Research Article

Factors of Learning Strategies Contributing to Students' Research Skills

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| ARTICLE INFO	ABSTRACT
	This bibliometric review analyzes the scientific production related to the variables Learning Strategies and Research Skills registered in the Scopus database during the period 2018-2023. The primary objective of the study was to identify and characterize the volume of publications, resulting in a total of 38 documents. The information collected was organized by graphs, categorizing it by year of publication, country of origin, area of knowledge, and type of publication. The results indicate that Peru is the country with the highest number of publications, with a total of 10 scientific documents. The Social Sciences area demonstrated the greatest productivity in terms of bibliographic contribution, with 22 documents. Journal articles accounted for 76% of the total number of publications. This analysis also includes a qualitative study on the positions of various authors in relation to the topics addressed, offering an overview of the current state of research in this field. The principal findings of the study indicate that it is crucial to disseminate the knowledge acquired in academic settings, as this not only enhances university operations but also fosters teamwork, enhances interpersonal relationships, and provides mutual support among students. Additionally, it motivates learning processes and yields significant outcomes in the academic environment. **Keywords:** Learning Strategies, Research Skills, University Students

1. Introduction

The contemporary landscape of higher education is characterized by a multitude of transformation processes and challenges. A significant proportion of these initiatives are designed to enhance academic competencies in the field of scientific research. In light of the necessity to confront these challenges, the World Declaration on Higher Education, in its article 1, asserts the imperative to "promote, generate, and disseminate knowledge through research, which allows the offering of services with adequate competencies" (Unesco, 2000).

In light of the aforementioned considerations, it is imperative that higher education institutions provide their students with the optimal tools for their training. In order to facilitate the development of undergraduate students' skills, it is essential that educational institutions integrate pedagogical strategies into their training plans. These strategies should enable students to gain knowledge and strengthen their abilities to access better job opportunities and further studies, where they require these skills, such as research-oriented skills (Lucumi, 2015).

In this context, it is essential that pedagogical performance be accompanied by a collaborative effort between teachers and students, wherein they strive to integrate their knowledge and contributions, assuming a guiding, supervising, and energizing role in the learning process of students. In other words, the integration of cooperative teaching and learning strategies is necessary to facilitate the acquisition of competencies that will enable students to become capable professionals capable of responding to the needs of society. It is crucial to underscore the most pivotal aspects of the implementation of learning strategies for the acquisition of research competencies. The following section provides a comprehensive overview of the proposed strategies, the most pertinent research competencies, and the manner in which they collectively facilitate the advancement of research students (González, 2015).
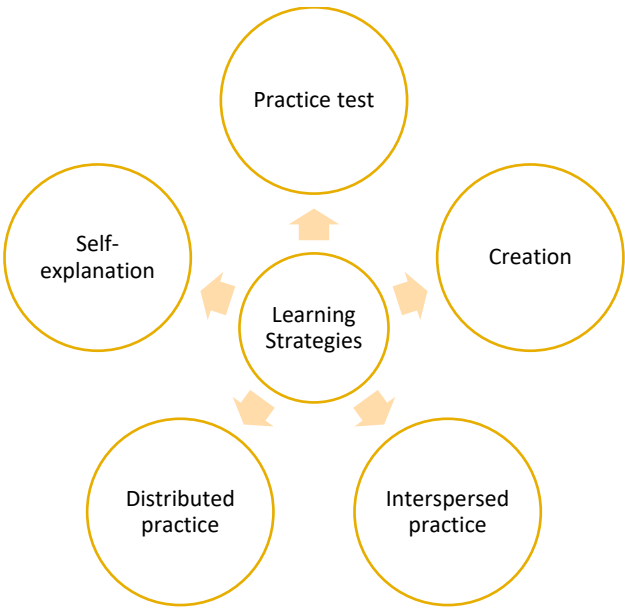
Figure 1. Learning strategies

