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Global Research Trends on Higher Education and Employability: A Bibliometric Analysis from 2014 to 2025

Tendencias globales de investigación sobre educación superior y empleabilidad: Un análisis bibliométrico de 2014 a 2025

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KEYWORDS

Bibliometric Analysis
Curriculum Relevance
Educational Policy
Employability
Higher Education

ABSTRACT

This study presents a comprehensive bibliometric analysis of global scientific production related to higher education and employability between 2014 and 2025. Using the Bibliometrix package in R and data extracted from the Scopus database, 3,376 documents authored by 8,548 researchers from over 80 countries. The annual growth rate of publications was 16.89%, reflecting increasing scholarly interest in aligning academic training with labor market demands. Key findings indicate that the most productive countries include the United Kingdom, the United States, and Australia, with significant international collaboration networks. Leading journals such as Higher Education, Skills and Work-Based Learning and Sustainability concentrate the largest number of publications. Keyword co-occurrence analysis reveals central themes such as higher education, employability, students, and curriculum, while thematic mapping shows that higher education and employability are consolidated as basic and highly relevant themes. Additionally, trend topic analysis identifies a recent rise in interest around artificial intelligence, engineering education, and soft skills. Despite the growing number of publications, citation rates have shown a slight decline in recent years, indicating a possible saturation or diversification of the field. This research highlights the evolving academic landscape surrounding graduate employability and provides insights for researchers, educators, and policymakers seeking to bridge the gap between academia and the labor market.

PALABRAS CLAVE

Análisis bibliométrico
Relevancia curricular
Política educativa
Empleabilidad
Educación superior

RESUMEN

Este estudio presenta un análisis bibliométrico exhaustivo de la producción científica global relacionada con la educación superior y la empleabilidad entre 2014 y 2025. Utilizando el paquete Bibliometrix en R y datos extraídos de la base de datos Scopus, se han obtenido 3.376 documentos escritos por 8.548 investigadores de más de 80 países. La tasa de crecimiento anual de las publicaciones fue del 16,89%, lo que refleja el creciente interés académico en alinear la formación académica con las demandas del mercado laboral. Los hallazgos clave indican que los países más productivos incluyen el Reino Unido, Estados Unidos y Australia, con importantes redes de colaboración internacional. Las principales revistas como Higher Education, Skills and Work-Based Learning y Sustainability concentran el mayor número de publicaciones. El análisis de co-ocurrencia de palabras clave revela temas centrales como la educación superior, la empleabilidad, los estudiantes y el currículo, mientras que el mapeo temático muestra que la educación superior y la empleabilidad se consolidan como temas básicos y de gran relevancia.Además, el análisis de temas de tendencias identifica un aumento reciente en el interés en torno a la inteligencia artificial, la educación en ingeniería y las habilidades blandas. A pesar del creciente número de publicaciones, las tasas de citas han mostrado una ligera disminución en los últimos años, lo que indica una posible saturación o diversificación del campo. Esta investigación destaca el panorama académico en evolución que rodea la empleabilidad de los graduados y proporciona información para investigadores, educadores y formuladores de políticas que buscan cerrar la brecha entre la academia y el mercado laboral.

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1. Introduction

In recent years, the growing disconnect between academic offerings and labor market needs has become a critical concern for higher education systems worldwide. Universities are increasingly expected to prepare graduates not only with disciplinary knowledge but also with skills and competencies that meet the evolving demands of the workforce (Menon & Suresh, 2021). However, evidence from various regions indicates a persistent gap between what higher education institutions deliver and what employers require, resulting in high rates of underemployment and skill mismatches among graduates (González et al., 2022).

International organizations such as the OECD, UNESCO, and the World Bank have emphasized the urgent need to reform academic programs to align with labor market expectations (Kinash et al., 2016). Concepts such as employability, curriculum relevance, and competency-based education have gained prominence in policy and academic discussions (Jabeen et al., 2017). Despite these efforts, many programs continue to be structured based on disciplinary tradition rather than on data-driven labor demand analysis, especially in developing contexts (Healy et al., 2020).

