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RESEARCH ON THE CONCEPTS OF EMPLOYABILITY AND COMPETENCIES AS A DRIVER OF EDUCATIONAL CHANGE THROUGH A BIBLIOMETRIC STUDY

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KEY WORDS

Competences
Employability
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ABSTRACT

Two decades ago, the member states of the European Union initiated a reform of university education with the aim of promoting employability, emphasising the importance of soft skills beyond the specific techniques of each degree. However, a significant discrepancy persists between the demand for these skills by the labour market and the supply by universities. This study employs a bibliometric analysis of scientific publications in the Web of Science and Scopus databases during the period 1996-2022 to analyse the impact of employability and soft skills on the scientific community. The study's primary findings indicate an increase in scientific production from 2010 onwards, accompanied by a notable absence of scientific collaboration, with 90% of papers being signed by a single author. The United Kingdom and Australia are observed to be performing significantly better than Spain in these aspects, with an 80% increase in scientific output.

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1. Introduction

In September 2022, the European Commission proposed 2023 as the European Year of Skills, justifying this decision on the grounds that more than three quarters of companies in the European Union (EU) report difficulties in finding workers with the necessary skills. Moreover, the latest Eurostat figures indicate that only 37% of adults receive regular training (European Commission - Speech, 2022).

Among the numerous EU initiatives designed to support and increase the take-up of skills, the European strategy for universities stands out. This is of crucial importance given that Europe has approximately 5,000 higher education institutions, 17.5 million students, 1.35 million teachers and 1.17 million researchers.

In the contemporary era, it is essential for individuals to acquire a range of skills, from fundamental competencies such as literacy, numeracy and digital proficiency, to vocational or technical skills. Entrepreneurial and transversal skills, such as foreign language proficiency, personal development and lifelong learning, are also important.

In recent times, there has been an increased focus on the competencies that graduates bring to the labour market. Consequently, university institutions are required to equip their students with the skills demanded by this environment, aligning their educational offerings with the requirements of recruiters.

The objective is to establish a university that is at the service of society, generating equal opportunities, integrating it into the economic and productive fabric, and fostering excellence through competition, thus achieving greater efficiency and equity (Círculo de Empresarios, 2007).

In summary, the purpose of higher education is to equip students with the necessary knowledge and skills to successfully enter the labour market, ensuring a congruence between their training and the demands of their future profession. The present debate focuses on identifying this knowledge, which is defined in various ways: qualifications, skills, aptitudes, abilities and, more recently, competences (Alonso et al., 2009).

Human resources experts posit that by 2025, the qualities that workers will need to possess will be focused on transversal skills common to all profiles, regardless of their rank or specific training. These skills will range from change management to self-image management and intrapreneurship. Different requirements will imply different selection criteria, with personal skills (92.5%), cultural fit (87.5%) and attitudes (82.5%) being more relevant. Additionally, technical skills (60.4%) and extracurricular and volunteering activities (60%) will also be significant (Adecco, 2016).

In order to achieve this objective, it is imperative to cultivate a close relationship with companies, with a view to identifying the skills required that extend beyond the purely technical domain. Successful initiatives have encompassed a range of labour market actors within the education and training sectors, thereby enhancing the employability of young individuals. This assertion is supported by the findings of the OECD report on "Skills Outlook 2021", which analyses how policies can promote lifelong learning of skills and the necessity for collaboration between diverse actors. The report's primary recommendations are as follows: 1) to place learners at the centre of learning to enhance the quality of education and training; 2) foster a habit of lifelong learning to acquire the skills needed in a changing environment; and 3) to closely coordinate learning providers to develop inclusive and high quality education.

Evidence from job advertisements in OECD countries shows that communication, teamwork and organisational skills are most in demand by employers across a wide range of occupations. Cognitive skills such as analytical, problem-solving, digital, leadership and presentation skills are also highly valued in all work contexts (OECD Skills Outlook 2021: Learning for Life).

In the early 2020s, even before the outbreak of COVID-19, the Fourth Industrial Revolution was already transforming jobs and skills demand at an accelerating pace. The World Economic Forum (WEF) estimated that one billion workers would need to be re-skilled by 2030 and that 42% of basic skills would change by 2022. While some of these skills are technical and digital, the pandemic has highlighted the importance of developing cognitive, creative, social and emotional skills.

With this in mind, UNESCO encourages Global Skills Academy partners to come together to create a more sustainable version of the Academy, adapted to current and future skills needs at the national level (UNESCO, 2021).

Inevitably, the skills people need today are different from those they will need in the future. Lifelong learning systems are crucial in bridging the gap between current and future skills needs, helping people to anticipate change, develop new skills and improve others. Moreover, many learning decisions are relevant and long-term for the future labour market.

Skills anticipation provides the means to identify future imbalances, bring together key actors to address them, and inform society about future skills demand and supply. Therefore, the International Labour Organization (ILO) proposes to promote education policies with skills anticipation systems, which include activities to develop and coordinate the measurement and analysis of skills needs, and to validate this analysis with the help of actors representing both demand (employers) and supply (educational organisations) and the institutions that regulate the market (Ministries of Labour and Education, local administrations) (ILO, 2017).

Against this background, the European Union (2018) emphasises that labour and employability skills are key factors in adapting to the rapid and profound changes that the working population will face. However, since the creation of the European Higher Education Area (EHEA), several aspects have emerged that need to be assessed in relation to improving employability and skills training. On the one hand, it is important to identify the key competences for better employability of graduates, but it is also important to know how and when to promote the acquisition of these key competences (García-Aracil et al., 2004), as transversal competences do not always play a prominent role in learning programmes. Countries and education systems approach transversal skills in different ways, driven by different histories, structures, needs and ambitions (Shackleton & Messenger, 2021).

2. Theoretical Framework

Given the university's interest in the labour market, a debate should be opened as to whether the university has made progress towards the goal of developing the employability of its graduates, already set out in the 1999 Bologna Declaration.

In this context, one of the main issues is what we mean by employability and the definition of the term skills or competences.

The literature has approached the concept of employability from different angles. The term employability has been used "in a variety of contexts with a wide range of meanings" (Gamboa et al., 2007, p. 6).

However, for most authors (Alles, 2007; García-Manjón, 2009; Moreno, 2012; Weinberg, 2004), employability is closely related to the worker's possession of skills, abilities or competences that allow him/her to access the labour market more easily, since these are two closely related concepts, which is the purpose of this bibliometric study.

Regarding the concept of competence, it should be pointed out that it has been classified according to different criteria for graduates, and there is no general agreement on its categorisation, either in the theoretical or empirical field. Therefore, a brief review of the scientific literature will be carried out, which will bring us closer to the most current definition and to the gap that has always existed between the labour market and the university in terms of knowledge of competences, which we believe, after carrying out the study presented, is already beginning to show a clear reductionist tendency.

In 1999, researchers in several European countries conducted the first representative international survey of graduates' key skills. More than 36,000 graduates from 12 countries who had completed their studies three to four years earlier were surveyed. The study, called CHEERS (Careers after Higher Education - European Research Survey), covered Japan and the following European countries Austria, the Czech Republic, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom. The questionnaire covered a total of 35 competences and was designed to assess, on a scale of 1 to 5, the level that graduates felt they had achieved and the level of demand in their job at the time of the job and career interview. Questions were also asked about the socio-biographical background of the students, the resources and conditions of study, and the qualifications obtained on graduation, in order to determine the extent to which these factors could explain the differences in the employment and career paths of the graduates. As a result, only three competences were found to be above the level required in the workplace: learning to learn skills, specific theoretical knowledge and

general knowledge, all considered to be academic or scientific, specific to each degree, and the least acquired was negotiation skills, currently considered to be transversal (Schomburg and Teichler, 2006).