Source: (García, Alfredo, & Ponte, 2021)
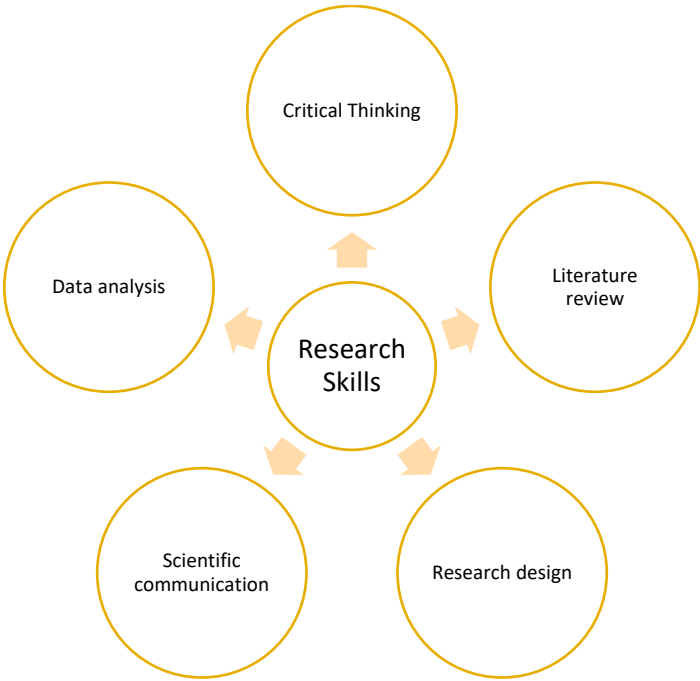
Figure 2. Research skills

Source: (Rueda Milachay, Torres Anaya, & Córdova García, 2022)
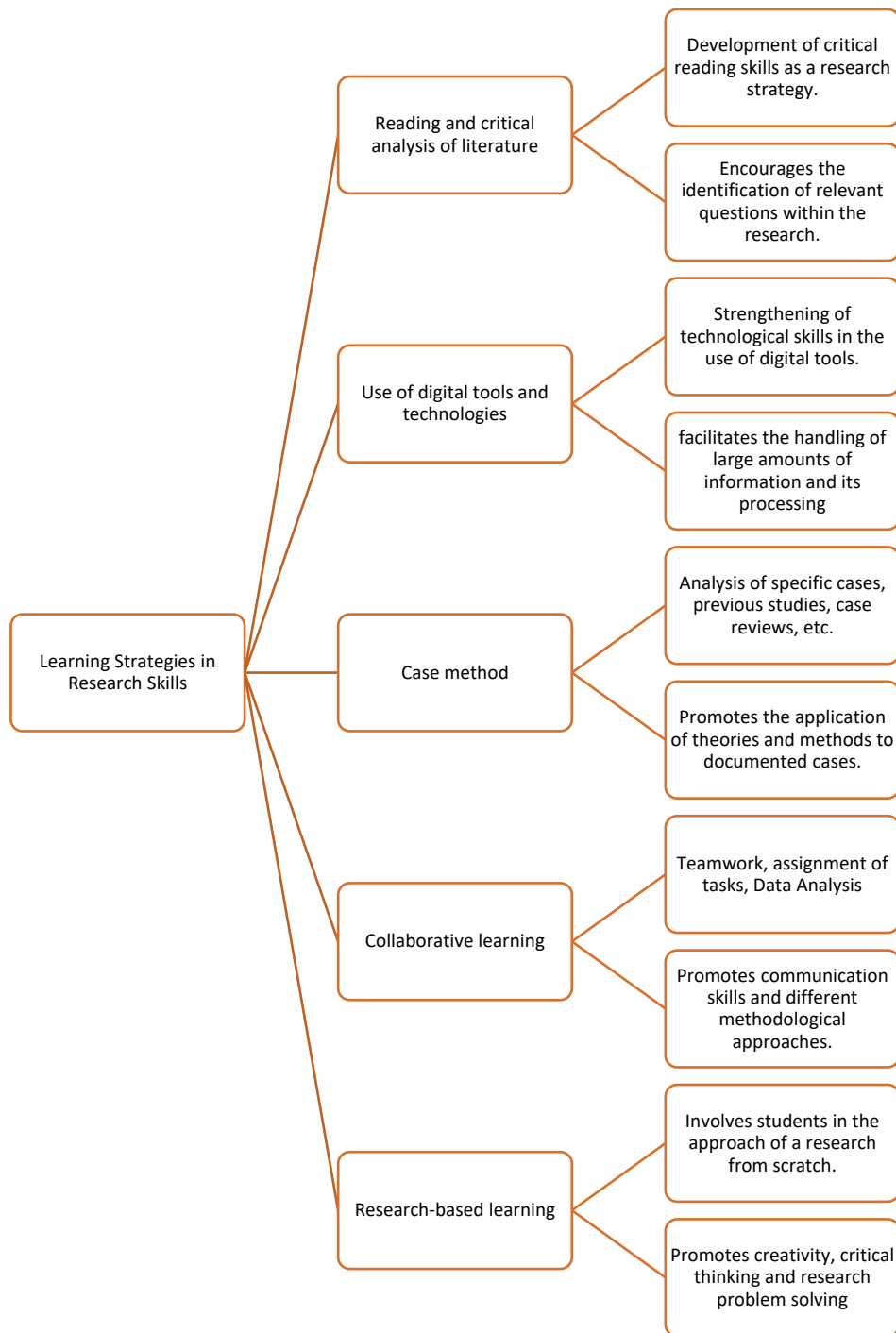
Figure 3. Research skills