Latin America—and Ecuador in particular—reflects this global challenge. National statistics show that a significant percentage of university graduates in Ecuador struggle to find employment that matches their field of study (Guerrero et al., 2020). Institutions like SENESCYT and INEC have reported persistent mismatches between graduate profiles and occupational structures, raising questions about the responsiveness of academic planning to economic and social realities

To better understand the global dynamics of this issue, this study conducts a bibliometric analysis of scientific publications addressing the relationship between higher education and employability (Bell & Bell, 2020). Using data retrieved from Scopus and processed with the Bibliometrix R package, the analysis maps research trends, key contributors, collaborative networks, and emerging topics from 2014 to 2025 (Tseng et al., 2019). The results aim to inform academic institutions and policymakers about the evolution of this discourse and to identify potential gaps, regional contributions, and strategic directions for improving the relevance of higher education in the labor market (McArthur, 2023).

2. Methodology

A bibliographic search was conducted in the Scopus database to retrieve scientific publications addressing the alignment between higher education and labor market demands (Ramirez et al., 2019).. The search covered documents published between 2013 and 2025, yielding a total of 3,376 records. The dataset included journal articles, reviews, and conference proceedings written in English and focused on key themes such as employability, curriculum relevance, and academic-labor market alignment (Erazo et al., 2019).

The records were exported in BibTeX format and processed using the Bibliometrix R package and its web-based interface Biblioshiny. This approach enabled quantitative and visual analysis of bibliometric indicators such as annual publication trends, most productive sources, authors, affiliations, countries, keyword frequency, thematic evolution, and collaboration networks (Macmillan et al., 2015).

A metadata completeness check revealed excellent coverage in core fields, including author names, publication titles, years, document types, journal sources, languages, citation counts, and author affiliations, with over 98% completeness. However, fields such as Cited References (CR) and Science Categories (WC) were unavailable due to inherent limitations in the Scopus export format.

The analysis followed established bibliometric techniques, including descriptive statistics, co-word analysis, co-authorship networks, keyword co-occurrence mapping, and thematic mapping, all aimed at identifying trends, gaps, and emerging areas in the global research landscape..

3. Results

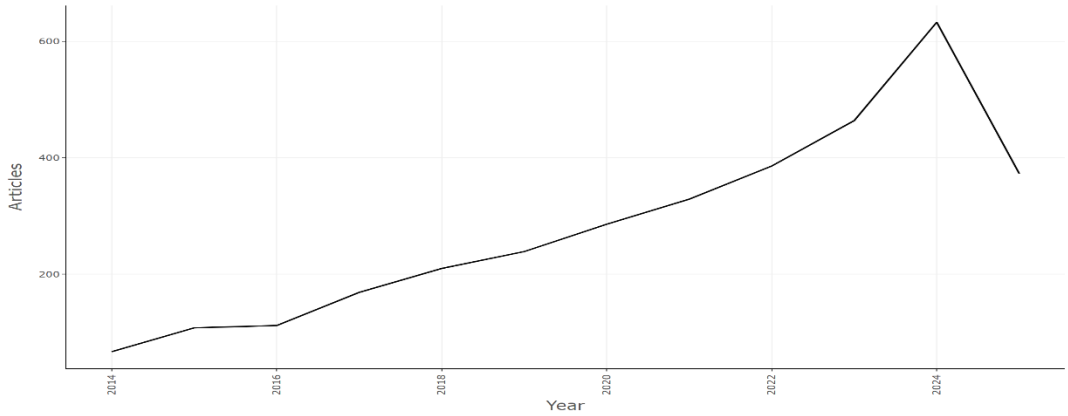
The bibliometric analysis of the 3,376 documents retrieved from Scopus provides a comprehensive overview of global scientific production related to higher education and its alignment with labor market demands. The results are organized into thematic subsections that examine the general characteristics of the dataset, trends in annual scientific production, the most relevant sources and authors, geographic and institutional distribution, keyword patterns, thematic structures, and international collaboration networks. Together, these findings offer a detailed understanding of the academic discourse surrounding employability, curriculum relevance, and the evolving role of higher education in responding to workforce challenges (Bretag et al., 2019; Donald et al., 2019; Ghasemy et al., 2020; Moore & Morton, 2017; Silva et al., 2018; Suleman, 2018).

