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Educational Innovation: Strategies For the Integration of Digital Technologies in The Classroom

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Abstract

This bibliometric review analyzes the scientific production related to the variables Educational Innovation, ICT, and Classroom, registered in the Scopus database during the period 2018-2023. The main objective of the study was to identify and characterize the volume of publications, achieving a total of 96 documents. The information collected was organized using graphs, categorizing it by Year of Publication, Country of Origin, Area of Knowledge, and Type of Publication. The results reveal that Spain is the country with the highest number of publications, reaching a total of 44 scientific papers. The Social Sciences area stood out as the most prolific in terms of bibliographic contribution, with 76 papers. Likewise, journal articles accounted for 69% of total publications. This analysis also includes a qualitative study on the positions of various authors in relation to the topics addressed, providing a comprehensive view of the current state of research in this field. Among the main contributions of this research, it is determined that it is necessary to note the need to integrate in the educational context the different educational strategies and digital technologies that allow the development of competencies and skills in educators and students for their academic training.

Keywords: *Educational Innovation, ICT, Classroom*

INTRODUCTION

Currently, education has presented a series of transformations, from the way of teaching and learning through educational strategies selected by educators, to the emergence of digital technologies and how they are incorporated and help in the learning and teaching processes at different educational levels.

Faced with this innovation, several digital technological resources offer free access to the Internet, which has led to analyzing the appropriate use of digital technology in education and the different strategies involved in the teaching process. Based on this premise, UNESCO (2015) states that the technological resource for education consists of sharing information on different ways in which technology can contribute to improving the quality of learning, reinforcing integration, and enhancing the management of education.

According to Cabero (1999), educational technology is an integrating and dynamic discipline that allows adapting to educational needs and different learning styles. In this regard, Litwin (2000) emphasizes that the integration of new digital technologies has improved the quality of the teaching and learning processes, while Medina (1994) points out that the incorporation of technologies in the education sector would make it possible to comprehensively address the challenges of the scientific development of society.

the United Nations Educational, scientific, and Cultural Organization (UNESCO, 2015) states that the implementation of ICT focuses on the educational process; in this case, virtual education, flexible education, and virtual learning environments. UNESCO applies a broad and integrative strategy in relation to education, according to which didactic educational resources are the pedagogical support that reinforces the teacher's performance, allowing to optimize teaching and learning processes (Vargas Murillo, 2017).

Finally, the integration of educational strategies and digital technologies promotes in classrooms the joint and interactive work of educators and students in order to address the academic objectives, emerging from this combination of reflective scenarios where the teacher and the student strengthen the teaching and learning processes.

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From the educational strategies implemented by teachers and students, different digital applications will emerge to strengthen the educational process. In addition, it would allow the development of different competencies and skills in students and allow them to achieve authentic and meaningful learning. For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Educational Innovation, ICT, and Classroom, as follows. As well as the description of the position of certain authors affiliated to institutions, during the period from 2018-2023.

METHODOLOGY

The present bibliometric review was carried out to analyze the scientific production related to the variables Educational Innovation, ICT, and Classroom, using the Scopus database during the period 2018-2023. The steps followed for this review are detailed below.

Definition of Objective and Scope

The main objective was to identify and characterize scientific publications in the study area. The period of analysis spanned from January 2018 to December 2023, and all relevant publications in English and Spanish were included.

Literature Search

An exhaustive search was carried out in the Scopus database using the following keywords: "Public Administration", and "Performance Indicators". Boolean operators were used to refine the results (AND):

TITLE-ABS-KEY (educational AND innovation, AND ict, AND classroom) AND PUBYEAR > 2017 AND PUBYEAR < 2024

The initial search yielded a total of 96 articles.

Study Selection

The following inclusion criteria were applied:

- ✓ **Relevance of the Topic**

  The studies chosen for analysis are consistent with the objective set out in this document, ensuring that the results obtained are concise, clear, objective, and coherent with the stated purpose.

- ✓ **Date of Publication**

  Studies published within the period 2018-2023 are included.

