The International Journal of Adult, Community and Professional Learning
ISSN: 2328-6318 (Print), ISSN: 2328-6296 (Online)
Volume 30, Issue 2, 2023
https://doi.org/10.18848/2328-6318/CGP/v30i02/1-23

Dual Vocational Education and Training: A Bibliometric Analysis

Luis Martínez-Izquierdo, University of Granada, Spain
Javier Mula-Falcón, University of Granada, Spain
Mónica Torres-Sánchez, University of Málaga, Spain

Received: 09/27/2022; ***Accepted:*** 03/16/2023; ***Published:*** 05/24/2023

Abstract: Scientific production on duality in vocational training has grown in parallel to the increased presence of this concept in the global discourse. However, there are hardly any studies that contribute to a general overview of this field of research that would facilitate access to knowledge. Therefore, the main objective of this research is to provide a detailed and international picture of Dual Vocational Education and Training (DVET). To this end, a systematic literature review was carried out in Web of Science (WoS), yielding a total of seventy-three papers which were subjected to bibliometric analysis. The main findings show that this is a fragmented research area despite the recent and intense growth of its production. It also highlights an intensive international collaboration between authors and institutions. Finally, the need to continue with this field of study is underlined, while future lines of research are highlighted.

Keywords: *Apprenticeship, Dual System, Vocational Education and Training, Bibliometric Analysis, WoS*

Introduction

The advent of the digital revolution and Industry 4.0—with the skills mismatch between the labor market and professional qualifications—have been key factors in the change of the productive sector. The advent of robots and web applications replacing human resources, as well as changes in the roles and expectations of work performed by humans, has had a major impact on the health of certain labor markets. In Southern Europe and Latin America, this new reality has exacerbated social problems related to unemployment and especially young unemployment. States such as Spain, Brazil, and Greece have been plunged into unemployment rates of around 14–20 percent. Youth unemployment figures, meanwhile, hover around 28–35 percent (Eurostat 2022). For example, in Spain, the Labour Force Survey for the fourth quarter of 2019, pre-COVID-19 crisis and with a year-on-year growth of 2 percent, showed youth unemployment figures of 30.5 percent at the national level, aggravated in certain Autonomous Communities, such as Andalusia, where it stands at 41 percent (INE 2020).

This maladaptation and vulnerability to changes in the workplace, high youth unemployment rates, labor mobility, and challenges of the new economy (OECD 2010) have put vocational training systems in these regions in the media and political spotlight (see EC 2012). As a result, these state-regulated technical and vocational training systems, whose duality was limited to traineeships, have begun a cycle of reform. The reform has been aimed at increasing the duality of the system, following the example of the successful German vocational training model.

According to Alemán Falcón (2015) and Eichhorst et al. (2015), dual apprenticeship systems in countries such as Germany, Switzerland, or Austria have key institutional elements, such as the following: (a) a high level of formalization, that is, they provide training in centrally accredited vocational qualifications; in addition, training contents are continuously adapted to the changing needs of the labor market; (b) a strong involvement of the social partners in both the development and maintenance of the curricula at government and federal level, as well as in implementation and monitoring at the regional level; (c) vocational schools provide the school-based part of the dual apprenticeship, embracing both general education and training related to specific skills, and this training is funded by the government; and (d) companies must meet certain technical requirements to be able to offer apprenticeships and bear the financial costs of in-house training.

This model has been presented as the tool capable of ending employment-related problems under the certification of productive working conditions present in Germany. The establishment of the German model as an exportable best practice model and the pressure for the reform of national systems in Latin America and Southern Europe have been the result of the work and pressure of institutions such as the OECD (OECD 2010, 2018), the International Labour Organisation (ILO 2017), the European Union through the Copenhagen Process and the German business community and government itself (Fuchs and Wiemann 2018; Wiemann 2017). However, the direct transfer of the dual apprenticeship system has been questioned on the grounds that Germanic institutional, cultural, and contextual conditions restrict an effective implementation of dual forms of vocational training (Euler 2013).