Source: (Quispe, Cárdenas, & Huillcahuri, 2021)

Furthermore, this approach enables university students to comprehend the significance of research skills, as they are manifested in enduring transformations occurring in the labor market and, notably, in universities. Research consistently influences these domains, leading to continuous enhancement in educational management processes within higher education institutions. The objective of this article is to present a description of the main characteristics of the compendium of publications indexed in the Scopus database related to the variables of learning strategies and research skills. Additionally, it includes a description of the position of some authors affiliated to institutions during the period 2018-2023.

2. METHODOLOGY

The objective of this bibliometric review is to analyze the scientific production related to the variables of learning strategies and research skills. The review was conducted using the Scopus database during the period 2018-2023. The following section outlines the methodology employed in this review.

2.1 Definition of the Objective and Scope:

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

2.2 Literature Search:

A comprehensive search was conducted in the Scopus database using the following keywords: The search terms "Learning Strategies" and "Research Skills" were employed. In order to refine the results, Boolean operators were employed (AND):

TITLE-ABS-
KEY (learning AND strategies, AND investigative AND skills) AND PUBYEAR > 2017 AND PUBYEAR < 202
4

The initial search yielded a total of 38 articles.

2.3 Selection of Studies:

The following inclusion criteria were applied:

- ✓ **Relevance of the topic:**
  The studies selected for analysis are in accordance with the objective set forth in this document, ensuring that the results obtained are concise, clear, objective, and coherent with the purpose proposed.
- ✓ **Publication date:**
  Studies published within the period between the years 2018-2023 are included.
- ✓ **Type of study:**
  The documents reported in Scopus are analyzed, without distinction of their type: Journal Articles, Conference Articles, Books, Book Chapters, 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, and thus ensuring the universality of the documents consulted.
- ✓ **Post Source:**
  Studies published in peer-reviewed scientific journals are preferred, guaranteeing a minimum standard of quality and academic rigor.

2.4 Data Analysis:

Various bibliometric analyses were carried out, including the following elements.

Analysis of co-occurrence networks: to visualize the relationships between studies cited together. The data was 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: In order to know the distribution of scientific production according to its country of origin.

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

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

2.4 Data Visualization:

Figures 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.

2.5 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 field of research.