In Spain, the Fundación Universidad Empresa initiated a study in 2005 that examined social demands and their impact on degree planning within the context of the European convergence process in higher education. The primary objective of this study was to analyse the discrepancy between the expectations of recent university graduates and the demands of employers with respect to the knowledge and skills required of graduates (Fundación Universidad-Empresa, 2005).

In a manner analogous to the CHEERS study, the REFLEX (Research on the Flexible Professional in the Knowledge Society) survey, conducted in 2006, revealed discrepancies between the competencies deemed to be of paramount importance and the actual requirements of a given occupation. This survey utilised an extensive questionnaire to collate the opinions and experiences of university graduates with regard to the level of competences required. This research project, which involved collaboration between Japan and thirteen European countries (Italy, Spain, France, Austria, Germany, the Netherlands, the United Kingdom, Finland, Norway, the Czech Republic, Switzerland, Belgium and Estonia), involved the survey of approximately 40,000 graduates throughout Europe and around 5,500 in Spain (CEGES-PF, 2007). The results obtained demonstrate that there are few significant differences between Spanish graduates and their European counterparts in terms of their own skill levels and those required for employment. The competence profile of Spanish graduates does not deviate substantially from the average of European graduates, although Spanish graduates only surpass European graduates, and with minimal differences, in the competences of teamwork, effective time management, assertive authority, writing reports and documents, and effective communication (ANECA, 2008).

Furthermore, it is evident from the graduates' own perspectives that the roles demand a distinct set of competencies that do not align with those traditionally encompassed or imparted within conventional higher education systems, particularly in professional models such as the Spanish one.

The competences highlighted in the study encompass activities and attitudes such as autonomy, proficient problem-solving and oral communication skills, proactive responsibility, effective time management and planning, initiative, adaptability and loyalty. The analysis further reveals that university graduates demonstrate deficiencies in competences related to skills and attitudes, while concurrently asserting an abundance in general knowledge and theoretical knowledge.

According to Van-Der Hofstadt, Román and Gómez Gras (2006), authors of the report Competencias y habilidades profesionales de los universitarios (Professional Skills and Competences of University Students), it appears that the univocal relationship that companies had traditionally maintained between a good academic record (or good training) and optimal job performance has been greatly weakened.

The report also demonstrates an increasing demand from companies for candidates to possess a range of competencies that have not traditionally been part of the academic curriculum. These include soft skills, teamwork and emotional intelligence. Consequently, young university students must possess not only sufficient theoretical knowledge, but also a series of new skills such as leadership, teamwork and stress management, which are detailed in depth in the report.

In 2007, ANECA conducted a study with the objective of investigating the experiences, perceptions and attitudes of higher education graduates concerning the challenges encountered and the factors facilitating labour market integration. A novel finding from this study is the lack of awareness and appreciation among higher education graduates of the new professional competencies required in a flexible labour market. The study identified a series of competencies that the labour market is beginning to demand from higher education graduates, including functional flexibility, international orientation, innovation management and continuous learning. It was found that knowledge and appreciation of these competencies is not very high, although it is believed that they are gradually being introduced in the representations that university students have of the world of work (ANECA, 2007).

The ANECA 2021 Report on the Framework for the Self-Assessment of Universities in the Improvement of their Actions in the Field of Employment and Employability of their Graduates highlights the following fundamental actions (more than 70%):

- Teacher training in transversal competences and key personal skills for employment.
- Designing activity-based teaching-learning processes in the work environment.
- Promote talent development programmes, ideas and/or competitions, entrepreneurial projects, challenge solving, etc.

- Implement procedures to achieve cooperation between universities and employing entities in the teaching-learning process.

- To train in teaching in knowledge and skills specific to the area of knowledge of teaching and to study practical cases in each field (ANECA, 2021).

The European Union has also provided classifications of these competences over the years, thanks to different projects, e.g. the Assessment of Transversal Competences 2020 (Assessment of Transversal Competences 2020 - ATS2020, 2021) project, which is co-funded by the Eramus+ Programme. This project, involving 17 partners from 11 EU countries, offers a comprehensive learning model for enhancing students' essential transversal competences within curricula, as well as new approaches and innovative tools for teachers to develop and assess these competences. In this project, transversal competences refer to a broad set of key skills deemed to be crucial for success in school, higher education and the world of work. These competencies include the ability to think critically, take initiative, use digital tools, solve problems and work collaboratively (Evaluation of Transversal Competencies 2020 - ATS2020, 2021).

In recent years, an international skills assessment has been conducted in more than 40 countries as part of the Programme for the International Assessment of Adult Competencies (PIAAC). The Programme is an OECD initiative to assist governments in assessing, monitoring and analysing the level of skills distribution among the adult population, as well as the application of these skills in different contexts. Its assessment measures the necessary cognitive and occupational skills that enable individuals to participate successfully in society and the economy to thrive. The results of the study facilitate the understanding of the potential contributions of education and education systems to the development of these skills. The pilot phase of the PIAAC Cycle 2 study was conducted between May and July 2021, with the main study scheduled to take place between autumn 2022 and spring 2023 from which the desired results can be drawn (Organisation for Economic Co-operation and Development-OECD, 2021).

In conclusion, as Llinares Insa (2020) states, there is no consensus on the fundamental employability competencies. A synthesis of the models examined in the extant scientific literature reveals a select group of competencies that emerge in at least 50% of cases and are characterised by the following attributes: lifelong learning, communication, teamwork, flexibility/adapting to change, work organisation and time management, problem solving, decision making, ability to relate to other people, initiative, and information and knowledge management.

Irrespective of their conceptualisation as competencies, "soft skills" —understood as transversal employability competences— are considered essential for securing employment and progressing in the labour market (Cimatti, 2016).

The issue under consideration is the modification of teaching methods for the purpose of transmitting the aforementioned competences. Teaching methods can be classified into two distinct categories: reactive and proactive. In the former, the teacher initiates action and the student reacts; in the latter, the student takes the initiative, while the teacher assumes a more guidance role. Reactive methods, encompassing theoretical and practical classes, and even laboratories with guided practice, are designed to impart knowledge and skills, yet neglect to cultivate methodological, social, and participatory competences. Conversely, proactive learning, which is characterised by methods such as seminars, interactive learning, discussion techniques, presentations and decision-making, and internships in companies (Gines Mora, 2004), demands different educational mechanisms. The key question, therefore, is how best to support the enhancement of these competences, especially given that most transversal competences are not linked to any particular subject and are developed in all subject areas. Consequently, innovative orientations tend to avoid subject-oriented approaches and increasingly focus on specific learning outcomes.

The acquisition of transversal competences is contingent on interactive and active learning. Educational programmes at all levels should, wherever possible, reflect real-life applications. For example, collaborative learning (project- and problem-based approaches to learning) allows students to work together in small groups to achieve a common goal and can facilitate the simultaneous development of several transversal competences.

Conversely, interactive learning environments have been shown to encourage learners to adopt an active and autonomous stance, while also fostering collaboration with other learners and facilitating the

development of social and communicative competences (Terzieva & Traina, 2015). Context-based and project-based learning have been demonstrated to motivate learners to a greater extent than traditional approaches (Garris et al., 2002), thereby enabling them to develop a range of transversal competencies that are in high demand by companies.

In any event, enhanced coordination is imperative between the labour market and education policies. It is asserted that the training of future professionals in systemic transversal competences represents a challenge that must be addressed from the outset in universities, with a view to averting the persistent gaps that persist between the skills acquired by graduates and those demanded by employers, as articulated by authors such as Abelha et al (2020) & Osmani et al (2019).

The provision of career guidance and information on graduates' labour market outcomes is of paramount importance in ensuring the alignment of students' preferences and labour market needs. Institutions are required to demonstrate responsiveness to employers' demands and students' expectations, whilst developing an educational offer oriented towards the labour market. This enables stakeholders to intervene in this environment, enabling employers to specify the skills required for employment, universities to develop adequate programmes for acquiring these skills, and students to identify the skills they need to enhance their employability (Santiago et al, 2008).