Against this background, research must respond to the various challenges and questions posed by the dual model of Vocational Education and Training. Scientific production on duality in vocational training has grown in parallel to the increased presence of this concept in the global discourse. However, the absence of a picture of the general configuration of this field of research makes it difficult for other researchers to access knowledge. Outside the scientific domain, it would be difficult to deal with decision-making at the political or professional level due to the large number of individual research reports (Gough, Oliver, and Thomas 2012). Bibliometric analyses, complemented by a systematic content review, are fundamental tools for drawing conclusions from large bodies of research, enabling the advancement of scientific theory and evidence-based practice (Harari et al. 2020).

Thus, a bibliometric analysis of the field of DVET is essential to present a detailed view of the organization of research in this field and to analyze the basic bibliometric indicators, which includes the authors, documents, sources, references, conceptual, social, and intellectual structure, of the literature on dual vocational training.

The questions guiding this bibliometric analysis are:

- How many studies on DVET have been published in the period from 2000 to the present? What has been their flow?
- What are the main sources?

- Who are the most active authors on the subject? Who are the most cited authors?
- What are the most cited documents?
- What are the most relevant references?
- Which institutions are supporting research on DVET?
- How is the social, intellectual, and conceptual structure of the literature developed?

Methodology

The current study consists of a Systematic Literature Review. The main objective of this type of review is to obtain an overview of specific fields of study (Gough, Oliver, and Thomas 2012). According to Harari et al. (2020), this study methodology aims to obtain conclusions based on scientific evidence that enables the theoretical and practical development of the research field (Harari et al. 2020).

However, for such reviews to be successful, it is essential to apply methodologies that are distinguished by a high level of reliability, transparency, and replicability. For this reason, this article uses the PRISMA Statement. This statement stands out mainly for its comprehensive and systematic nature, which helps to minimize bias in the selection and inclusion of studies and to reduce subjectivity in literature review processes (Moher et al. 2010).

Databases and Search Equations

The database selected for the document search was Web of Science (WoS). It was chosen for several reasons. First, because of its reputation in the international scientific arena. Secondly, due to the efficiency of its analysis techniques, which allows the detection of high-quality research (Codina 2018).

The keywords used in this database were obtained after an exploratory review. In this sense, finally, different synonyms of vocational education were used as well as terms related to the field (both in Spanish and English). These languages were selected following the guidelines of Stern and Kleijnen (2020) and Ferreira, Urrútia, and Alonso-Coello (2011). That is, English was used as it is the most widely used language in the world of science, and Spanish was used as it is the native language of the authors. These terms were combined with different Booleans to obtain the following search equation: ("dual vet" OR "fp dual" OR "dual vocational education and training" OR "formación profesional dual" OR "dual education system" OR "dual education model" OR "dual apprenticeship*" OR "formación dual").

Research and Selection of Studies

After entering the search equation into the WoS database, a total of 146 records were obtained. However, these were reduced after applying different inclusion/exclusion criteria.

A series of inclusion/exclusion criteria were applied based on the databases themselves and focused on the following three essential aspects: year of publication, language, and type of publication. As for the year of publication, it was limited to the time span between 2000 and 2020.

This time range was selected as it covers the whole cycle of European education policy in relation to the promotion of VET and Dual VET. With regard to language, only publications in English and Spanish were included (Martínez-Izquierdo and Torres-Sánchez 2022a, 2022b). Finally, regarding the format of the publications, only articles and book chapters were considered with the aim of obtaining the broadest possible overview from published and peer-reviewed documents (Codina 2018). After this process, the records were reduced to eighty-five studies.

After these processes, the title and abstract of the remaining papers were read. In this second phase, the inclusion/exclusion criteria used were based on the degree of adequacy of the studies with the objective of the present research (Booth, Papaionnou, and Sutton 2012). In this sense, therefore, records that did not directly address Dual VET were eliminated. As a result, the number of studies was reduced to seventy-three. Figure 1 shows the process of study selection.