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

3. RESULTS

3.1 Word co-occurrence

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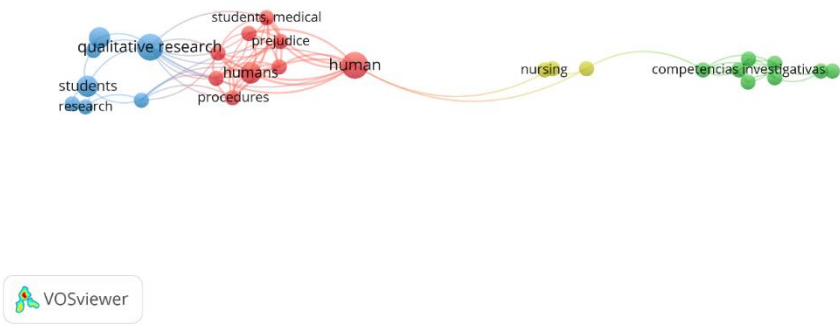

Figure 4. *Word co-occurrence*

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

This term co-occurrence map offers a lucid representation of the interrelationships between disparate topics and terms in the scientific literature on research skills in college students. The clusters of terms in red, green, and blue represent different thematic areas. The central nodes, such as "Student" and "Research Competencies," stand out as key topics of discussion. The keyword "students" was the most influential within the execution of research projects published in journals indexed in Scopus. Its frequency indicates a high degree of usability within the research identified for analysis within this document and presents a significant proximity to keywords such as procedures, skills, decision-making, and learning strategies. It is crucial to underscore that these keywords represent a significant proportion of the works analyzed, which allows for the inference of the challenges and competencies that enable students to develop research skills within the university setting.

3.2 Post Count

Figure 5 shows how scientific production is distributed according to the year of publication.
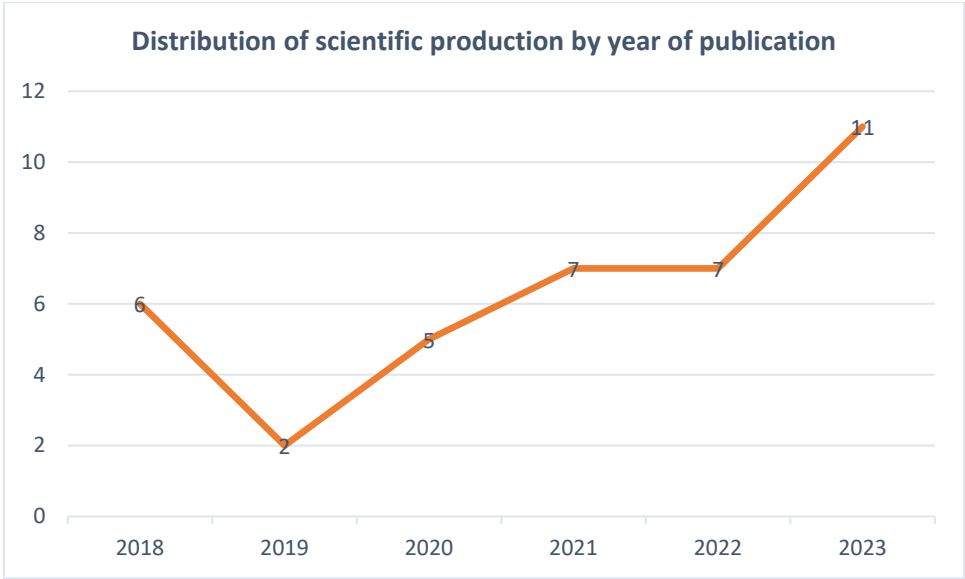
Figure 5. *Annual distribution of scientific production*

