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# Adapting Educational Curricula to the Digital Era: Assessing the Influence of ICTs on Evolution

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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 Educational Curriculum and ICT. 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 411 publications. 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 Spain, with 42 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 Educational Curriculum and ICT was Social Sciences with 238 published documents, and the most used Publication Type during the period indicated above were Journal Articles with 44% of the total scientific production.*

***Keywords:*** *Educational curriculum, digital age, ICT.*

## 1. Introduction

In the 21st century, where the digital age and online platforms play a fundamental role in today's society, we are able to see how these technologies have a positive impact on different sectors. The education sector has reacted positively to the arrival of this digital era, which has shown an unprecedented evolution in curricula, which seeks to enable students to adapt much more quickly to these technological advances and prepare them for an increasingly digitized world. As we observe how these new technologies play a transformation in society in the way we communicate, live and facilitate productivity in certain sectors, we can also see how they have had a significant impact on education.

In the last five years, we have observed the way in which traditional teaching and learning models have been left behind, which were mainly based on the consultation of books, lectures and other orthodox methods, the introduction of the digital age in these pedagogical models for education has given way to a more holistic approach where teaching starts from the premise of being much more dynamic and interactive based on the need of to address each student's learning needs individually. Based on this premise, the use of technological devices has become much more common in training classrooms,

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these resources offer a wide range of information in online education. It is important to highlight that this evolution in educational plans has been based on the need to be able to exploit those skills that in the future will be relevant for society and in a world that is in constant digital change. As a result, digital skills, such as computer literacy, programming, and computational thinking, are increasingly seen as essential for employability and success in today's workforce.

However, students need to learn and analyze basic concepts related to these new technologies and digital tools, in order to be able to face future challenges. In addition to being able to incorporate these new technologies offered by this digital age, it is necessary for institutions in their curriculum to include a more holistic approach where critical thinking, teamwork and other skills necessary for society are developed. Exploiting this skill would help students adapt to an ever-changing work environment and address societal and global challenges.

Being able to implement technological methods in the educational curriculum has opened the way to being able to focus teaching methods in a more comprehensive way, where the needs of each student can be addressed individually in order to improve the academic performance of students. Students can now more effectively access online resources, participate in educational forums, and network students around the world. These resources have made it possible to expand access to education, which has allowed each student to look after their own interests and allow each student to be more autonomous at the time of learning.

However, the evolution of the educational curriculum in the digital age also presents challenges. The digital divide and lack of equitable access to technology are issues that need to be addressed to ensure that all students have equal opportunities. To conclude, the evolution of the educational plans carried out by the digital age has been a process of adaptability where the need for students to be able to learn necessary digital skills is prioritized and in the same way to be able to implement pedagogical models where it is taught to develop approaches such as critical thinking and achieve that educators impart personalized learning. These aspects are key to this digital evolution in the education sector. 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 Curriculum 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 preparation and publication of research papers in high-impact journals indexed in the Scopus database on the variables Educational Curriculum and ICT, during the period 2017-2022.

## 3. Methodology

This article is carried out through a research with a mixed orientation that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of the variables Educational Curriculum and ICT.

A qualitative perspective, examples of some research works published in the area of study mentioned above, based on a bibliographic approach that allows describing the position of different authors on the proposed topic. It is important to note that the entire search

was carried out through Scopus, managing to establish the parameters referenced in Figure 1.

3.1. Methodological design

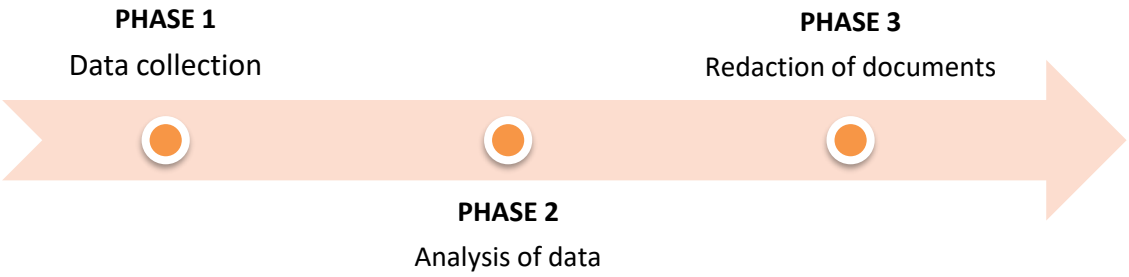


Figure 1. Methodological design

Source: Authors' own creation

3.1.1 Phase 1: Data collection

Data collection was carried out from the Search tool on the Scopus website, where 411 publications were obtained from the following filters:

TITLE-ABS-KEY ( educational AND curriculum, AND ict ) AND PUBYEAR > 2016 AND PUBYEAR < 2023

- Published documents whose study variables are related to the study of the Educational Curriculum and ICT
- Limited to the years 2017-2022.
- 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 collected in Scopus during the previous phase is organized and then classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, the results of the previous results are analysed, resulting in the determination of conclusions and, consequently, the obtaining of the final document.