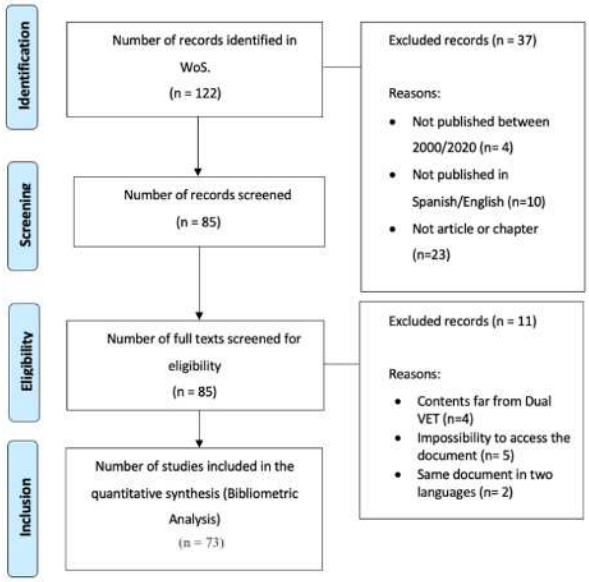

Figure 1: Flow Chart of the Study Search and Selection Process

Finally, a total of seventy-three studies were selected for quantitative analysis in the present study. This entire selection process and the subsequent process of analysis of the results was carried out by two researchers in order to provide the study with the highest possible level of coherence and reliability (Creswell 1998). To this end, consensual processes were developed based on reflection and discussion of each of the decisions made in this research.

Data Analysis

The selected studies were subjected to bibliometric analysis using the Biblioshiny application. The aim of this application is to bring bibliometrics closer to groups new to coding. In addition, Biblioshiny allows the analysis of three knowledge structures (conceptual, intellectual, and social) and three levels of metrics (source, author, and document) (Moral-Muñoz et al. 2020).

Biblioshiny works with txt. or bib. files, so after the selection of the documents, they were all exported to these formats. Finally, the analysis of the results consisted of a detailed description of different aspects such as research areas, authors, documents, conceptual structure, intellectual structure, and social structure.

In this study, we only focus on quantitative analysis as the aim is to describe and establish a general overview of the subject matter of the study. Future studies should delve deeper into qualitative approaches that allow for content analysis of the selected texts.

Results: Bibliometric Analysis (WoS)

The body of references retrieved from WoS is composed of a total of seventy-three documents; sixty-four are scientific articles, and nine are book chapters. The total number of authors is 121, while the number of sources is forty-three. A detailed bibliometric analysis of the selected body of documents is shown in Figure 2. For this purpose, the analysis has been organized around the following three sections: conceptual structure, intellectual structure, and social structure.

Description	Results
Documents	73
Sources (Journals, Books, etc.)	43
Keywords Plus (ID)	89
Author's Keywords (DE)	232
Period	2004 - 2020
Average citations per documents	3.822
Authors	121
Author Appearances	140
Authors of single-authored documents	31
Authors of multi-authored documents	90
Single-authored documents	34
Documents per Author	0.603
Authors per Document	1.66
Co-Authors per Documents	1.92
Collaboration Index	2.31
Document types	
ARTICLE	63
ARTICLE; BOOK CHAPTER	8
ARTICLE; PROCEEDINGS PAPER	1
REVIEW; BOOK CHAPTER	1

Figure 2: WoS Overview Information

Conceptual Structure

Scientific production (Figure 3) is grouped between 2004 and the present (2020); the interannual growth rate for the whole period is 23.01 percent, but in the last five years, it has reached 64.38 percent.