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

As illustrated in Figure 5, the production of scientific literature on the subjects of artificial intelligence and ethics has exhibited a notable increase in terms of both the number of annual publications and the total volume of literature produced. In 2018, the global total was 6 publications, while in 2023, there were 11. Among the most noteworthy articles published in the last year is one entitled "Motivating young people to learn STEM through a gender-inclusive digital forensics program." This article describes the design, implementation, and research of the Cyber Sleuth Science Lab (CSSL), an innovative educational program and a supportive virtual learning environment. The CSSL combines pedagogical theory, gender-inclusive instructional strategies, scientific principles/practices, gamification methods, computational thinking, and real-world problem-solving. The program provides underrepresented youth, particularly girls, with digital forensics knowledge, skills, and career pathways, encouraging them to engage with intricate technology-related societal issues and become cyberdetectives. This is achieved through the utilization of authentic digital forensics methodologies and tools to address investigative scenarios (Casey, 2023).

3.3 Publications by country of origin.

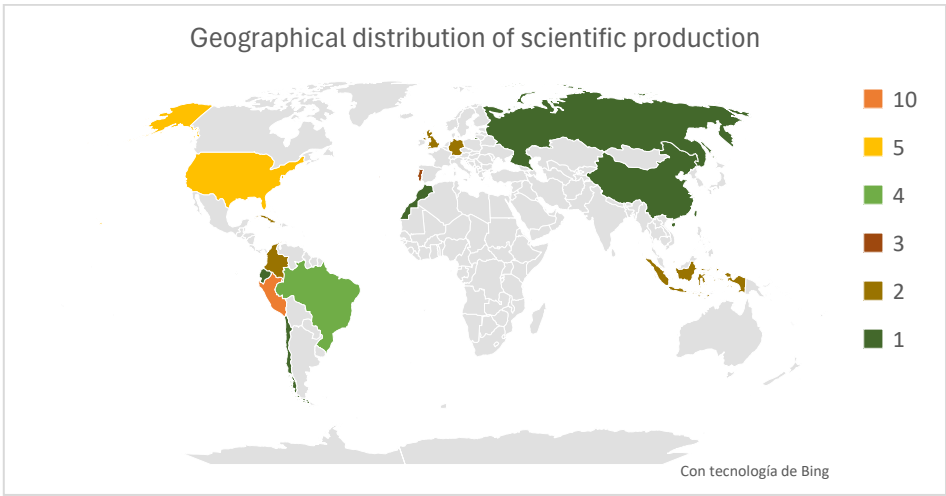*Figure 6* shows how scientific production is distributed geographically.

Figure 6. *Geographical distribution of scientific production.*

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

Figure 6 depicts the distribution of scientific production by country of origin. The map employs a color scale to indicate the level of scientific production in each country. The colors orange and yellow represent higher production, while colors such as green represent lower production. During the period spanning 2018 to 2023, Peru led the field with a total of 10 records in Scopus addressing the debate between learning strategies and research skills in higher education institutions. Brazil was the Latin American country with the highest participation, with a total of four publications, including the article "Interdisciplinary Formative Research in the Undergraduate-Graduate Field." The objective of this study was to ascertain the prevailing definitions, perceptions, and proposals regarding interdisciplinary formative research in the university environment at the undergraduate level. Among the most commonly employed methodologies are bibliographic exploration, selection criteria, data retrieval, and the evaluation of the quality of the selected articles. In this context, a total of 25 definitions of formative research were identified in the Scopus database, while 16 definitions were found in the Scielo database. Of the 41 studies analyzed, 36 facilitated the extraction of perceptions, which were primarily categorized into four main ideas: curricular policy, formative and research vision, research culture, and research trainer. Similarly, in ten of the articles reviewed, proposals were highlighted, particularly four experimental investigations aimed at improving scientific skills. In conclusion, formative research, from and for university classrooms, considered in the training of professionals for different disciplines, becomes a fundamental strategy, as a learning method, useful in didactics, systematic preparation, and guides the rethinking of university curricula. It is a strategy that is both transversal and interdisciplinary, and it is designed to promote research skills and the training of researchers according to the profile of the graduate. Finally, it is a strategy that is designed to respond to the emerging problems and needs of the surrounding community (Doig, 2023).