In order to ensure active employability, it is vital that education, training and employment are pursued concurrently (Bermúdez, 2020, p.81). In this sense, recent studies indicate that for policymakers and institutions of higher education, the integration of key employability skills should be a priority (Cheng et al., 2021). In conclusion, while institutions and researchers emphasise the significance of acquiring transversal competencies for employability, there has been insufficient progress since the EHEA proposal in this regard. Consequently, the primary objective of this article is to analyse the extent to which the patterns of collaboration between researchers in these areas have been and are sufficient. This will be achieved by conducting a bibliometric study of scientific publications in the area, collected in the Web of Science (WoS) and Scopus databases during the period 1996-2022. The study will contrast whether the Bologna Declaration of 1999 was a driving force for competences as a motor for employability.

The primary objective of this study is to document and analyse the trends in employability and skills over the past 24 years, utilising a bibliometric approach. This method will facilitate the answering of the following research questions:

1. What is the total volume, growth trajectory and geographical distribution of employability and skills research?

2. Who are the key authors in the employability and skills literature and what are the correlations?

What issues in employability and skills research have received the most attention in the literature? How do these issues relate to each other?

In addition to integration into curricula or degrees, the acquisition of these skills requires active recognition by the educational institution. One of the forms of recognition closest to the labour market today, which also allows technology to be integrated into students' curricula, are the so-called digital badges. These were developed by the Mozilla Foundation in partnership with the McArthur Foundation to provide a method for recognising informal and lifelong learning (Glover, 2013).

A digital badge is defined as a graphical representation of competence, skill or ability, integrated with the criteria and evidence that a learner has accumulated to obtain it (Buckingham, 2014).

These digital credentials represent a novel approach to the validation of knowledge, skills, and abilities within specific domains (Randall et al., 2013). They hold the potential to enhance learner engagement with particular content or to guide them through a series of activities or tasks, thereby facilitating the achievement of specific objectives (Araujo, Santos, Pedro, & Batista, 2017).

The utilisation of badges, both in current practice and in the development stage, has been adopted by prestigious institutions such as MIT, in addition to organisations outside the higher education sector, including NASA and the film studios of Disney-Pixar (Tally, 2012).

Currently, companies seeking to recruit new employees are increasingly examining the profiles of prospective candidates on social media platforms such as LinkedIn, in order to assess their skillset. The use of digital badges to certify and recognise skills has been demonstrated to facilitate the selection process for recruiters, thereby enhancing an individual's employability.

The model proposed herein has the potential to serve as a model for other universities to identify, recognise or certify competences such as self-knowledge, personal growth, leadership, communication,

teamwork, innovation, initiative, empathy and entrepreneurship. In the case of the present institution, a digital badge is generated for each competency achieved in each of the courses that constitute the degree.

3. Methodology

The present study has drawn upon a range of sources to inform its analysis. Specifically, it has utilised studies on employability and skills carried out in the member countries of the European Union, the United Kingdom and Switzerland. These studies were published during the period 1996-2022, and they have been indexed by the main multidisciplinary databases. The consultation was conducted through the Web of Science (WoS) platform and Scopus, as these are the two databases on which there is the greatest international consensus about their decisive academic importance (Leydesdorff et al., 2016).

It is imperative to acknowledge the pivotal role of research in scientific publication, a facet frequently assessed through publications and other scientific outputs. Among the most prevalent methodologies employed for evaluating different aspects of this activity, the fundamental role of bibliometric analysis merits particular attention. This analysis enables retrospective examination of how scientific advances have been achieved and disseminated, as well as the evaluation of research potential. the institutions involved, but also to characterise the development of scientific disciplines and their lines of research, as well as scientific publications in an area of knowledge, their obsolescence and dispersion (Sanz-Valero et al, 2014).

To date, no studies have appeared that carry out a rigorous analysis, both bibliometric and conceptual, of the terms employability and competences in two of the databases with the greatest global impact, according to criteria and variables that make it possible to analyse the state of the art and thus be able to detect threats, weaknesses and plan new avenues and challenges for action if necessary.

The aim of this research is therefore twofold:

1. To carry out a bibliometric quantification, in the WoS and Scopus databases, of the scientific output on employability and skills, in the form of journal articles, from 1996 to the present day, since it is possible to compare whether this output has increased significantly with the Bologna Declaration of 1999, and to verify whether the growth up to the present day has been progressive, since the study of publications in databases allows us to see and measure both the impact of a term within a subject and the research trends associated with it.

The analysis was carried out on the following variables: production, sources, authors, documents and conceptual structure.

2. To analyse the keywords used in the articles, in order to establish possible conceptual and thematic relationships that researchers were making at the time.

The bibliometric analysis employed the Bibliometrix tool, an open-source tool that facilitates scientific mapping and is programmed in the "R" application (Aria and Cuccurullo, 2017). The search equation "Employability" AND "Skills" was used in both WoS and Scopus. The initial information from both databases yielded a total of 829 publications from WoS and 883 from Scopus, narrowed down to journals from EU member states, Switzerland and Great Britain. Subsequently, the databases configured by concepts, dates and countries were transferred to the R application, which, through Bibliometrix, employed automated analysis mechanisms to convert the information into graphs and tables of various types. The data extraction process was conducted through direct database consultation, with the following variables being considered:

1. Overview of scientific production:
    1. Total number of items.
    2. Number of citations received by each article and average number of citations per year.
    3. Flows between authors, countries around the world and keywords.
2. Sources of publications:
    1. Growth of impact factor H publications.
    2. Dispersion in the scientific literature.
3. Authors:
    1. Lotka's Law or the relationship between authors and articles.
    2. Country of the main author (correspondence).

4. Documents:
    1. Word clouds.
    2. Word map.
    3. Trend themes.
5. Structural concepts:
    1. Cooccurrences and relationships between key concepts that form different clusters.

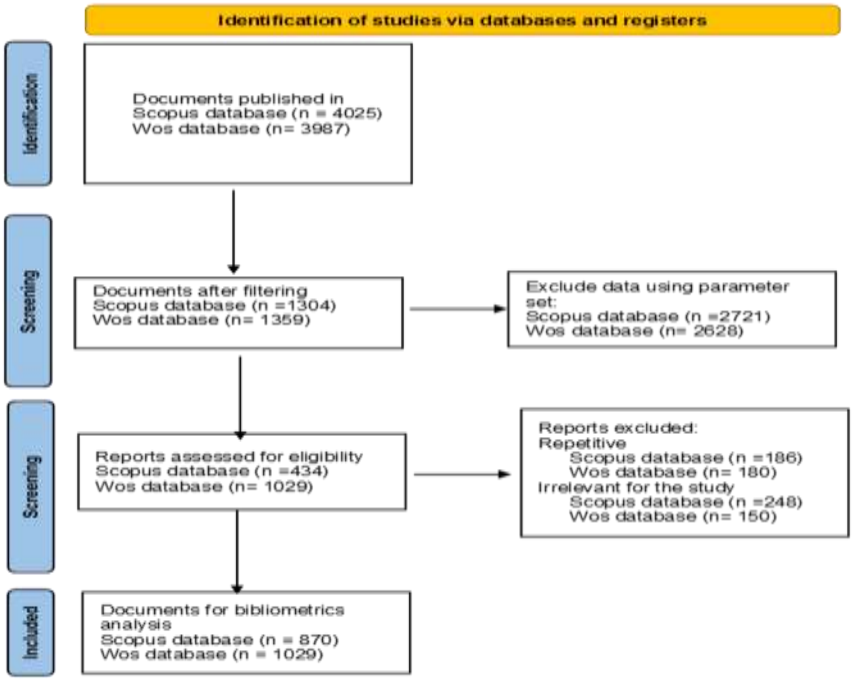
3.1. Search Criteria

The search terms employed for the Scopus and WoS databases were "employability" and "skills", respectively. The results, which included 4,025 documents in the former case and 3,987 in the latter, were then subjected to further scrutiny. The selection of articles for inclusion in the systematic review was guided by the following criteria:1) Subject area: Social Sciences; 2) Type of publication: only articles; 3) Publication stage: final; 4) Language: Spanish and English; 5) Only European Union countries, Great Britain and Switzerland. In the case of the Scopus database, the total number of publications was reduced to 870, after applying the above filters, and to 1,029 by applying similar filters for WoS.