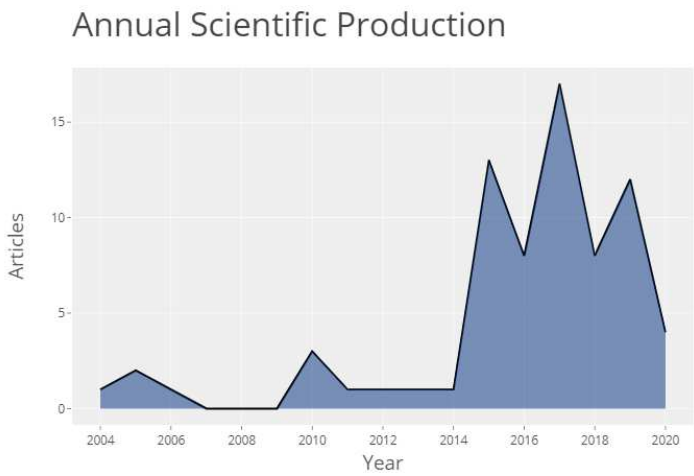

Figure 3: Annual Production

In relation to scientific production by country (Figure 4), Germany stands out as the country with the highest number of documents (n = 37), followed by Switzerland (n = 25), Spain (n = 16), Austria (n = 7), and Russia (n = 5).

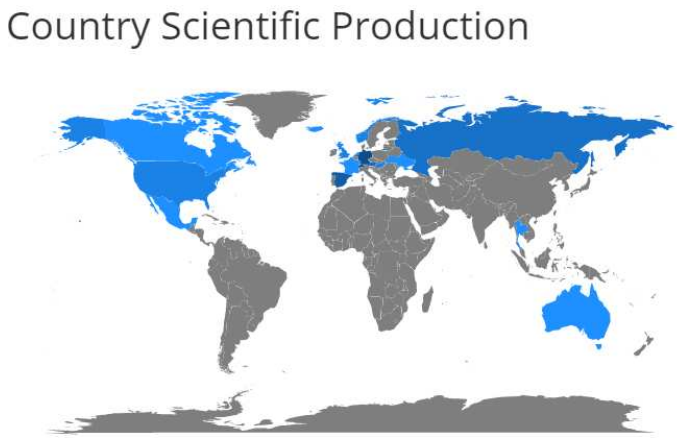

Figure 4: Scientific Production by Country

In terms of sources (Figure 5), the journals with the highest number of publications in this area are the *Journal of Vocational Education and Training* (n = 5), followed by *Education and Training* (n = 4), *Research in Comparative and International Education* (n = 4), and the *International Journal of Organizations* (n = 4).

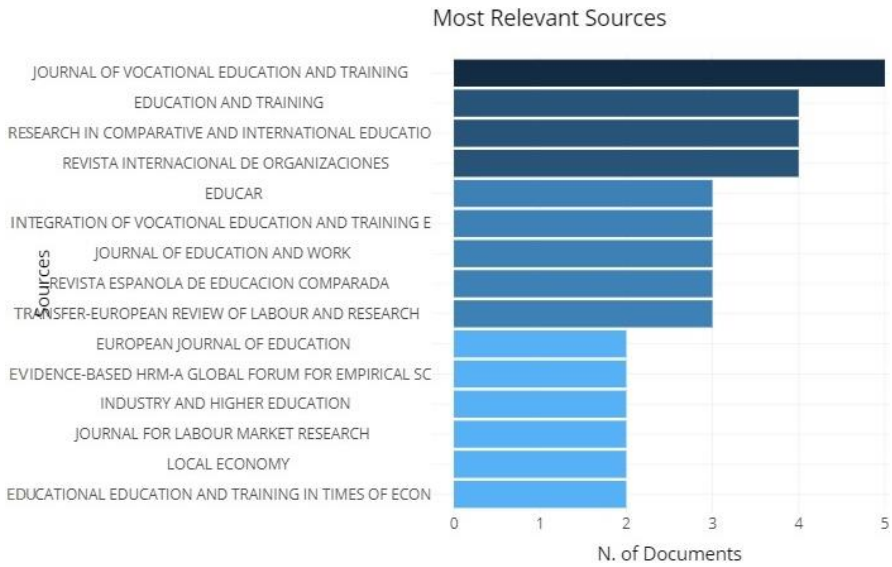

Figure 5: Most Relevant Sources

In terms of sources' impact according to the H-index (Figure 6), *Education and Training* stands out with an H-index equivalent to 4, followed by the *Journal of Vocational Education and Training*, *Research in Comparative and International Education*, and the *Journal of Education and Work* with an H-index of 3.

