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# The Evolution of the Educational Curriculum in the Digital Age: Impact of ICTs

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**Abstract**

*A documentary review was carried out on the production and publication of research papers related to the study of the variables Education, Digital Era and ICT, as online resources within the different study methodologies at the university level. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022, achieving the identification of 145 publications in total. The information provided by this platform was organized through graphs and figures, categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors on the proposed topic is referenced through a qualitative analysis. Among the main findings made through this research, it is found that Indonesia, with 19 publications, was the country with the highest scientific production registered in the name of authors affiliated with institutions of that nation. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material related to the study of the implementation of queries to Databases, ICT Resources as a strategy in education was Social Sciences with 87 published documents, and the Type of Publication that was most used during the period indicated above was the Journal Article, which represents 50% of the total scientific production.*

***Keywords:*** *Education, Digital Age, ICT.*

## 1. Introduction

Education, as a fundamental pillar for society, has transformed significantly throughout history in response to a constant need for social changes, advances in technology interacted hand in hand with pedagogical strategies. Taking into account the historical data of society, no era has witnessed such a transcendental transformation in educational models as the introduction of the digital age. The advent of information and communication technologies known by their acronym ICTs has ushered in a new technological era focused on teaching and learning, revolutionizing not only the way teachers teach their academic components but also transforming the way in which the academic curriculum is taught.

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The current digital age, characterized by the rapid spread of computers, the internet, and a myriad of technological and digital devices, has significantly altered the traditional paradigms of education. This metamorphosis has led to significant changes in curricular models, academic delivery methods, and improved self-learning outcomes, which shows us a relationship between education and technology. To understand the contemporary change in educational curriculum, it is imperative to recognize that curriculum design has never been static. Historically, education has adapted to cultural, economic and social changes. From the ancient Greek philosophers who emphasized the pursuit of knowledge to the industrial age that gave rise to standardized education, each era shaped the curriculum according to its unique needs and values.

The digital age catalyzed a shift from traditional teacher-centered pedagogy to student-centered, collaborative learning models. Educational institutions began to integrate ICT tools into the classroom to improve engagement, personalization, and interactivity. This evolution challenged educators to reconsider their teaching methods and adapt to new digital environments. The impact of ICT on the educational curriculum is multifaceted. First, the curriculum was expanded to include digital literacy as a core skill, recognizing the need for digital competence in the modern world. Subjects such as computer science, digital ethics, and online safety found their place in the curriculum. ICT tools have enabled educators to tailor curriculum content to individual student needs. Adaptive learning platforms and data analytics enable teachers to identify learning gaps and provide personalized learning experiences, fostering greater student success.

While the impact of ICTs on education is transformative, it also poses significant challenges, such as digital inequality, privacy concerns, and the need for digital citizenship education. These considerations highlight the importance of an ethical and balanced integration of technology into the curriculum. If we look to the future, the evolution of the educational curriculum in the digital age will continue. Emerging technologies such as artificial intelligence, virtual reality, and augmented reality have the potential to further reshape the way we teach and learn, requiring continued adaptation and innovation in curriculum design. 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 Education, Digital Era and ICT, as well. Such as the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

## 2. General Objective

To analyze, from a bibliometric and bibliographic perspective, the production of research papers on the variables Education, Digital Era and ICT registered in Scopus during the period 2017-2022.

## 3. Methodology

A quantitative analysis of the information provided by Scopus is carried out under a bibliometric approach on the scientific production related to the study of the variables Education, Digital Era and ICT. Likewise, from a qualitative perspective, examples of some research works published in the area of study mentioned above are analyzed, from a bibliographic approach to describe the position of different authors regarding the proposed topic.

The search is carried out through the tool provided by Scopus and parameters referenced in Figure 1 are established.