3.2. Detection Prism

The PRISMA flowchart was used to represent the flow of information through the different stages of the systematic review, and to show the number of records identified, included and excluded, as well as the reasons for the exclusions. Figure 1 shows the different steps taken to reduce the sample to the data cited.

Figure 1. Treatment of admissibility of documents under the Prisma Guideline



Source: Own elaboration based on Prisma, 2025.

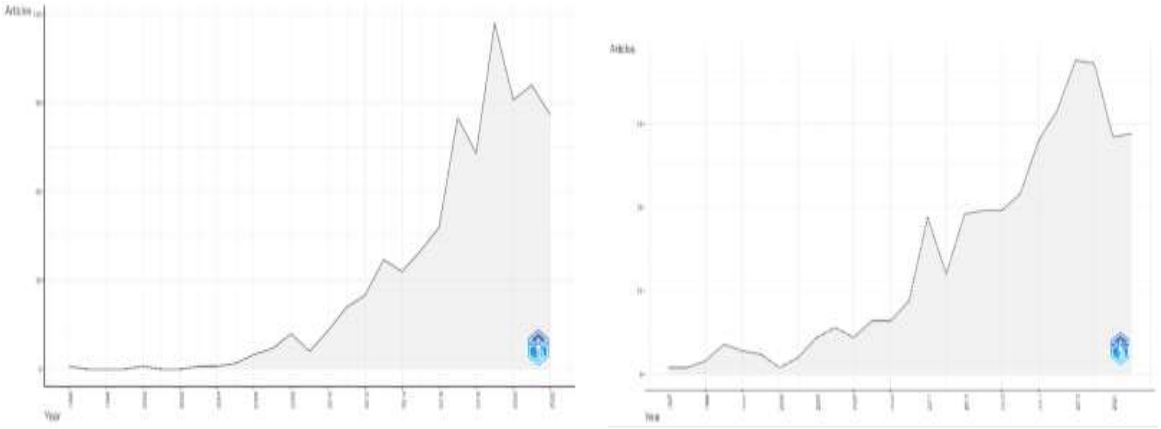
4. Results achieved

The quantitative and qualitative data obtained from the analysis of the two databases are presented separately in order to facilitate a dual evaluation.

The annual scientific production exhibited a consistent pattern across both databases, with a significant increase since 2010. This phenomenon may be attributed to the Bologna Process, which aimed to establish a European Higher Education Area (EHEA) by 2010. The objective of this initiative was to enhance employability, mobility, and the recognition of university degrees across member nations. While the growth rate of WoS is 18.69%, that of Scopus is marginally lower at 15.41%.

The years 2019 and, as demonstrated in Figure 2, are those with the highest scientific production in these domains, due to the growing significance that companies have begun to attribute to soft skills such as communication, creativity and teamwork, possibly in connection with the pandemic.

Figure 2. Annual scientific production WoS and Scopus.



Source: Bibliometrix, 2024.

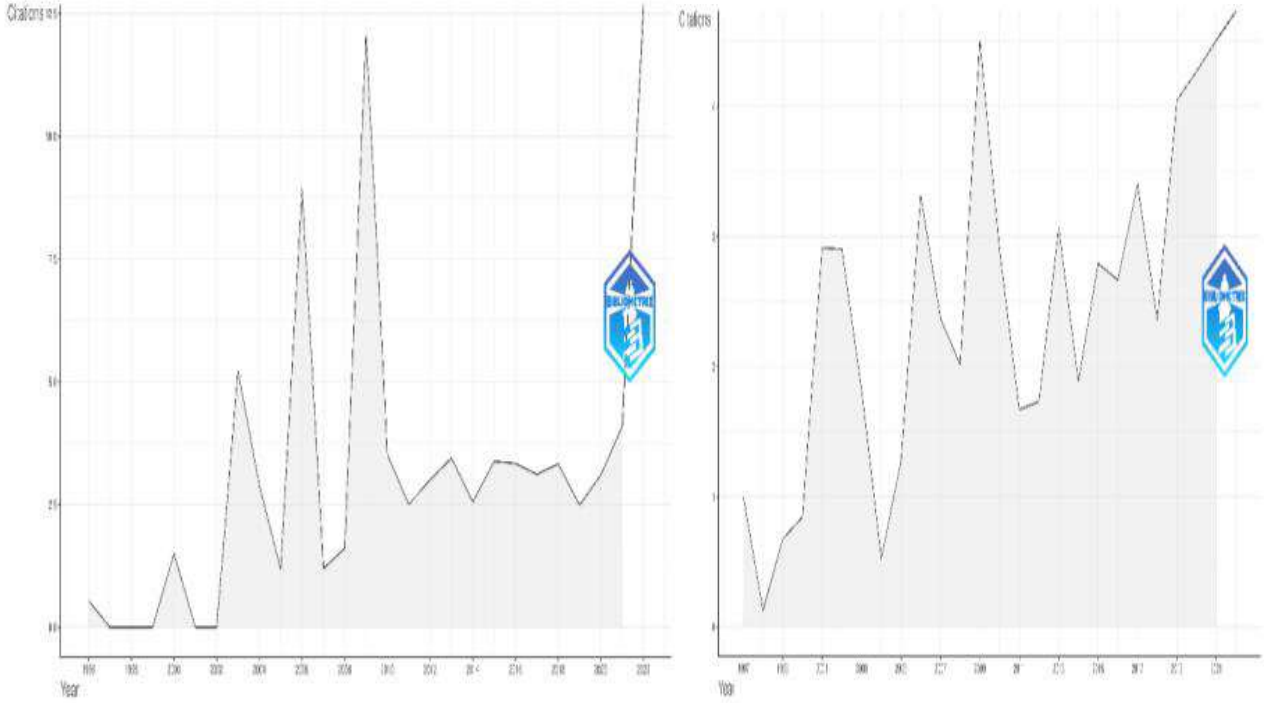
With regard to the mean number of citations per annum (see Figure 3), 2019 has been identified as the year with the highest number of citations in the two databases. This is due to an increase in publications on these concepts, as is also evident in the calculations presented in Table 1.

Table 1. Annual Scopus scientific production. Articles

Year	WoS	Scopus
2010	13	22
2011	21	47
2012	25	30
2013	37	48
2014	33	49
2015	40	49
2016	48	54
2017	85	70
2018	73	79
2019	117	94
2020	91	93
2021	96	71
2022	86	72

Source: Own elaboration, 2025.

Figure 3. Average number of citations/year WoS and Scopus.