Figure 6: Impact Ranking of Sources (H-index)

The most relevant authors (Figure 7)—according to the number of publications—are Deissinger (n = 3), Gessler (n = 3), Lamamra (n = 3), and Pineda-Herrero (n = 3). The rest of the authors in the next fifteen positions, such as Marhuenda-Fluiza or Palomares-Montero, only have two publications.

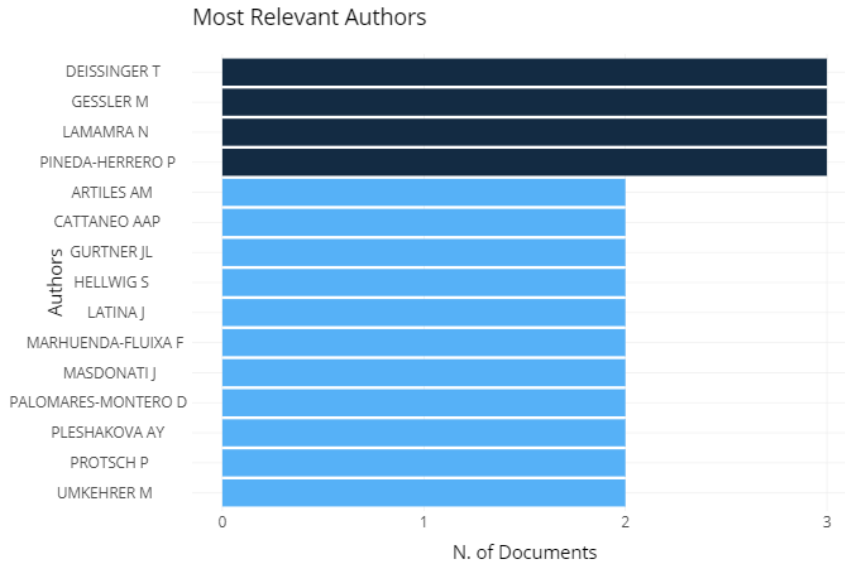

Figure 7: Most Relevant Authors

The most cited author (Figure 7) is again Deisinger with fifty-two citations. However, there are other highly cited authors, such as Eichhorst (51), Schmidl (51), and Zimmermann (51).

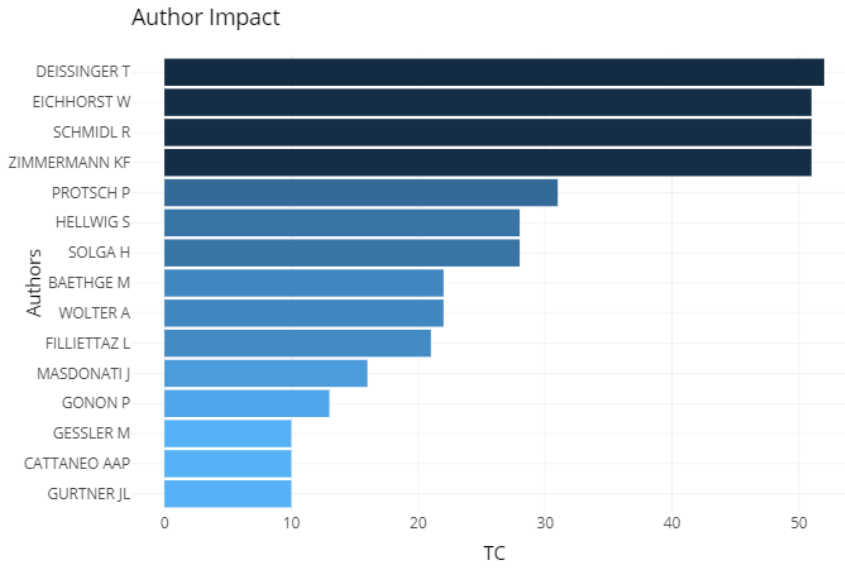

Figure 8: Authors' Impact by Number of Citations

Regarding the H-index (Figure 9), Deissinger again leads the top fifteen (H-index = 3), followed by six authors with an H-index of 2 (Gessler, Cattaneo, Gurtner, Hellwig, Masdonati, and Protsch).