- ✓ **Type of Study**

  Documents reported in Scopus are analyzed, without distinction of their type. Journal Articles, Conference Articles, Books, Book Chapters, and Reviews, among others.

- ✓ **Language**

  The search is carried out in Scopus with the variables in English, ensuring that the results are reported in that language, thus ensuring the universality of the documents consulted.

- ✓ **Source of Publication**

  Studies published in peer-reviewed scientific journals are preferred, guaranteeing a minimum standard of quality and academic rigor.

Data Analysis

Various bibliometric analyses were conducted, including the following.

Co-occurrence network analysis: to visualize relationships between co-cited studies. Data were analyzed and visualized using VOSviewer software, allowing the creation of network maps and distribution graphs.

Publication count: To determine the number of studies published per year.

Publications by country of origin: To know the distribution of scientific production according to country of origin.

Influence of the areas of knowledge: to identify the influence of the different areas of knowledge in the execution of research work related to the variables studied.

Type of publication: To determine the number of publications corresponding to each type of format accepted in Scopus.

Data Visualization

Graphs were prepared to represent the distribution of publications by year, country, area of knowledge, and type of publication.

In addition, heat maps were generated to visualize the density of publications by country and network diagrams to show the co-occurrence of keywords.

Interpretation and Discussion of Results

The patterns and trends observed in the bibliometric data were interpreted, comparing them with previous studies and discussing their implications for the research field.

Emerging areas of research and gaps in the current literature were identified.

RESULTS

Cooccurrence of words

In the following figure, it is possible to identify a diagram to show the co-occurrence between the keywords identified in the data search for the proposed bibliometric analysis.

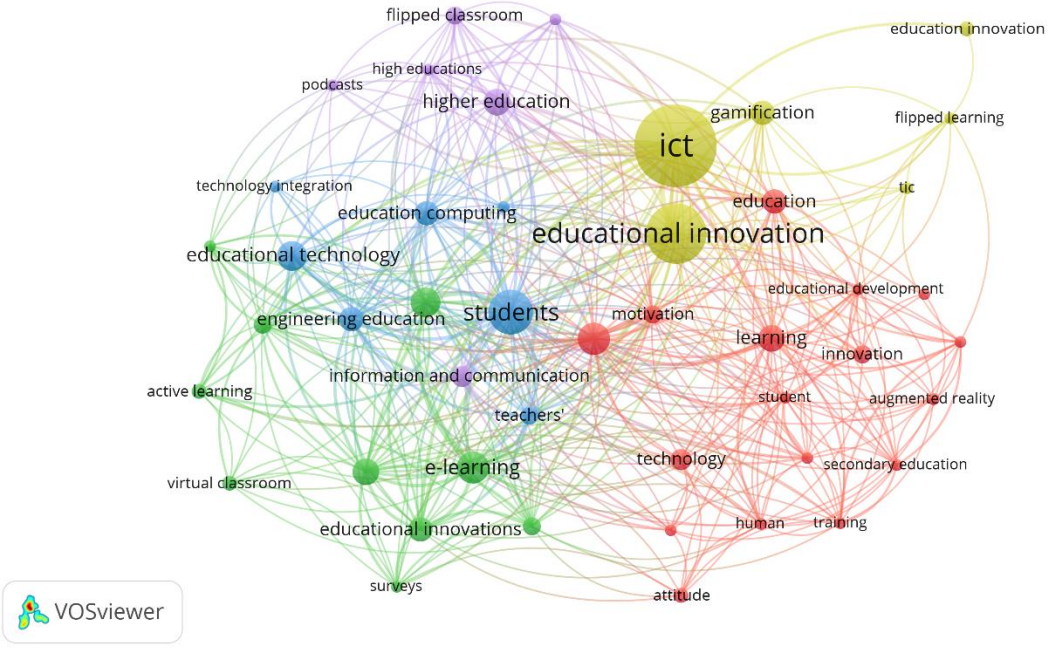

Figure 1. Cooccurrence of words

Source: Own elaboration (2024); based on data exported from Scopus.