3.1. General Overview of the Dataset

The bibliometric analysis of 3,376 documents indexed between 2014 and 2025 provided a general overview of the study corpus. These documents originated from 1,679 different sources and were authored by 8,548 researchers, of whom 705 published individually. The average annual growth rate was 16.89%, highlighting an increasing interest in the subject. The average number of co-authors per article was 2.84, and 19.49% of publications reflected international collaboration. A total of 7,650 author keywords were recorded, and the average number of citations per document was 11.22. The average age of the documents was 3.72 years, indicating a relatively recent body of literature.

3.2. Scientific Production Trends

Figure 1.



Annual scientific production from 2014 to 2025.

The annual scientific production on the topic has shown a consistent upward trend over the last decade. Starting from fewer than 100 articles in 2014, the number of publications steadily increased, peaking at over 600 documents in 2024. Although a slight decline is observed in 2025, it is likely due to incomplete data collection for the current year. This trend reflects a growing interest and research activity in the field, highlighting its increasing relevance in the scientific community.

3.3. Numerical Modeling Outcomes

Based on the average number of citations per article per year in the field. Between 2014 and 2021, citation averages fluctuated around 2.0 to 3.0 citations per article, peaking in 2021. From 2022 onward, a significant drop is evident, likely due to the limited time available for newer publications to accumulate citations. This pattern highlights the importance of interpreting citation data in the context of publication age.

3.4. Most Relevant Sources

The analysis of the most productive journals reveals that Higher Education, Skills and Work-Based Learning and Sustainability (Switzerland) lead the list with 64 publications each. These are followed by Studies in Higher Education (50 documents), Higher Education (44), and Education and Training (41). These results indicate that the topic of alignment between academic training and labor market needs is widely addressed in both specialized higher education journals and interdisciplinary sources concerned with sustainability and social development. This distribution also suggests a multidisciplinary interest in bridging the gap between educational offerings and professional demands.

3.5. Most Relevant Sources

To identify the leading contributors to the academic discussion on the topic, a productivity analysis was conducted. In this respect it has been demonstrated that Jackson Denise stands out as the most prolific author with 16 documents, followed by Bennett Dawn with 12 and Nghia Tran Le Huu with 8. A second group of authors, including Caratozzolo Patricia, Madsen Miriam, and Sandoval Luis, each contributed with 7 publications. This distribution highlights the presence of key figures and possible research clusters within the field, which may serve as a foundation for further bibliographic coupling or co-authorship network analyses.

3.6. Most Relevant Sources

Within the institutions with the highest scientific output on the topic under study. The University of Johannesburg leads with 41 articles, followed by Deakin University with 37, and Monash University with 31. Other relevant contributors include Curtin University and RMIT University, each with 30 articles. The data indicates a significant concentration of research activity in Australian universities, highlighting regional leadership in the field. Additionally, institutions such as the Institute for the Future of Education and the School of Engineering and Sciences also demonstrate consistent contributions, with 24 publications each, suggesting emerging centers of academic interest.

3.7. Countries' Scientific Production

The global distribution of scientific publications on the subject. A higher concentration of research output is observed in countries such as the United States, the United Kingdom, and Australia, which aligns with the geographical locations of institutions with the highest number of indexed articles. Additionally, European countries like Spain, Germany, and France, as well as India and China in Asia, show notable contributions. In Latin America, Brazil, Mexico, Colombia, and Chile stand out as key contributors. Meanwhile, Africa presents a more dispersed academic presence, with South Africa being a notable exception. This distribution reflects a strong correlation between research infrastructure and publication output, highlighting existing disparities in scientific production across different regions.

3.8. Countries' Production Over Time

According to the the evolution of scientific production between 2014 and 2024 for the five countries with the highest number of publications: United Kingdom, USA, Spain, India, and Australia. The United Kingdom leads the trend, showing a consistent and accelerated increase, especially after 2020. The USA follows closely, with a steady growth pattern. Spain and India also show marked increases, though at a slower rate, while Australia demonstrates stable growth. These patterns reflect growing international interest in the topic, with peaks that may coincide with global research agendas, funding initiatives, or the emergence of new technologies and policies related to the field.