3.4 Distribution of scientific production by area of knowledge

Figure 7 shows the distribution of scientific production, according to the prevalence of theories in different areas of knowledge.
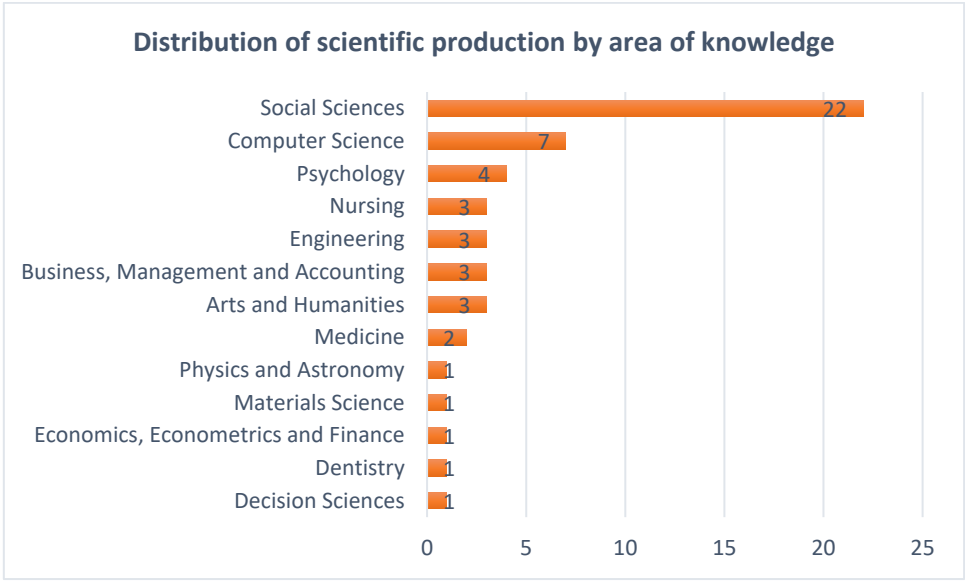

**Figure 7.** *Distribution of scientific production by area of knowledge.*

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

The field of Social Sciences boasts the highest number of publications registered in Scopus, with a total of 22 documents that have based their methodology on Learning Strategies and Research Skills. Second place was taken by Computer Science with seven articles, while Psychology came in third with four. These figures can be attributed to the contributions and studies of various disciplines. The article with the greatest impact was registered by Ciencias Sociales entitled "Modelling in the scientific approach to the teaching of life and earth sciences: visions and practices of Moroccan teachers." The study aimed to highlight the role of modelling in the teaching of biological sciences and to explore the understanding, teachers' approaches and perceptions of modelling models and practices. A questionnaire-based methodology was employed to collect data on teachers' awareness of the importance of models in the life sciences and the instructional approaches taken in these models. The findings indicate a clear

understanding of the importance of models in the teaching of life sciences among Moroccan teachers. Moreover, they employ approaches analogous to those employed in modeling models and practices. The research findings indicate that instructors are aware of the potential of models to enhance the effectiveness and appeal of science instruction. The study establishes the critical role of modeling in life science teaching, emphasizing the need to incorporate modeling activities into the curriculum to foster scientific inquiry and students' problem-solving skills. The practical implications of the study indicate the value of training programs and professional development initiatives for teachers to promote the use of models in the teaching of the biological sciences (Ifqiren, 2023).