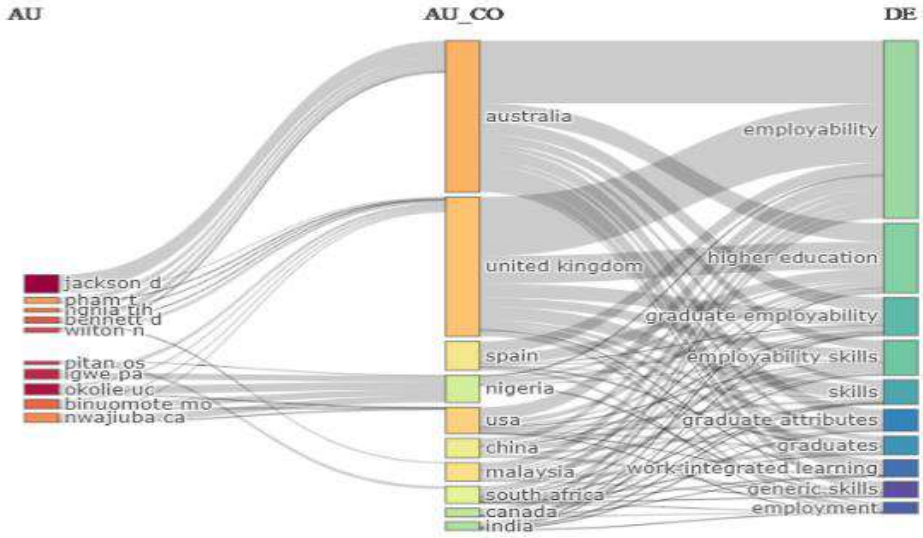
Source: Bibliometrix, 2024.

As illustrated in Figures 4 and 5 below, the Sankey diagram is utilised to analyse the data, thereby demonstrating the data flows between categories and their proportional volume. The volume is defined as the magnitude of the relationship between these categories, and is represented by arrows, the larger the arrow, the greater the magnitude of the relationship.

The Sankey or Three Fields Plot is employed to show the data flows between authors, countries of these authors and main keywords. The analysis reveals that the UK and Australia are the countries where most authors focus their research on the concepts of interest, along with the associated keywords. The graph includes all countries where scientific studies on these terms have been conducted, with the aim of assessing Spain's role in this regard. The analysis indicates that Spain ranks third in terms of the number of authors researching employability and competences. It is noteworthy that countries with limited scientific output, such as Nigeria and Malaysia, also engage in research on these terms.

The most extensively researched keywords are “employability”, “higher education”, “the employability of graduates” and “competences necessary for employability”. One of the authors who has done the most research into these concepts is Jackson, D.

Figure 4. Sankey plot for data extracted from WoS.

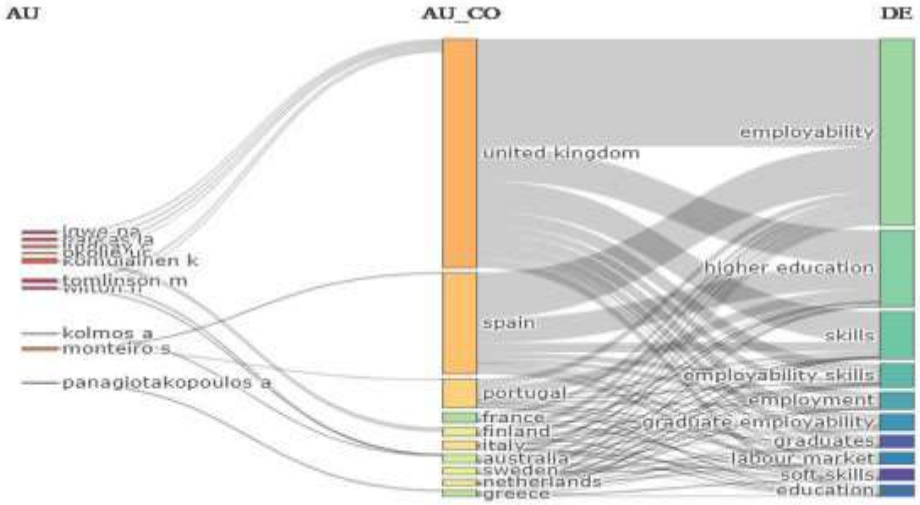


Source: Bibliometrix, 2024.

The results extracted from Scopus are similar, although Spain occupies second place in terms of information flow, only behind the United Kingdom. The most studied concepts are practically the same and the order is also the same (figure 5).

Therefore, we can conclude that in Spain there has always been a concern for scientific research into the concepts studied.

Figure 5. Sankey plot for data extracted from Scopus. Sankey plot for data extracted from Scopus.

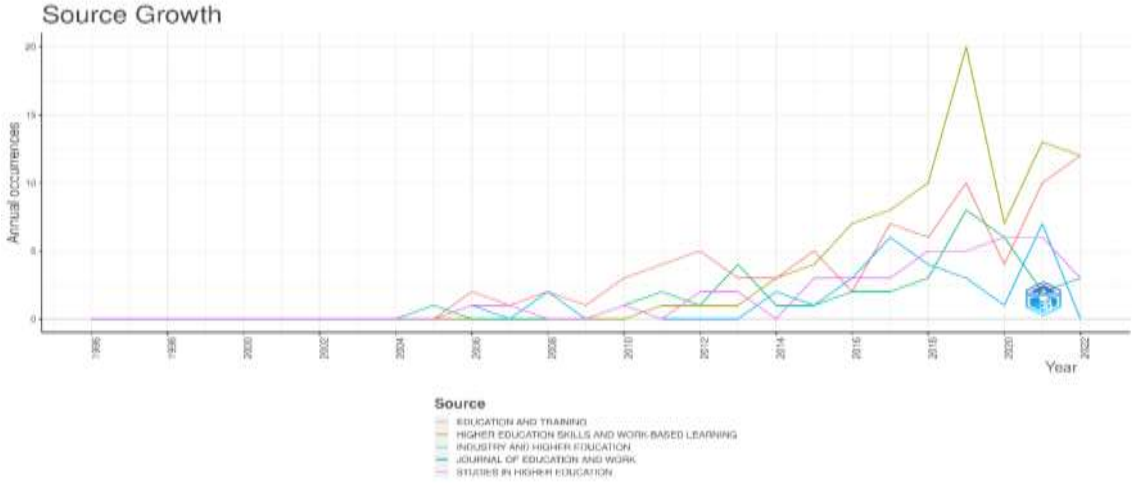


Source: Bibliometrix, 2024.

The following graph (graph 6) illustrates the primary journals in which these authors have published in WoS and Scopus, demonstrating the commencement of scientific publication growth from 2010 onwards in journals with a high impact factor, such as Education and Training (H = 24) and Studies in Higher Education (H = 18).

The H-index is a measure of the impact of a journal, calculated as the number of articles that have been cited H times. Thus, a journal with an H-index of 24 indicates that it has 24 publications that have been cited a minimum of 24 times. This is a remarkably high figure and suggests that the research conducted in these journals provides feed back into research in this field.

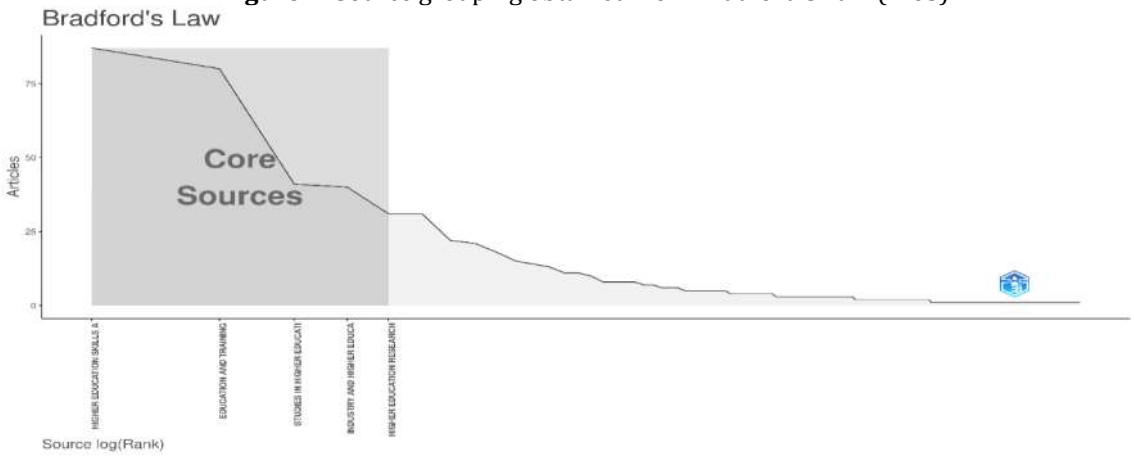
Figure 6. Variation in impact journal publications (WoS).