3.9. Keyword Analysis

The most frequent terms found in the titles, abstracts, and keywords of the reviewed articles include "higher education", "education", "employability", and "students", highlighting a strong focus on the role of higher education in preparing graduates for the labor market. Other frequently appearing

words such as “curriculum”, “skills”, “engineering education”, and “labour market” suggest a recurring concern with aligning educational programs to current workforce needs.

This qualitative analysis supports the earlier quantitative findings, emphasizing the central role of higher education in fostering key competencies for professional integration.

3.10. Keyword Frequency Distribution

The relative frequency of the most common keywords in the analyzed scientific literature shows that the term "higher education" stands out as the most frequent, appearing in 22% of the articles, followed by "na" (8%), "employability" (6%), "students" (5%), and "education" (3%).

Other frequently used terms such as “employment,” “teaching,” “curriculum,” “soft skills,” and “labour market” reflect a consistent focus on aligning academic programs with job market demands and enhancing student readiness for professional life. Visualization highlights the dominant research themes in the field and underscores the centrality of employability and skill development within higher education discourse.

3.11. Trends in Scientific Keywords Over Time

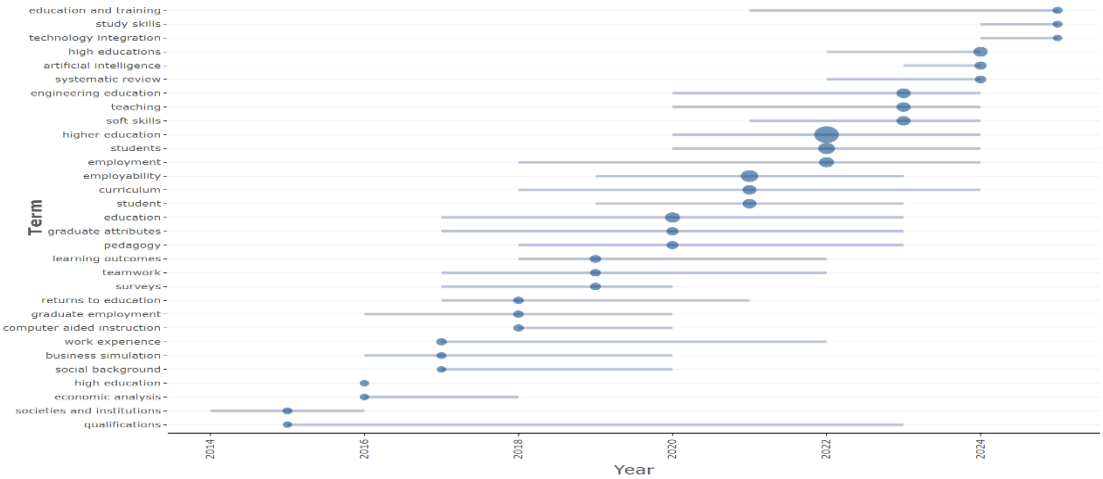
Figure 2 presents the temporal evolution of key terms used in scientific publications related to higher education. The horizontal lines represent the span of years during which each term was recurrent, while the size of the dots indicates the relative frequency of appearance in a given year.

The analysis reveals a sustained interest in core concepts such as "higher education," "students," "employability," "curriculum," and "teaching", which have remained relevant across several years. More recent topics, including "artificial intelligence," "technology integration," and "study skills," reflect the growing interest in digital transformation and skill adaptation in academic contexts.

The emergence of “systematic review” and “engineering education” in later years suggests an increase in methodological rigor and specialization. Additionally, earlier focuses on "graduate employment," "economic analysis," and "returns to education" show how concerns around the economic outcomes of higher education have evolved into broader discussions about skills and adaptability.

This timeline provides insight into shifting academic priorities and the dynamic nature of educational research themes.

Figure 2.



Evolution of key terms in academic publications from 2014 to 2024. The dot size represents the number of occurrences per year, and the line shows the overall time span of relevance for each term.

3.12. Keyword Co-occurrence Network

The keyword co-occurrence network highlights the conceptual structure of the literature by grouping related terms into clusters. It was found that "higher education" appears as the most central and densely connected term, forming a large red cluster together with keywords such as "employability", "education", "students", "graduate employability", and "skills".