This term co-occurrence map provides a clear view of how different topics and terms are interrelated in the scientific literature on the role of educational innovation, ICT, and the classroom. The clusters of terms in red, green, and blue show different thematic areas, while central nodes such as Educational Innovation stand out as key topics of discussion. ICT was the most influential keyword within the execution of research projects published in journals indexed in Scopus. Its frequency shows a high usability within the research identified for analysis in this document and presents a significant proximity with keywords such as Technology, Learning System, Technological Integration, and Higher Education. It is important to highlight that these keywords constitute an important number of works, which allows inferring about the benefits and challenges that would imply the integration of new digital technologies in educational institutions. It should be noted that this resource benefits and potentiates the skills of both educators and educated allowing them to improve the academic performance of students and these allow them to develop skills necessary for a system in constant change.

Counting Publications

Figure 2 shows the distribution of scientific production according to the year of publication.

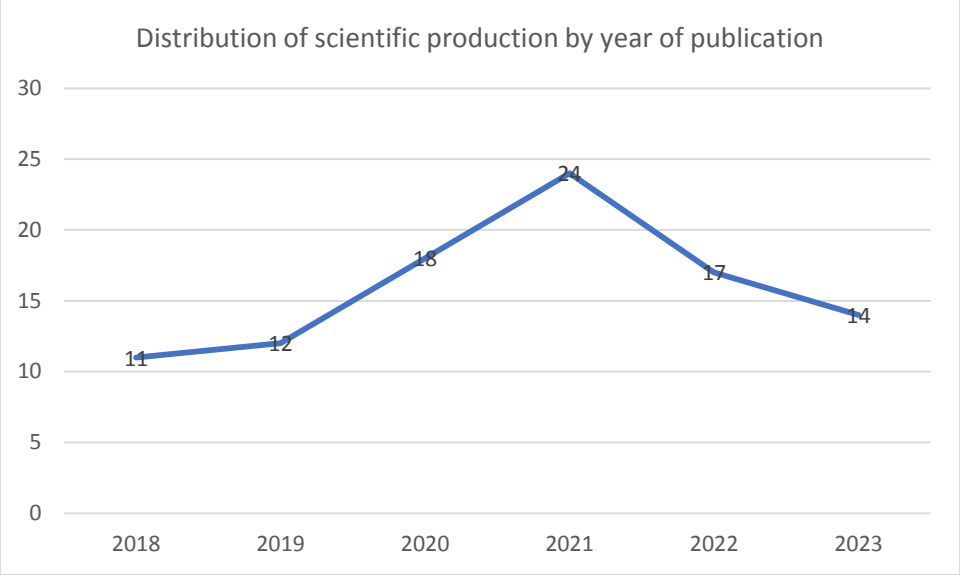

Figure 2. Annual distribution of scientific production.

Source: Own elaboration (2024); based on data exported from Scopus.

As evidenced in the previous Figure, the growth of scientific production around the variables Educational Innovation, ICT, and Classroom, has had great growth in terms of the volume of annual records, in 2018 the overall was 11 publications while in 2023 there were 14. Among the most outstanding articles of this last year, is the one entitled "The need to integrate digital education in higher education: challenges and opportunities" (Alenezi, 2023). This article attempts to offer profound reflections on the potential and future challenges of information and communication technologies (ICT) and digital education as they relate to the adoption of the most recent technological advances in the digital era and extensive open online courses. With the development of Internet technology, a significant change has been experienced in the way scholars communicate and collaborate since the digital revolution fostered unrestricted access to information on a global scale. Today's classrooms are equipped with a plethora of ICT tools and almost all instructors have made significant strides in integrating digital technology to enhance student access to information and collaborative learning opportunities. The higher education system should seek to utilize the power of ICT to be competitive and deliver high-quality education as a consequence of digital transformation, disruptive technological innovations, and accelerated change. To achieve these ambitions, this article describes some

challenges facing higher education, as well as the technological resources and methodologies they have used in the current scenario to transform higher education to embrace digital transformation.