Source: Bibliometrix, 2024.

As illustrated in Figure 7, Bradford's law, also known as the law of dispersion in the scientific literature, quantifies the correlation between the number of journals and the number of articles published in these journals on a specific scientific research topic, in this case, employability and skills. The analysis reveals that only five journals account for most research articles on these concepts, indicating a low level of dispersion.

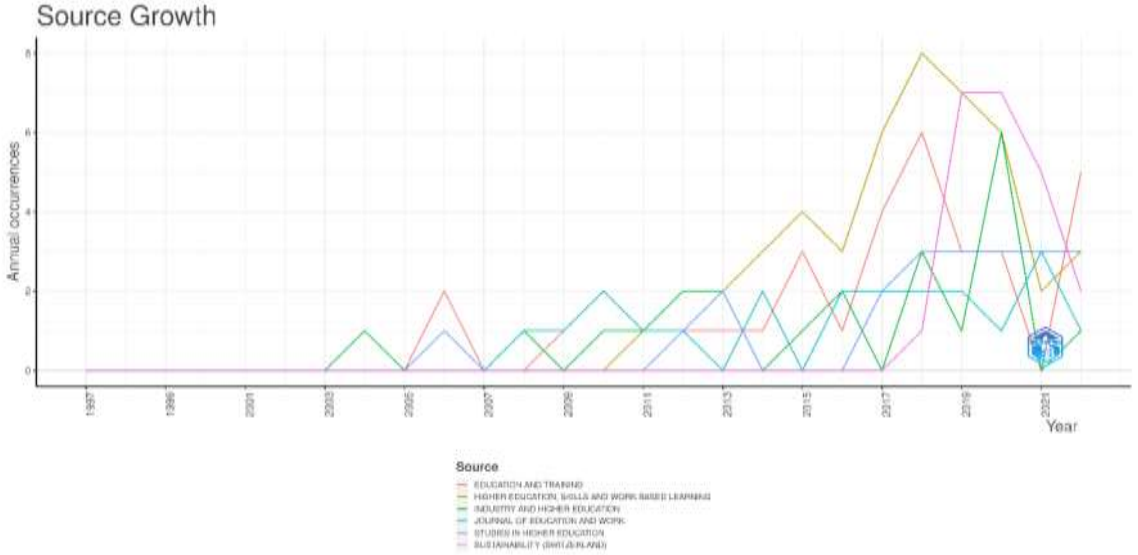
Figure 7. Source grouping obtained from Bradford's Law (WoS).



Source: Bibliometrix, 2024.

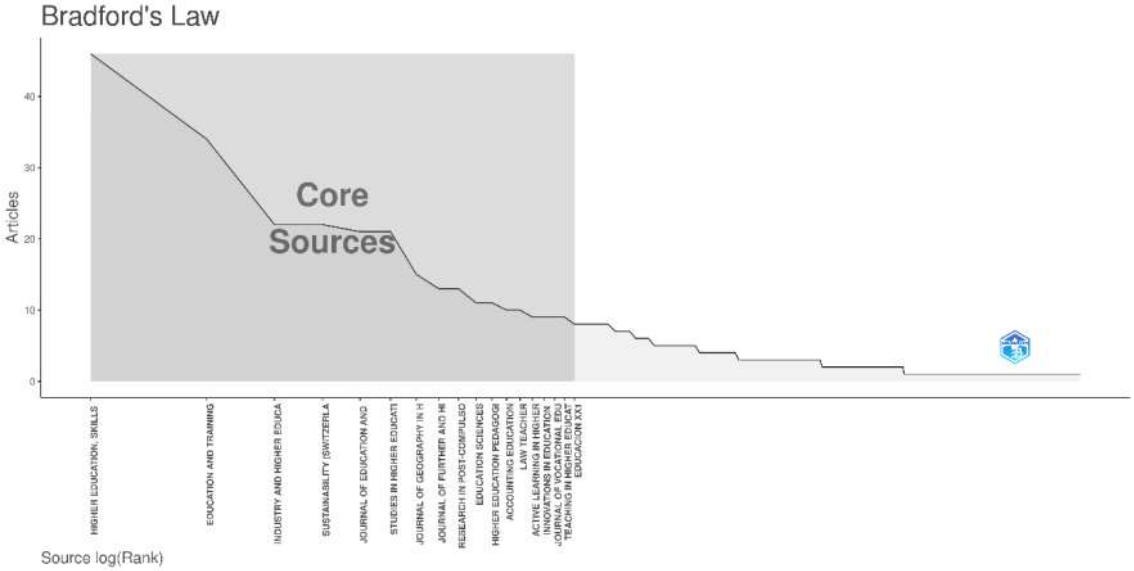
As illustrated in Figure 8, the Scopus database demonstrates a high degree of similarity in terms of the journals that publish scientific articles on the concepts under investigation. With some variation in the sources as journals are introduced as sustainability, the data show that, in general, the same journals are used for all concepts. In contrast, the dispersion shown by Bradford's law is greater, with many journals accepting publications on the concepts analysed, although only the four most important journals publish the largest number of articles (Figure 9).

Figure 8. Variation in impact journal publications (Scopus).



Source: Bibliometrix, 2024.

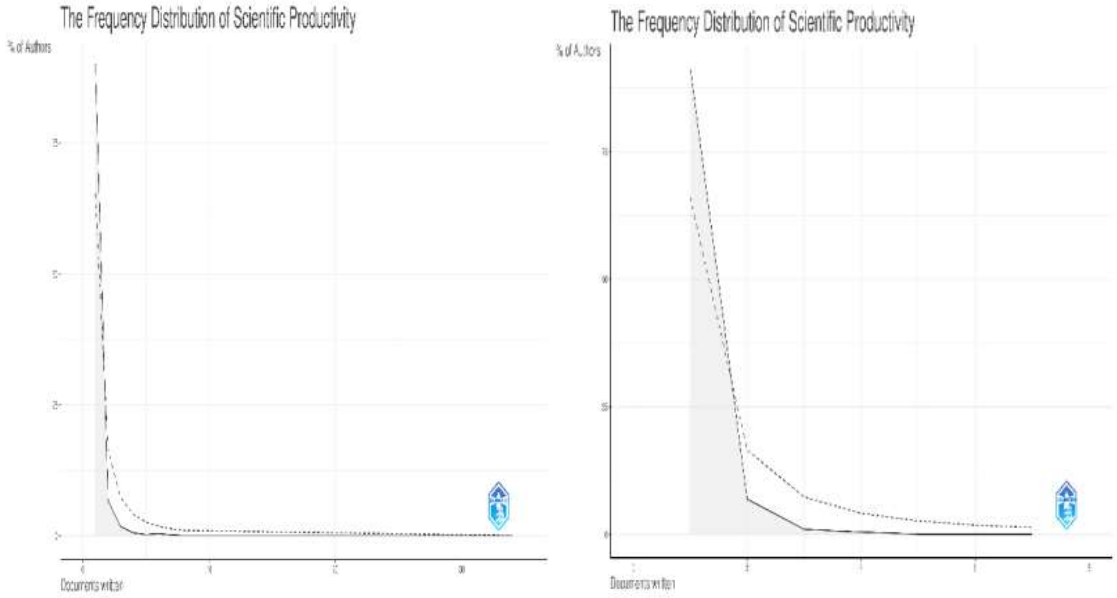
Figure 9. Clustering of sources obtained from Bradford's Law (Scopus).



Source: Bibliometrix, 2024.

