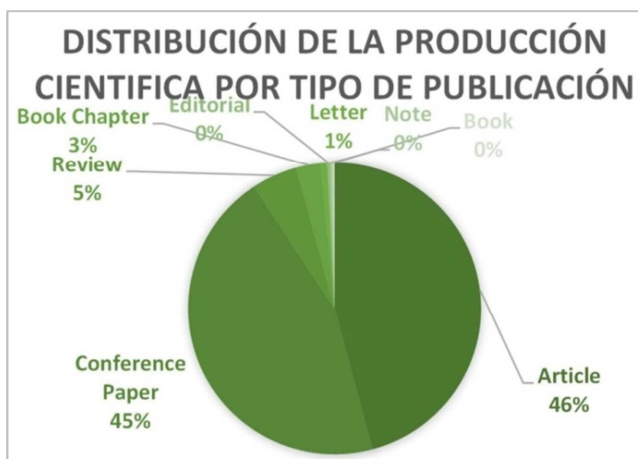
Figure 6 shows how the bibliographic production is distributed according to the type of publication chosen by the authors.

As shown in Figure 6, within the different types of publications, 46% of the total number of documents identified through Phase 1 of the Methodological Design,

correspond to Journal Articles, followed by conference proceedings representing 45% of the total number of registered publications, within which we can identify *“Predictive models for the detection of problems in autonomous learning in higher education students virtual modality”* [6, 19] this study states that autonomous learning has changed over the years as a result of the diversification of the forms of learning being face-to-face, blended and virtual,

with which also generated several problems since in this modality persist high dropout rates, repetition and low performance.

“Most students have difficulty planning, executing and monitoring their learning process autonomously so this study seeks to improve and optimize learning in order to contribute to the success of students with appropriate predictive and intervention strategies” [2] In third place are the reviews with 5% of the total of the identified documents, within which we can identify the one entitled "Flexible Education: Strategy for the configuration of virtual universities in Colombia" [21, 22] This article reviews the incursion and implementation of flexible education (FE) in higher education in Colombia as a strategy for training professionals to work in virtual platforms and that today allow shaping a flexible professional for the virtualization of work capable of exercising autonomy in their learning processes. [17] In fourth place are book chapters with 3% and finally letters with 1% of the total number of publications registered in Scopus.



Source: Own elaboration (2021); based on data provided by Scopus.

**Figure 6.** Type of publication.

## 5. Conclusions

Through the bibliometric analysis study proposed in this research, it can be concluded that Brazil is the Latin American country with the highest number of bibliographic records in the Scopus database registered with 694 documents, followed by Colombia with 332 articles and Ecuador with 220 published documents, all aligned to the topic Virtual Education as a favorer of autonomous learning. Observing that from 2015 to 2020, the publications were doubled as observed in the bibliographic records in a period of 5 years.

Autonomous learning seeks to integrate students in the construction of their own knowledge by implementing flexible teaching where the teacher goes from being the main actor to a guide who has a better structured knowledge. [11] Therefore, in these times of change, autonomous learning is encouraged in online education since there are more up-to-date tools that help the student access unlimited information networks where what is sought is to develop a critical stance

before the knowledge presented to determine what information is more favorable for learning. [23]

Concluding that it is important to use technological education as an appropriate methodology to promote the autonomous learning of students, especially in these times of change in which we are adapting more and more to the digital age. Evidencing the creation of new needs that students must satisfy in the construction of knowledge.

In relation to the analysis of the type of publication carried out, it is evident that 46% published scientific articles; 45% conference paper.

While the scientific production by area of knowledge is observed predominance of the first three areas of knowledge where the area of Computer Science is located, with 829 publications; Social Sciences with 684 disclosures and finally the Engineering area with 364 disclosures.

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