Publications By Country of Origin

Figure 4 shows how scientific production is distributed geographically.

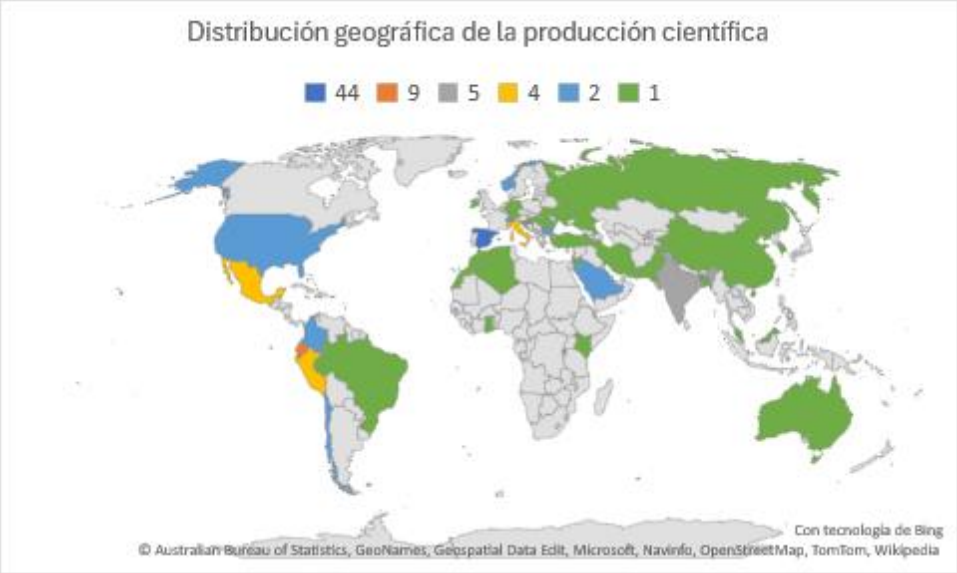

Figure 3. Geographical distribution of scientific production.

Source: Own elaboration (2024); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, the records coming from institutions were considered, establishing Spain, as the country of that community, with the highest number of publications indexed in Scopus during the period 2018- 2023, with a total of 44 publications. In second place, Ecuador with 9 scientific papers, and India occupies the third place presenting to the scientific community with a total of 5 papers among which is the article entitled "Educational innovation in adult learning considering digital transformation for social inclusion" (Ramirez, 2022). This research seeks to identify teaching-learning mechanisms that enable educational innovation and evolution for Youth and Adult Basic Education and thus achieve social inclusion in a rural development environment that has technological and internet access limitations in rural areas. The work seeks to identify a strategic process of learning objects to apply an inverted classroom in a non-face-to-face modality. The objective is to respond to the low level of knowledge in the area of Language and Literature to mitigate the lack of understanding of andragogical resources of teachers in virtual classes. A methodological strategy is proposed that is related to the scientific field through bibliometric and quantitative analysis based on scientific information. In the second moment, the environment is evaluated through satisfaction surveys conducted on students and teachers of a third high school in the rural area in the non-presential modality of the Juan Jiménez Educational Unit at Abdón Calderón extension, province of Sucumbíos, Ecuador.

Distribution Of Scientific Production by Area Of Knowledge

Figure 4 shows the distribution of scientific production, according to the prevalence of theories in different areas of knowledge.