## 4. Results

4.1 Co-occurrence of words

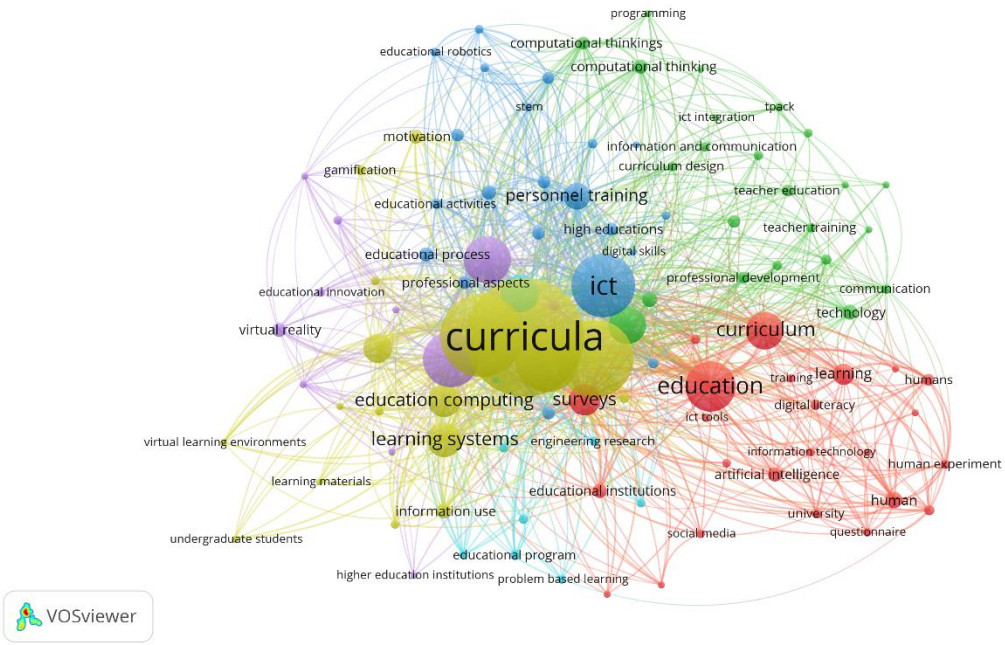


Figure 2. Co-occurrence of words

Source: Authors' own elaboration (2023); based on data exported from Scopus.

Curriculum 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. Education is among the most frequently used variables, associated with variables such as Educational Information, Motivation, Digital Systems, Digital Evolution, ICT, Learning Systems, Education Program. From the above, it is striking, being able to introduce these new technologies in educational plans allows educators to provide knowledge in a more comprehensive way since both individual and collective needs can be addressed in teaching, these new technologies offer new methods of innovation where it is possible to leave behind the traditional paradigms of education and allow new pedagogical methods to be carried out. This digital age facilitates access to information, promotes collaboration and fosters the skills needed in today's society.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