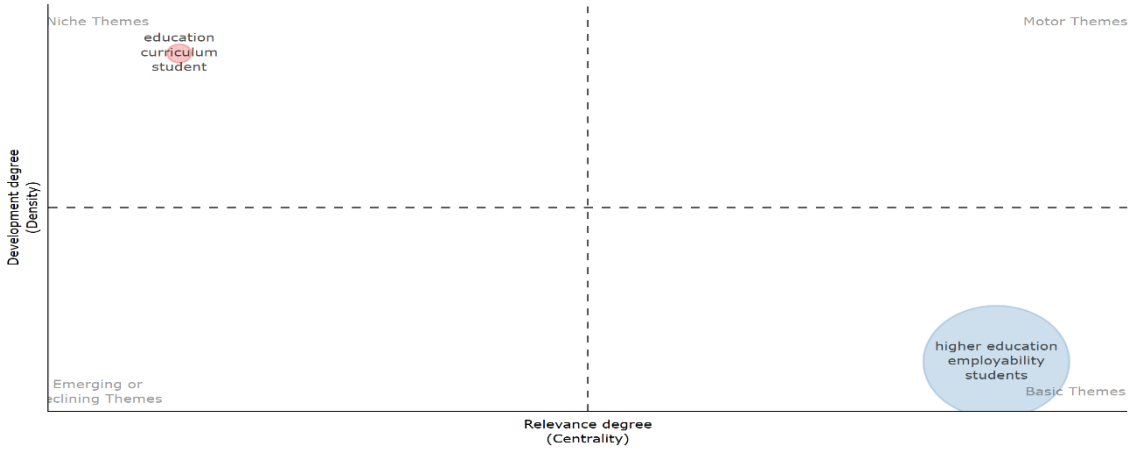
A second cluster is oriented toward innovation and technology in education, with nodes such as "e-learning", "artificial intelligence", "educational innovation", and "experiential learning". The third cluster is more focused on human-related studies and demographics, with terms like "gender", "human capital", "university", and "tertiary education". These clusters suggest that the academic discussion surrounding the alignment between higher education and the labor market involves diverse dimensions including graduate skills, pedagogical innovations, and societal factors.

3.13. Thematic Structure of the Scientific Discourse

Figure 3 shows the thematic map resulting from a co-word analysis, organizing terms based on two axes: centrality (relevance degree) and density (development degree). The graph is divided into four quadrants:

- Motor Themes (top right): Highly developed and important themes. This quadrant is empty in the current analysis, suggesting a lack of consolidated and central emerging topics with high internal development.
- Basic Themes (bottom right): Important but underdeveloped. This includes “higher education,” “employability,” and “students,” which are foundational concepts in the field and form the structural backbone of the scientific discourse but show room for deeper exploration.
- Niche Themes (top left): Well-developed but isolated. Here we finducation,” “curriculum,” and “student” as independent but specialized topics that may contribute to specific case studies or institutional approaches.
- Emerging or Declining Themes (bottom left): Weak in both relevance and development, currently unoccupied, indicating that no significant marginal or declining terms were detected.

Figure 3.



Thematic map based on centrality and density of co-occurring keywords. Terms are grouped into quadrants: motor themes, basic themes, niche themes, and emerging/declining themes.

This map highlights the centrality of higher education and employability in academic research, while also revealing potential gaps in thematic integration and the opportunity to further connect niche topics with broader discussions.

3.14. Global Scientific Collaboration Network

Figure 4 displays the global collaboration map among countries based on co-authorship networks. The map highlights the interconnectedness of nations through academic partnerships in the analyzed literature. Darker shades indicate countries with higher scientific output, while the red lines represent collaborative links between nations.

The strongest collaboration clusters emerge from the United States, United Kingdom, Australia, Germany, and China, which act as central nodes, connecting research networks across continents. Notably, international cooperation is highly dense in Europe and Anglophone countries, extending to Asia, Latin America, and Africa, indicating the global nature of the research agenda on higher education and employability.

This geographic representation reflects the international scope of scientific efforts, with high-income countries driving global collaboration. The results suggest that countries with greater resources and research infrastructure tend to foster more international alliances, thereby influencing the global discourse.