In relation to the authors variable, it is important to acknowledge the findings of Lotka's Law (illustrated in Figure 10). This law demonstrates a quantitative relationship between authors and articles produced within a specific field over a specified time period. The analysis reveals an uneven distribution, with the majority of articles being produced by a small number of highly productive authors. For instance, in the WoS database, a single author is responsible for 90.1% of all publications, a figure that is strikingly similar to the 91.5% observed in the Scopus database, where a single author is responsible for the same proportion of scientific output.

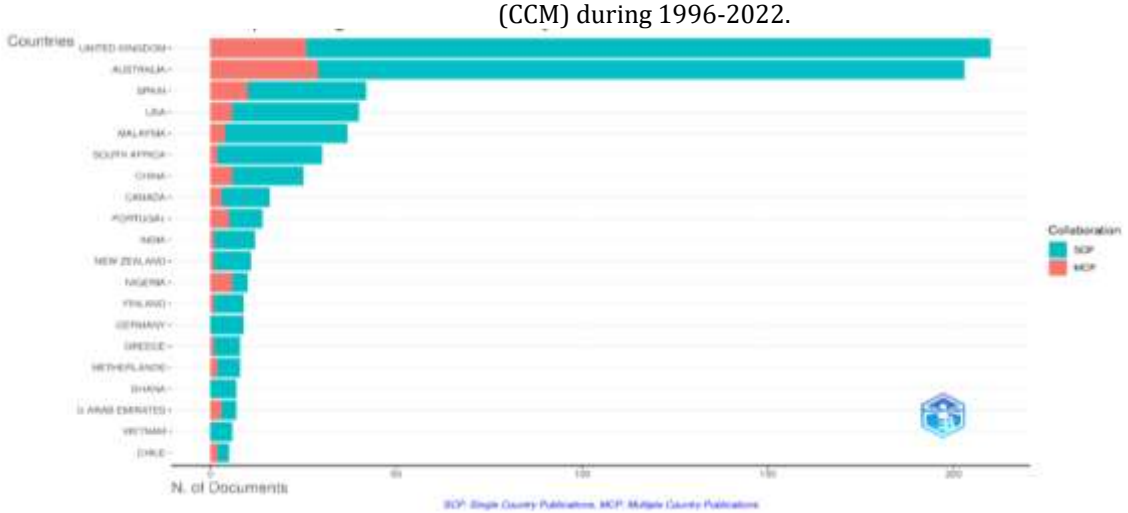
Figure 10. Lotka's law in WoS and Sopus.



Source: Bibliometrix, 2024.

As illustrated in Figure 11, an analysis of the countries of origin of the most prolific authors reveals notable trends. The United Kingdom stands out with 184 domestic collaborations and 26 international collaborations, followed by Australia with 174 domestic and 29 international collaborations, and Spain with 32 domestic and 10 international collaborations. It is noteworthy that the data from both databases align, indicating the reliability of the findings.

Figure 11. Country of correspondence author. Collaboration within a country (SCP) and between countries (CCM) during 1996-2022.



Source: Bibliometrix, 2024.

Finally, with regard to the variable documents, figure 12, the most frequent words in relation to the words with the most co-occurrences in the documents analysed are plotted in the following word clouds for WoS and for Scopus, drawing attention to the fact that the central word for WoS is “skills”, while for Scopus, the most named words are “employability” and “students”, but the term “skills” does not appear.

Figure 12. WordCloud for WoS and Scopus.

Source: Bibliometrix, 2024.

Treemap, a purely hierarchical visualisation, quantifies the relative area (akin to a rectangle) occupied by a set of data according to a primary variable, its subsets according to a secondary variable, and so on, up to the desired level. In this instance, both Treemaps demonstrate a comparable representation, although it provides a more detailed representation than the word cloud graph. For the Scopus database, the concept skills category has a frequency of 6, in contrast to the 166 observed in the WoS database. This indicates that the concept "skills" category manifests in only 1% of the cases, a figure that stands in stark contrast to the frequency of 69 observed for the "employment" category, which accounts for 9% of the cases.

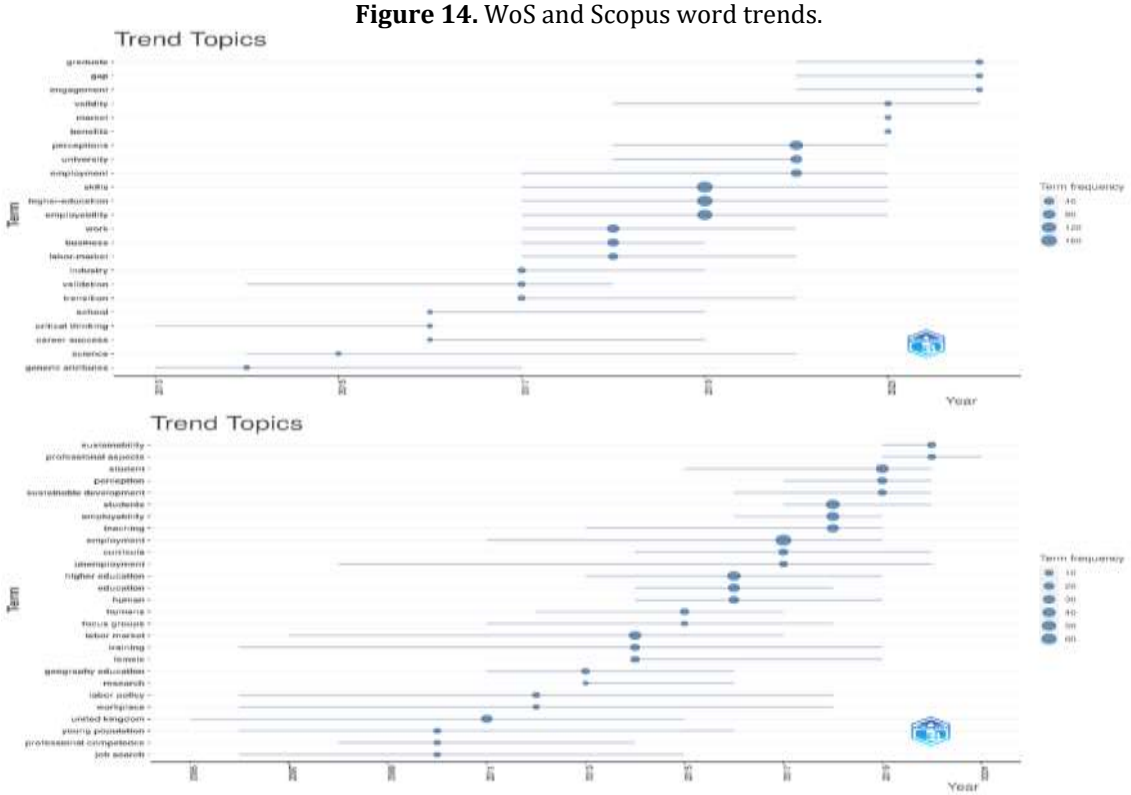
Figure 13. Treemap WoS and Scopus.

Source: Bibliometrix, 2024.

It is also important to be aware of the direction in which scientific production is heading, and to determine whether the terms “employability” and “competences” are currently being researched. While the key words for Scopus are currently “sustainability”, “professional aspects”, “perception” and “students”, although still infrequently in the publications, for WoS they are “graduates”, “gap” and “commitment”, concepts more in line with what Bologna proposed, a greater rapprochement between university and company and more in line with what companies are currently demanding, a university commitment that reduces the competence gap between university studies and labour needs.

In graph 14, along the same lines, the trendic topics or reference words in the years under study are highlighted with their respective frequencies. This allows for the study of the evolution of the main concepts related to employability and competences in recent years in the two main databases. Despite the differences between the results of both, a coinciding term is identified: "student", either as a “graduate” in the case of WoS or student as it appears in Scopus. This is significant, as it suggests that the focus is finally being directed towards the most crucial actor.

Figure 14. WoS and Scopus word trends.