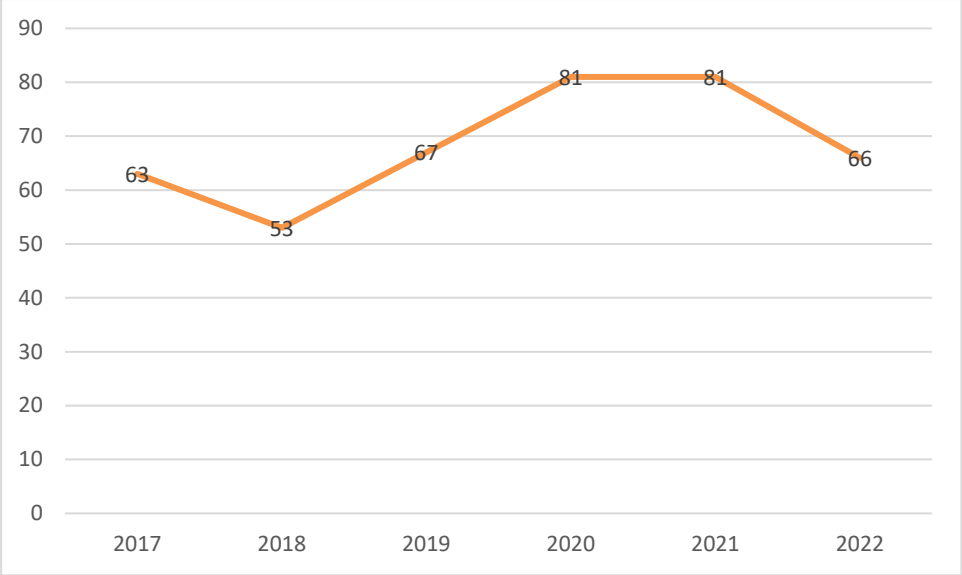


Figure 3. Distribution of scientific production by year of publication.

Source: Authors' own elaboration (2023); based on data exported from Scopus

Among the main characteristics evidenced by the distribution of scientific production by year of publication, the number of publications registered in Scopus was in the years 2020-2021, reaching a total of 81 documents published in journals indexed on this platform. This can be explained by articles such as the one entitled "Use of robotics in education to improve cognitive development: a pilot study" The aim of this article is to report on a pilot study at the intersection of neurodiversity and educational robotics. (2) Methods: The pilot study was part of a larger project, namely Robotics for the Inclusive Development of Atypical and Typical Children (RIDE). A pre- and post-test design was used to examine the development of different cognitive processes in sixth-grade students, such as computational thinking (CT), spatial relationships, visual-constructive ability, attention, and reading ability, in relation to a robotics development program employed in the classroom. (3) Results: The results suggest an overall improvement in almost all measures. Specifically, participants' performance improved significantly from the pre-test to the post-test on the visual-constructive skills test, they made significantly fewer reading errors, and they substantially improved in their reading comprehension.(Kálózi-Szabó, 2022)

4.3 Distribution of scientific output by country of origin

Figure 4 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.

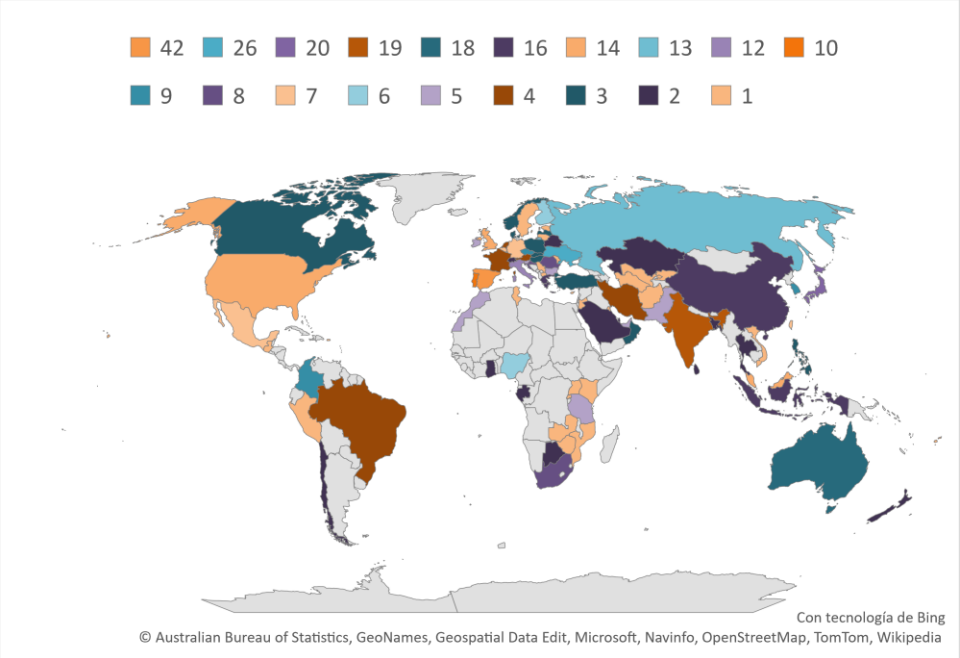


Figure 4. Distribution of scientific production by country of origin.