Figure 4.

World map of scientific collaboration among countries based on co-authorship. The intensity of connections reflects the frequency and strength of international research partnerships.

4. Discussion

The results of this bibliometric analysis reveal a growing body of research that addresses the alignment between higher education and labor market needs. The increasing annual production rate and average citation count suggest that this topic has gained relevance in academic and policy-oriented discussions, especially over the last decade. The predominance of journals such as Higher Education, Skills and Work-Based Learning and Sustainability reflects both a specialized and interdisciplinary interest in employability, curriculum development, and educational policy (Börner et al., 2018; Oliinyk et al., 2021; Sá & Serpa, 2018; Sokhanvar et al., 2021).

The findings also highlight significant geographical disparities. Countries such as the United Kingdom, the United States, Australia, and Spain dominate the publication landscape and collaboration networks, indicating that the global discourse is largely shaped by institutions from high-income regions. In contrast, the relatively lower representation of Latin American and African countries suggests the need to further investigate local perspectives and contextual solutions in these areas. Ecuador's limited presence in the dataset, for example, underscores the urgency of institutional efforts—such as those of the Universidad Bolivariana del Ecuador (UBE)—to generate research that responds to national labor market dynamics (Jackson, 2012; Laufer et al., 2021; Riebe et al., 2016; Small et al., 2017; Van Ginkel et al., 2015;).

The keyword analysis confirms that higher education, employability, curriculum, and students remain central concepts, while the emergence of terms like artificial intelligence, educational

innovation, and study skills indicates a shift toward digital and future-oriented competencies. These results align with global recommendations from UNESCO and the OECD, which emphasize the importance of flexible, skills-based curricula to improve graduate outcomes (Britton, 2017; Chan et al., 2017; Hernandez-de-Menendez et al., 2020; Jackson, 2017; Jackson & Wilton, 2017; Wu & Liu, 2021).

However, the thematic map revealed an absence of well-developed "motor themes", suggesting that despite increasing publication volume, the field may still lack strong theoretical integration or a dominant framework guiding research. This may point to fragmentation in approaches and a need for more coordinated academic agendas that bridge theory, policy, and institutional practice (Azeiteiro et al., 2015; Brewer et al., 2019; Kolmos & De Graaff, 2014; Murillo-Zamorano et al., 2019; Sam & Van der Sijde, 2014).

Overall, this analysis supports the idea that while the conversation around higher education and employability is expanding, it remains uneven across regions and research domains. There is a clear opportunity for developing countries - particularly in Latin America- to strengthen their participation through targeted research, policy-driven projects, and collaborations that address their specific labor and educational challenges (Abulibdeh et al., 2024; Brundiers et al., 2021; Rasul et al., 2023; Succi & Canovi, 2020; Tomlinson, 2017; Villaroel et al., 2018).

5. Conclusions

This study provides a comprehensive bibliometric overview of global scientific production related to the relevance of higher education in addressing labor market demands. The analysis of 3,376 documents published between 2014 and 2025 reveals a steady increase in research output and a growing international interest in topics such as employability, curriculum development, and graduate skills.

The results confirm that the discourse is largely led by institutions and researchers from high-income countries, particularly the United Kingdom, the United States, and Australia, while regions such as Latin America remain underrepresented. Key concepts like higher education, students, curriculum, and employability dominate the literature, while newer terms such as artificial intelligence and educational innovation suggest emerging priorities aligned with technological transformation and future-ready competencies.

Despite the volume of publications, the absence of well-developed motor themes in the thematic map suggests a need for greater theoretical consolidation and integration across studies. There is also an evident opportunity for countries with limited representation—such as Ecuador—to contribute to and shape this global discourse by generating context-specific research and fostering institutional collaborations.

This study highlights the value of bibliometric methods for understanding knowledge structures and research gaps. It is recommended that future investigations combine bibliometric insights with qualitative policy analysis to deepen understanding of how higher education systems can effectively respond to changing labor market dynamics. Furthermore, institutional and governmental stakeholders should consider using evidence from such analyses to design more responsive academic programs, support faculty development, and promote alignment between educational outcomes and economic realities.

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