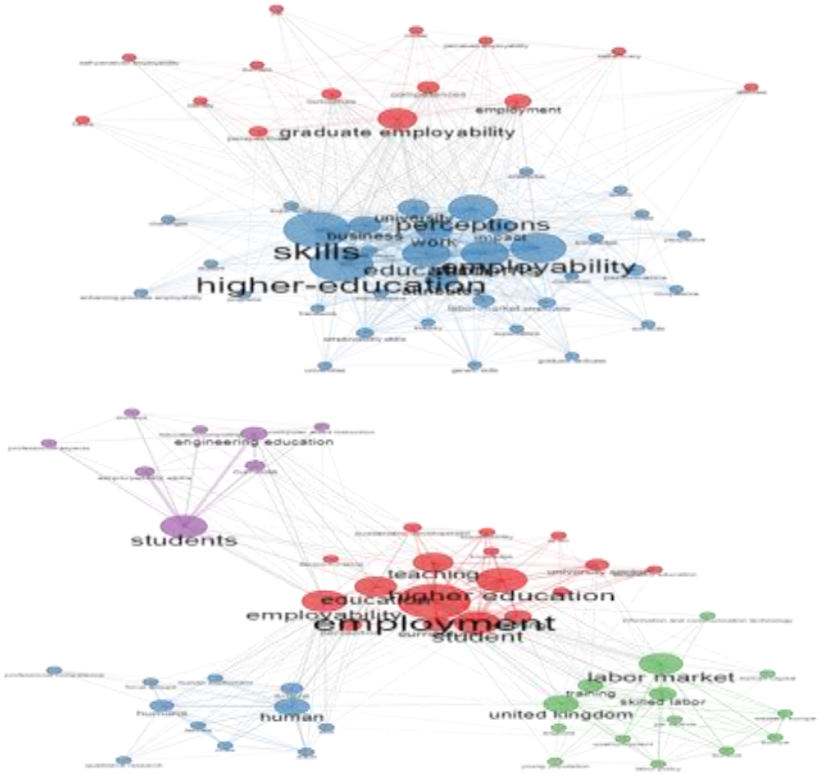


Source: Bibliometrix, 2024.

As illustrated in Figure 15, the conceptual structure variable is analysed through a network of co-occurrences, which is defined as a grouped interconnection of terms, with consideration given to their presence in the documents retrieved from the initial WoS and Scopus search. The generation of networks involves the connection of pairs of terms using a set of criteria that define co-occurrence. For instance, the terms "skills" and "higher education" can be said to co-occur if they both appear in a particular article. An alternative article may contain the terms "higher education" and "work", thus creating a network of co-occurrence of these three terms. It is important to note that co-occurrences almost always occur between the same terms (employability, work, higher education, perceptions, teaching, etc.).

In this particular instance, the keywords have been methodically arranged into two clusters for WoS and four for Scopus. A central cluster is identified, in which the keyword with the highest co-occurrence rate is denoted by "higher education" for WoS and "employment" for Scopus. These keywords establish significant relationships with graduate employability, which is the second cluster of WoS, and "students", "human resources" and "labour market" as the main secondary terms of the Scopus cluster.

Figure 15. WoS and Scopus co-occurrence network.



Source: Vosviewer, 2024.

4. Conclusions and Discussion

There is a clear trend towards a new university model characterised by globalisation, universality and the need to respond to the new demands of society. The Bologna Process is only a European-level realisation of this change of context, which must be extended much further, towards an uncertain and complex environment, where universities can respond quickly and adequately to the changing environment.

These changes give rise to new questions regarding the adjustment of the education and employment of European graduates to address the existing gap. Since 2010, when it was established that the EHEA should have achieved its main objectives, including enhancing employability, two issues have attracted particular interest from researchers. The first is the identification of competences relevant to the professional success of graduates. The second issue is concerned with the promotion of these key competences within the education system, a field in which old traditions, prioritising the development of technical competences over the learning of transversal or soft skills, often prevail.

Universities must strive to adapt their curricula to the skills training demanded by employers. In order to do so, it is necessary to understand the business profile that graduates take on internships or as employees, and to understand with what skills preparation students arrive at their first job. To this end, it is essential to undertake research that utilises a bibliometric study to analyse the degree of interest aroused in the European scientific and academic community by the concept of employability and competences in the historical series (1996-present). This series encompasses the Bologna Declaration and the establishment of the EHEA.

The objective of this study is to review the scientific production on the interaction between employability and competences in two of the most influential databases on the scientific community: WoS and Scopus. Through the results obtained, we offer a state-of-the-art overview of the historical evolution of research in this field over the past 25 years, as well as the identification of the main research perspectives in both terms.

A total of 829 publications have been documented in WoS and 883 in Scopus following the filtration process, which identified 2,014 and 1,826 publications in both databases, respectively. The filtration

process has focused on journal articles published in the European Union, the United Kingdom and Switzerland. However, for some results, a global perspective has been adopted due to the significance of countries such as Australia in the scientific production of the terms analysed.

Since 2010, there has been a gradual increase in production in the terms studied, reaching 89% in WoS and 76.5% in Scopus, with 2019 and 2020 being the years with the highest scientific production, possibly due to the pandemic, which allowed more time for research in the face of reduced leisure.

The United Kingdom and Australia have the highest number of authors writing about the searched concepts and related keywords, although few journals incorporate this research. The following journals have been found to index the research: Higher Education Skills, Education and Training, Studies in Higher Education, Industry and Higher Education and Higher Education Research. These are all indexed in Scopus and Emerging Sources Citation Index (Clarivate Analytics), indexes that measure the quality of scientific journals.

Spain is the third most prolific country in terms of the number of articles on employability and skills published, although its production is significantly lower than that of countries such as the United Kingdom and Australia, accounting for only around 20% of both.

The following three trends are evident in the analysis of the keyword relational nodes:

- The interaction of employability with higher education.
- The relationship between skills and employment.
- The relationship between teaching, higher education and employability.

Therefore, in addition to qualifications, importance continues to be attached to the relationship between employment and university, as higher education institutions bring graduates closer to the labour market. This bibliometric study on skills and employability offers a descriptive and analytical view from a diachronic and synchronic perspective of the main bibliometric variables in two of the databases with the greatest impact on the scientific community (WoS and Scopus). The study enables researchers and institutions to visualise the most developed study trends and emerging research lines, facilitating the advancement of the necessary rapprochement between universities and business. The study enables universities to understand their current situation and determine the learning strategy to reduce the training gap in competences.

The issue of university graduates' access to the labour market has occupied a prominent position in the agenda of universities over the past decade. The development of society and knowledge is contingent on the generation of new knowledge and its dissemination through education, training and the utilisation of that knowledge. The fundamental mission of the university is to provide sufficient training and qualifications to ensure the employability and competitiveness of its graduates (Martín Del Peso et al., 2013). In this context, students must acquire the competencies demanded by the contemporary reality, and it is incumbent upon the university, as an institution that seeks social progress, to incorporate these competencies into its curricula.

Despite international publications (both European and Latin American) on the subject, the complexity of analysing graduate integration and the need to approach the process from different disciplines means that the lack of knowledge about the situation of graduates from different degrees is one of the main concerns of most higher education institutions, making it one of their greatest future challenges.

In conclusion, the following questions are posited as potential subjects for future research: Universities should adopt active and collaborative learning approaches and encourage the participation of employers in curriculum design. What examples of good practice exist in this area? International collaboration can enrich research with diverse perspectives and foster innovation. What barriers exist to this collaboration and how can they be overcome? International collaboration can enrich research with diverse perspectives and foster innovation. What barriers exist to this collaboration and how can they be overcome? Skills such as communication, teamwork and problem solving are crucial. What teaching and assessment methods can be most effective in developing these skills? And finally, the lack of alignment between the skills taught in universities and the demands of the labour market is a major cause of the problem analysed, raising the following question: How can universities and companies collaborate to reduce this gap?

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