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

Within the distribution of scientific production by country of origin, the registrations from institutions were taken into account, establishing Spain as the country of this community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 42 publications in total. In second place, Ukraine with 26 scientific papers, and Japan occupying the third place presenting to the scientific community, with a total of 20 papers among which is the article entitled "Modeling the effect of TPACK and computational thinking in classroom management in technology-enriched courses" In this study, we investigated the relationship between classroom management in technology-enriched courses, computational thinking (CT) and technological knowledge of pedagogical content (TPACK). A total of 125 volunteer teachers participated in this study, which used the relational screening research model. Three instruments were used for data collection in this research and the data obtained were analyzed using the Partial Least Squares Structural Equation Model. The findings show that the relative effect of TPACK and TC on classroom management is significant. In addition, CT has been found to have a significant impact on the level of TPACK.(Saritepeci, 2022)

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications based on the area of knowledge through which the different research methodologies are implemented.

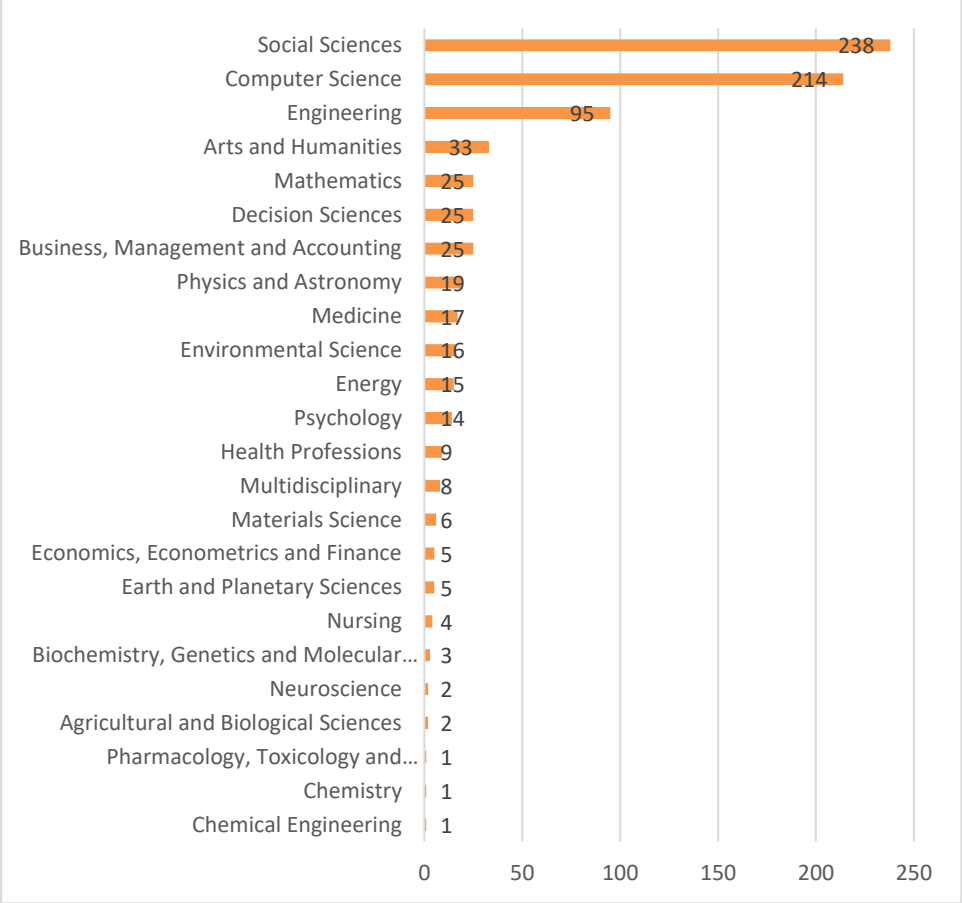


Figure 5. Distribution of scientific production by area of knowledge.

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 238 documents that have been based on its Educational Curriculum and ICT methodologies. In second place, Computer Science with 214 articles and Engineering in third place with 24. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by Social Sciences entitled "Analysis of the quality of teaching and learning from the perspective of university students" This article presents the results of an empirical research focused on the quality of teaching and learning methods. from the perspective of master's students at one of the Czech universities. The research focused on learning outcomes, forms and methods of teaching, and the use of ICT technologies following a quantitative survey in this area, which showed the need to examine the topic in depth and in a broader context. Data for qualitative research were collected through in-depth interviews; The main research method was focus groups. The data were processed and analyzed using coding techniques. The results showed that students prefer teaching and learning outcomes associated with use in future practice. The ways of teaching depend on the style of the teacher rather than on the description stated in the curriculum. Contrary to most practices, students prefer teaching methods that lead to active learning. The advantages are identified in the framework of the involvement of ICT in teaching, which makes sense and has a positive impact on student learning; However, the effect depends on how the forms of teaching are used.(Vaclavik, 2022)