3.1 Methodological design


Figure 1. Methodological design
Source: Authors' own creation

3.1.1 Phase 1: Data collection

Data collection is carried out through the Search tool on the Scopus website, through which a total of 145 publications are identified. To this end, search filters were established consisting of:

TITLE-ABS-KEY ( education, AND digital AND era, AND ict ) AND PUBYEAR > 2016 AND PUBYEAR < 2023

- ✓ Published documents whose study variables are related to the study of the variables Education, Digital Age and ICT.
- ✓ Without distinction of country of origin.
- ✓ Without distinction of area of knowledge.
- ✓ No distinction of type of publication.

3.1.2 Phase 2: Construction of analytical material

The information identified in the previous phase is organized. The classification will be made by means of graphs, figures and tables based on data provided by Scopus.

- ✓ Co-occurrence of Words.
- ✓ Year of publication
- ✓ Country of origin of the publication.
- ✓ Area of knowledge.
- ✓ Publication Type

3.1.3 Phase 3: Drafting of conclusions and outcome document

After the analysis carried out in the previous phase, we proceed to the drafting of the conclusions and preparation of the final document.

## 4. Results

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords within the publications identified in the Scopus database.

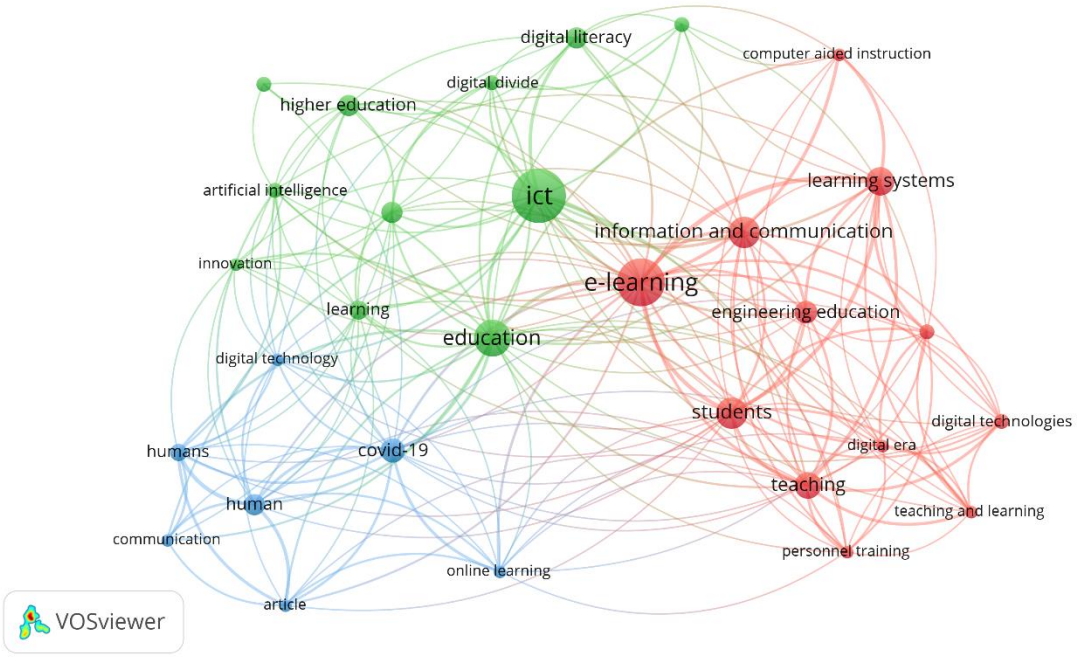


Figure 2. Co-occurrence of words

Source: Authors' own elaboration (2023); based on data provided by Scopus.

Information and Communication was the most frequently used keyword within the studies identified through the execution of Phase 1 of the Methodological Design proposed for the development of this article. ICTs are among the most frequently used variables, associated with variables such as Education, E-Learning, Students, Artificial Intelligence, Teachers, Educational Engineering, Digital Technology. The digital age driven by the widespread influence of ICTs has ushered in a new era in education, reshaping curriculum, pedagogy, and learning outcomes. This extensive exploration will delve into the multifaceted evolution of the educational curriculum, highlighting the profound impact of ICTs on modern education. As we navigate the complex intersection of technology and learning, it is critical to be aware of both the opportunities and challenges presented by this transformation, striving for an educational landscape that prepares students for the demands of the 21st century.