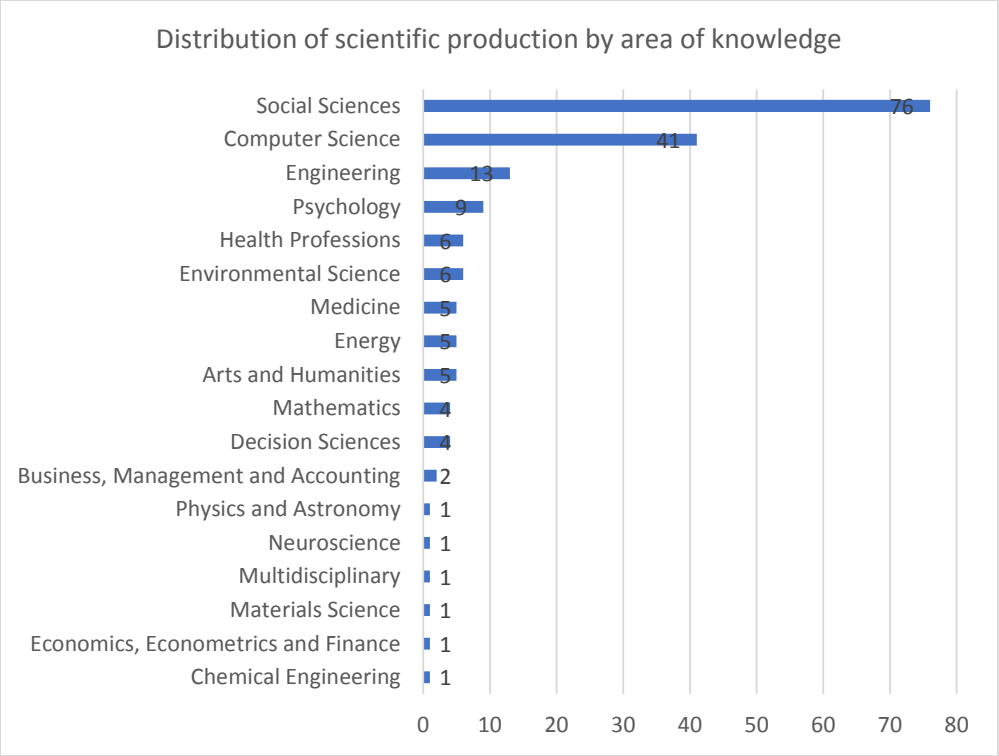

Figure 4. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2024); based on data provided by Scopus.

Social Sciences was the area of knowledge with the highest number of publications registered in Scopus with a total of 76 documents that have based their methodology on Educational Innovation, ICT, and Classroom. In second place, Computer Science with 41 articles, and Engineering in third place with 13. The above can be explained thanks to the contribution and study of different branches, and the article with the greatest impact was registered by Social Sciences entitled "Gamification in engineering education: the use of the Classcraft platform to improve motivation and academic performance" (Parody, 2022). This article presents a gamification teaching experience whose main objective is to improve motivation and obtain results for students in a mathematics major during their first year at university. This case study applied the tool Classcraft®, which is a role-playing game supported by a digital platform and a mobile application that has been developed to respond to the classroom management needs of teachers. The hypothesis states that the use of this application as an ICT could enhance learning and promote the development of the four "super skills" (or the Four Cs): critical thinking, communication, collaboration, and creativity. To explore the educational effectiveness of the methodology, a comparison was made between a gamification group of students and a control group. The results showed that the average grade obtained by students in the control group was lower than that obtained by students in the gamification group. In addition, the Nemenyi test showed that the Four C's were improved by the Classcraft® activities and group projects.

Type of Publication

The following graph shows the distribution of the bibliographic findings according to the type of publication made by each of the authors found in Scopus.