4.5 Type of publication

In Figure 8, the distribution of the bibliographic search is carried out according to the type of publication made by each of the authors found in Scopus.
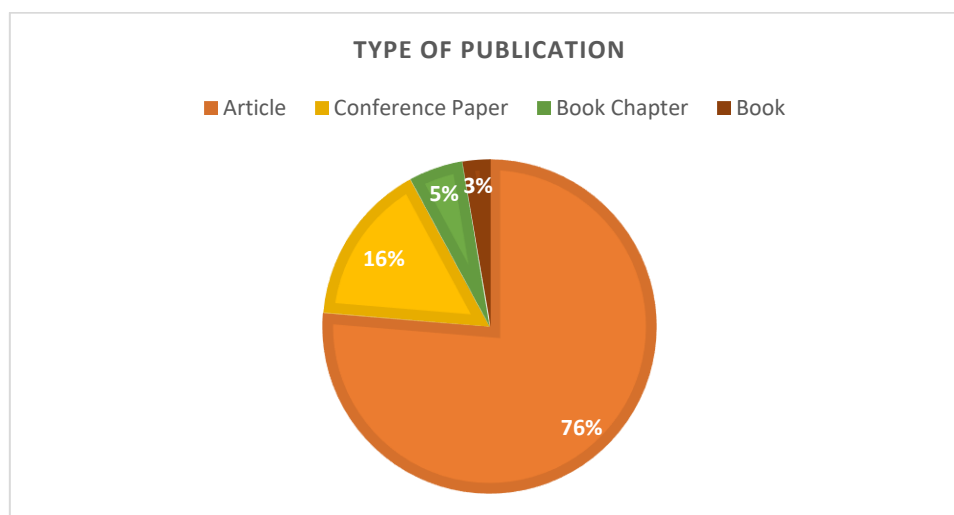
Figure 8. *Type of publication.*

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

Figure 8 illustrates the diversity of scientific publications, with a clear predominance of articles and conference papers. Additionally, reviews and book chapters are also represented in significant numbers. The remaining categories of publications, though less prevalent, provide a comprehensive overview of the distribution of academic and scientific work. The majority of publications (76%) were journal articles, which were the most common and dominant type of publication in this distribution. Secondly, conference papers account for 16% of the total number of publications. Book chapters represent the third most common type of publication, accounting for 5% of the total. This suggests that a significant number of publications are dedicated to reviewing and summarizing existing literature in a particular field. In this final category, the one entitled "Research Skills in Secondary School Students: A noteworthy contribution is the article entitled "A Systematic Review." The objective of this study was to conduct a systematic review of the strategies employed for the development of research competencies in secondary education. The information management section was expanded without including the years of publication for the various scientific articles. In order to diagnose the information, databases such as Scielo, DOAJ, Scopus, Dialnet, and the Scholar Google metasearch engine were employed. In order to be included in the review, documents had to relate to the development of competencies in secondary education. The results of the study indicate that the most frequently employed strategies for developing research competencies in secondary education are project-based learning, problem-based learning, the use of education-oriented web technologies, and the incorporation of these strategies into curricular plans (Varías-Palacios, 2023).

5. CONCLUSIONS

The bibliometric analysis presented in this document allows to conclude that, in terms of the geographical distribution of scientific production around the Learning Strategies and Research Skills variables, Peru was the country with the highest number of publications registered in Scopus during the period between 2018 and 2023, with a total of 10 documents. The United States followed with a total of 5 publications. With regard to the academic disciplines exerting the greatest influence on the writing and publication of research papers related to the topic under

consideration in this article, it can be observed that Social Sciences, Computer Science and Psychology stand out. The results of the bibliometric analysis based on academic training in higher education institutions (HEIs) indicate that pedagogical strategies based on cooperative learning are effective tools for the acquisition and development of different types of competencies focused on research, such as scientific information, writing of scientific articles, and so forth. Data analysis and processing, resource management and scientific methodology, when combined with social skills, facilitate the achievement of a significant percentage in the acquisition and application of these types of competencies within the university context.

Conversely, it is crucial to encourage the application of academic knowledge. This not only enhances university operations but also fosters teamwork, improves interpersonal relationships, and provides mutual support among students. Additionally, it motivates learning processes and yields significant outcomes within the academic realm.

It is recommended that pedagogical methodologies be applied in higher education institutions with the objective of facilitating the acquisition and effective application of scientific research skills, which are essential for accessing opportunities in the labor market. These skills are useful for carrying out tasks that require them, and they align with the current demands of a globalized society.

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