4.2 Distribution of scientific production by year of publication.

Figure 3 shows how scientific production is distributed according to the year of publication, taking into account that the period between 2017 and 2022 is taken

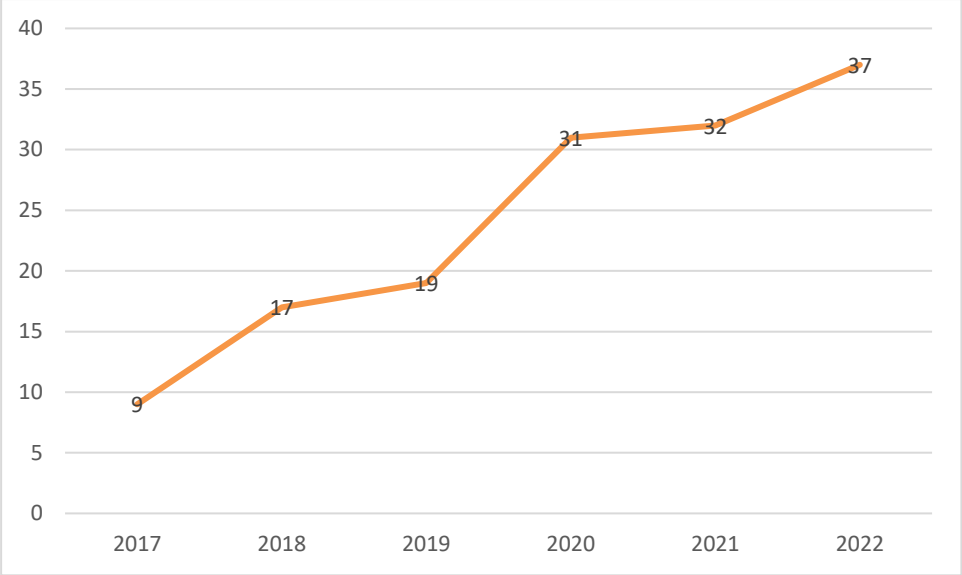


Figure 3. Distribution of scientific production by year of publication.

Source: Authors' own elaboration (2023); based on data provided by Scopus.

Among the main characteristics evidenced through the distribution of scientific production by year of publication, the number of publications registered in Scopus was in 2022, reaching a total of 37 documents published in journals indexed on this platform. This can be explained by articles such as the one titled "Social Health and Psychological Safety of Students Participating in Online Education During the COVID-19 Pandemic" This paper explores the impacts of the COVID-19 pandemic on student learning and well-being and outlines potential considerations for education systems as they support students during the recovery period and beyond. Our study is based on the results of our own survey which was conducted using a snowball and a convenient sample of 1524 respondents (aged 19-26; 56.2% female and 43.8% male) from the Czech Republic (N = 804) and Russia (N = 720). We used the mixtures of ANOVA and the Generalized Linear Model Dirichlet Process (DP-GLM) to explain the causes of stress and anxiety after grouping variables represented by gender and study specializations. Our results demonstrate that more than 87% of students in the sample expressed medium to high vulnerability to stress, while 58% of respondents were affected by severe anxiety during their participation in online education. The most important factors that emerged as significant were fear of infection and social distancing, while the best coping strategy was self-control. These results allow us to provide practical recommendations for effectively coping with and managing stress and anxiety among students in the post-pandemic era. (Korneeva, 2022)

4.3 Distribution of scientific production by country of origin.

Figure 4 shows how the scientific production is distributed according to the nationality of the authors.