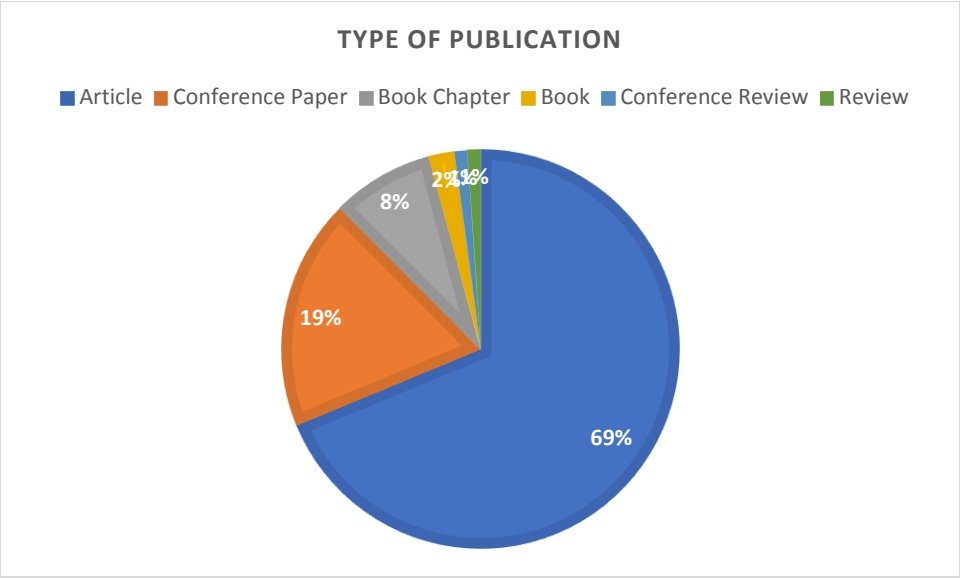

Figure 5. Type of publication.

Source: Own elaboration (2024); based on data provided by Scopus.

The graph reflects a diversity of types of scientific publications, with a clear predominance of articles and conference papers. Reviews and book chapters also have a significant presence. The other types of publications, although less frequent, complete the picture of how academic and scientific work is distributed. Journal Articles represent 69% of the total number of publications and were the most common and dominant type of publication in this distribution. In second place, Conference Articles represent 19% of the total number of publications. Book Chapters, in third place, constitute 8% of the total number of publications, which allows to infer a significant number of publications dedicated to reviewing and summarizing the existing literature in a particular field. In this last category, the one entitled "Information and communication technologies for education considering the inverted learning model" stands out (Cueva, 2022). The study focuses on the use of Information and Communication Technologies (ICT) considering the Reverse Learning Model (LE) as an active methodology. However, it is also essential to know the appropriate ICT to apply during the learning process. Information and Communication Technologies articulated with the Inverted Learning Model benefit and motivate students in a process where collaborative learning and communication between classmates and teachers are favored; in addition, it encourages autonomous work, helps the analysis of the contents in each of the subjects, and favors the construction of new knowledge. Therefore, it is necessary to know which ICTs are incorporated as more efficient in the Inverted Learning Model. Thus, it is necessary to obtain information on the ICTs that teachers have preferred to apply within the Inverted Learning Model, and which are recommended from classroom experience. The study shows which ICTs are most used and which ones benefit students in order to obtain significant learning. Consequently, considering the application of ICT and Flipped Learning in educational communities is a way to innovate the teaching-learning process.

CONCLUSIONS

Thanks to the bibliometric analysis carried out in this paper, it is possible to conclude that, regarding the geographical distribution of the scientific production around the variables Educational Innovation, ICT and Classroom, Spain was the country with the highest number of publications registered in Scopus during the period from 2018 to 2023 with a total of 44 papers, followed by the United States with a total of 5 publications. As for the areas of knowledge with the greatest influence in the writing and publication of research papers related to the topic proposed for this article, Social Sciences, Computer Science and Engineering stand out. the results obtained through this bibliometric analysis on digital technologies in the training classrooms show that these resources promote benefits in the quality of the educational process

because they end up closing the geographical and time gaps between teachers and students, and due to the different sources of information where the construction of knowledge is integrated actively.

Therefore, it is necessary to note the need to integrate, in the educational context, the different educational strategies and digital technologies that allow the development of competencies and skills in educators and students for their academic training.

To conclude, active participation in the development of academic activities would contribute to significantly improving the quality of the teaching and learning process, affirming that new technologies offer countless opportunities to create a more dynamic and participatory educational process, allowing students to develop the competencies and skills necessary to adapt to society and sector in constant change due to the effect of globalization.

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