4.5 Type of publication

In the following graph, you will see the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

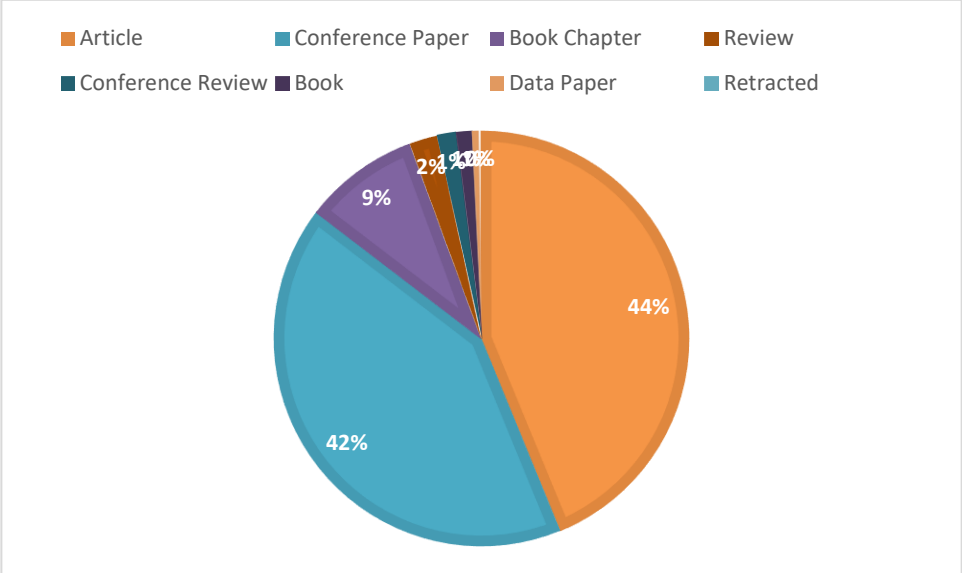


Figure 6. Type of publication.

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 44% of the total production identified for analysis, followed by Session Papers with 42%. Chapter of the Book are part of this classification, representing 9% of the research papers published during the period 2017-2022, in journals indexed in Scopus. In the latter category, the one titled "Game-Based Learning: Improving Student Experience, Knowledge Acquisition, and Usability in Higher Education Programming Courses" stands out. This article presents a large-scale study investigating students' reaction to game-based learning as part of programming courses. The study focuses on knowledge acquisition, learner experience, and game usability. Background: Despite the rapid growth of the information and communications technology (ICT) sector, the lack of engagement with science, technology, engineering and mathematics (STEM) subjects and high dropout rates in computer science and engineering careers are directly related to the large number of vacant vacancies in the ICT job market. To address one of the underlying causes of this crisis (i.e., traditional teaching paradigms struggle to attract students to rather abstract and difficult STEM subjects, such as coding), innovative learning solutions enhanced by technology are being sought. Expected Results: A set of serious games was proposed and designed to promote students' understanding of programming concepts, improve their confidence, stimulate their interest in STEM, and increase engagement with courses through vivid and engaging scenarios.(Zhao, 2022)

## 5. Conclusions

Through the bibliometric analysis carried out in this research work, it was possible to establish that Spain was the country with the highest number of records published in the Educational Curriculum and ICT variables, with a total of 42 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 integration of new technologies in educational plans, which is based on the need for students to develop necessary skills that allow them to perform positively, both in the educational plan and in society. The curriculum in the past focused on being able to acquire knowledge in a theoretical way, today educational curricula are based on the development of digital skills, autonomous

learning, access to resources and allowing educators to impart knowledge in a more personalized way. However, students can use these resources to be able to surf the net, this in order to access online resources and complement their initial education with digital education. The evolution of these curricula in the digital age has led to a re-evaluation of learning methods, introducing this technological era has transformed how learning is delivered. Traditional pencil-and-paper-based exams have given way to more practical and authentic assessments that reflect the skills needed in the world of work. In addition, students are currently evaluated based on educational projects, group work and effective use of technological tools, it is important to recognize that the evolution of the educational curriculum in the digital age also poses challenges. The digital divide continues to be a barrier for many students who do not have adequate access to devices or internet connection. In addition, there is a need to ensure that teachers are properly trained to effectively use technology in the classroom and that responsible and ethical use of technology is promoted. Finally, the evolution of the educational curriculum in the digital age has been a necessary response to technological advances and has made it possible to prepare students for an increasingly digitized world. However, it is important to address the challenges that arise and ensure that technology is used inclusively and responsibly in the educational process.

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