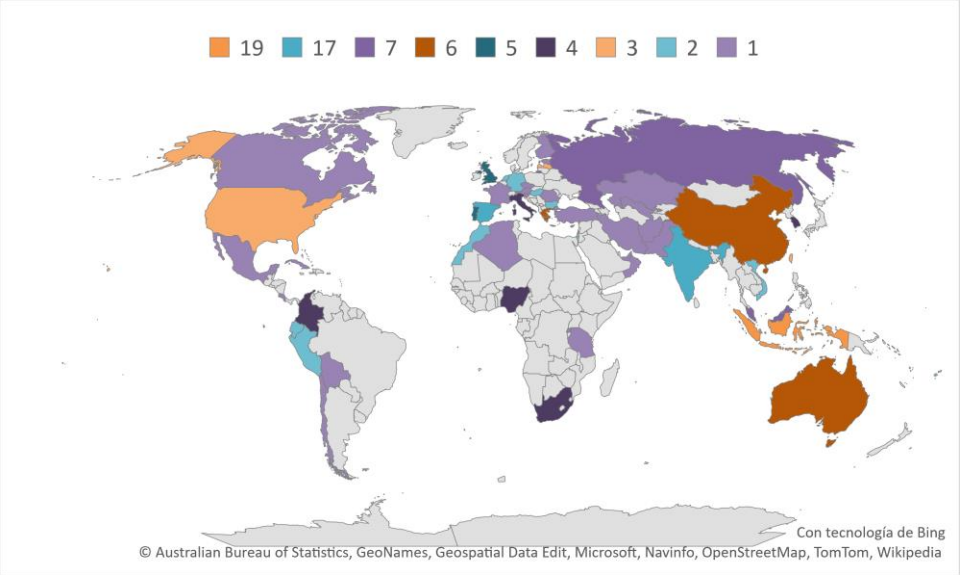


Figure 4. Distribution of scientific production by country of origin.

Source: Authors' own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, records from institutions were taken into account, establishing Indonesia as the country of this community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 19 publications in total. In second place, India with 17 scientific papers, and Spain occupying the third place presenting to the scientific community, with a total of 7 documents, among which is the article entitled "Influence of students' perceptions on the quality of instruction on their performance in digital reading in 29 OECD countries: A Multilevel Analysis" This study aims to investigate the correlation between students' perceptions of instructional quality characteristics and their performance in digital reading from the aspects of perceived instructional approaches, classroom management, and supportive climate. Data from 223,807 15-year-old students in 29 countries of the Organisation for Economic Co-operation and Development (OECD) was drawn from the latest Programme for International Student Assessment (PISA) 2018 database and the study adopted a three-level hierarchical linear model (HLM). ). The findings demonstrated the positive influence of students' perceived adaptation of instruction, stimulation of reading participation, disciplinary climate, teacher interest and support. However, students' perceptions of teacher-directed instruction, reading skills exercises, digital skills teaching, language instruction time, and teacher feedback were unexpectedly negatively correlated with their performance in digital reading. Finally, the study concludes by discussing its implications for improving the quality of reading instruction.(Hu, 2022)

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.

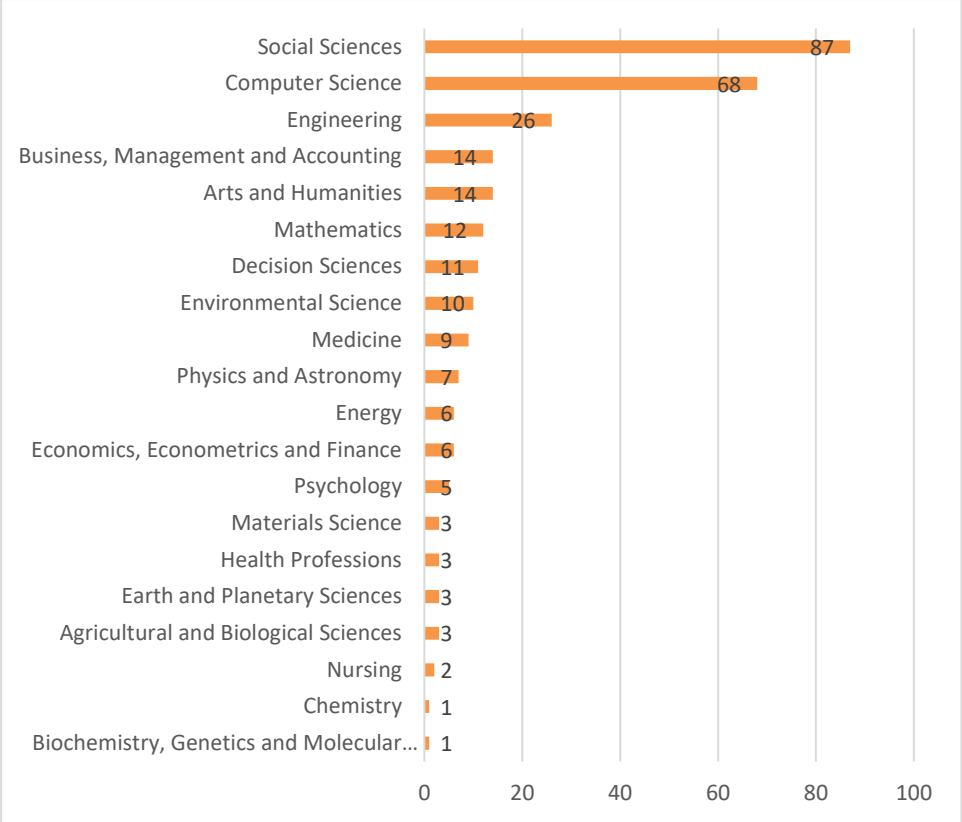


Figure 5. Distribution of scientific production by area of knowledge.

Source: Authors' own elaboration (2023); 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 87 documents based on their variable methodologies Education, Digital Age and ICT. In second place, Computer Science with 68 articles and Engineering in third place with 26. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the area of Social Sciences entitled "The effectiveness and impact of the teaching of coding through Scratch on the competencies of Moroccan students" the present study aimed to investigate the usefulness and impact of teaching coding through "Scratch" (i.e. a coding software for students) in Moroccan students, measure their ability to learn to code, and finally explore Moroccan teachers' perceptions of it. Therefore, a pre-test and post-test course pilot study was conducted targeting 38 sixth-grade students in a rural school. The control group (19 participants) was not taught the basics of Scratch coding, while the experimental group (19 participants) was taught hands-on introductory Scratch coding lessons based on the theoretical model for teaching computer programming. In addition, a quantitative survey questionnaire was used to collect fifth and sixth grade teachers' perceptions (202 participants) of Scratch. The Statistical Package for Social Sciences was used to analyze the data. The results of the quantitative questionnaire showed that Moroccan teachers support Scratch teaching for its potential benefits, while the results of the experimental study showed that computer coding can be easily integrated into Moroccan schools. The software is suitable for students as they demonstrated a keen interest in coding and have experienced positive impacts on various competencies.(Binaoui, 2022)

4.5 Type of publication

Figure 6 shows how the bibliography is distributed according to the type of publication chosen by the authors

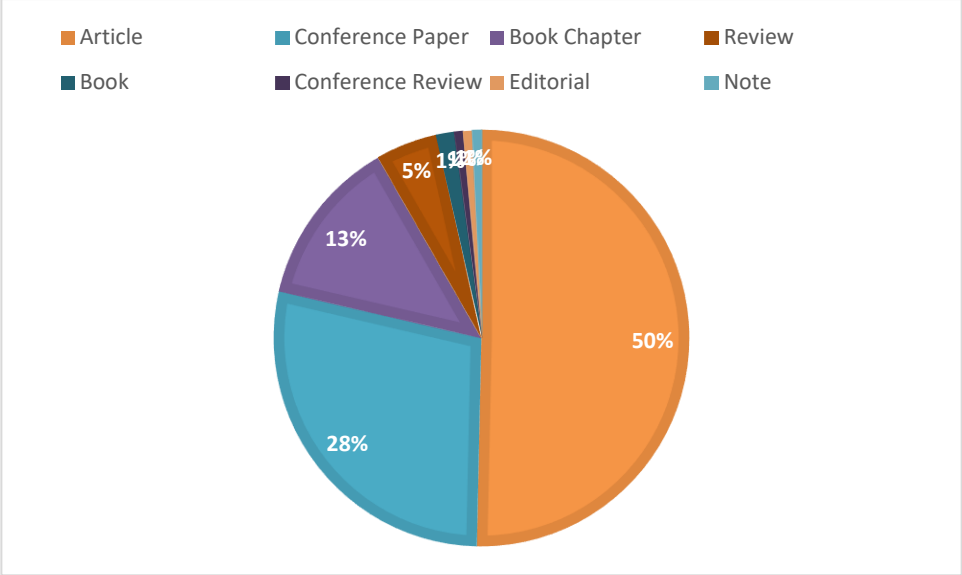


Figure 6. Publication Type

Source: Authors' own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was the one entitled Journal Articles with 50% of the total production identified for analysis, followed by Session Paper with 28%. Chapter of the Book are part of this classification, representing 13% of the research papers published during the period 2017-2022, in journals indexed in Scopus. In this last category, the one entitled "New digital era. The objective of this diagnostic research was to identify the perceptions of indigenous communities about the digital divide and the government proposals for their inclusion in training processes. To this end, the School of Indigenous Leadership at the University of Atacama was developed in 18 months. The method of segmentation, classification and hierarchical regression (CART) was applied to identify and select the determinant variables of ICT management, and once the variables were selected, the associations between them were determined with the multivariate method of multiple correspondence analysis (MCA). Binary logistic regression analysis was used to evaluate the probability of presenting a mismanagement of ICT according to the variable selected as the most determinant of this characteristic, which corresponded to age, dichotomized in those under 46 years of age and over 45 years of age. Finally, univariate analyses of descriptive statistics of quantitative and categorical variables, centralization and dispersion statistics, histograms, and bar graphs were estimated. One of the strongest findings indicates that people over the age of 45 are about three times more likely to show poor ICT skills than people under the age of 46.(Burgos-Videla, 2022)

## 5. Conclusions

Through the bibliometric analysis carried out in this research work, it was established that Indonesia was the country with the highest number of records published in the Education, Digital Era and ICT variables. with a total of 19 publications in the Scopus database. In the same way, it was established that the application of theories framed in the area of Social Sciences, were used more frequently in the implementation of Information and Communication Technologies (ICTs) since they have contributed a fundamental role in the evolution and transformation of academic curricular models in the digital era. The introduction of this technological approach has transformed traditional paradigms of teaching and learning, allowing students new interactive and novel experiences in the teaching of classes. Through the use of ICTs, teachers have managed to renew their more personalized learning methods in order to address students' learning difficulties

individually and achieve significant educational advances autonomously. It is important to note that ICTs have contributed significantly to the role of education, allowing academic flexibility, eliminating geographical gaps and providing great opportunities for students in remote areas to have access to quality education. Despite the constant benefits that the integration of this technological avant-garde in educational curricula presents, it is not without challenges, such as the need to have adequate facilities, constant training by educators and schools and the constant risks of a dependence on these technological resources. For this reason, it is essential that teachers manage to find the balance between the different traditional teaching methods and the use of ICTs, ensuring that the implementation of these technologies is delivered in a meaningful way for the constant improvement of learning and teaching outcomes. Finally, ICTs have revolutionized education and their continued integration into the curriculum is essential to prepare students for the digital age, equipping them with the skills needed to excel in an ever-evolving world.

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