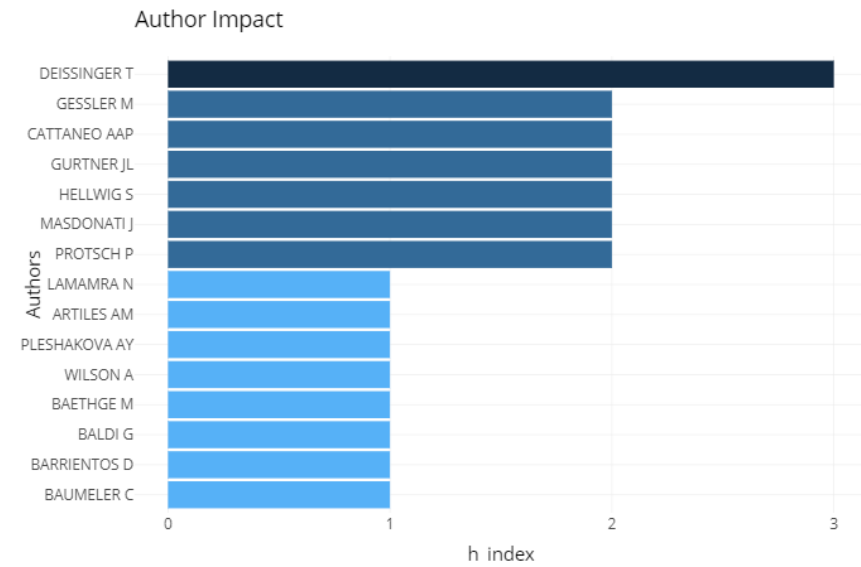

Figure 9: Author Impact According to H-index

The affiliations (Figure 10) are led by the Universitat de Autònoma de Barcelona and the University of Bremen, both with five studies. They are followed by four studies by the Swiss Federal Institute of Vocational Education and Training, the University of Konstanz, and the University of Lausanne with four papers each.

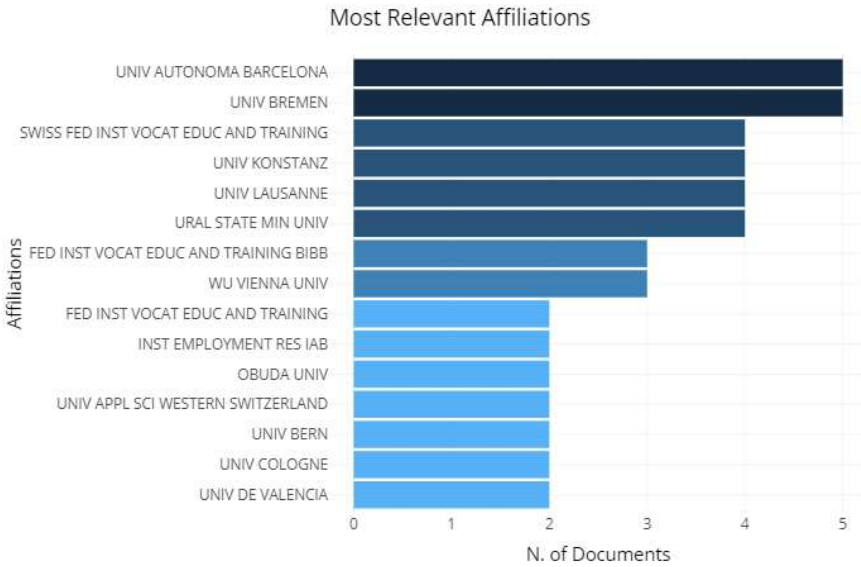

Figure 10: Most Relevant Affiliations According to the Number of Documents

Looking at the most cited papers (Figure 11), the leader is the study by Eichhorst et al. (2015) with fifty-one citations. Behind him, although with a large gap, are other authors such as Protsch and Solga (2016) and Deissinger and Hellwig (2005), who have twenty-eight and twenty-six citations, respectively.

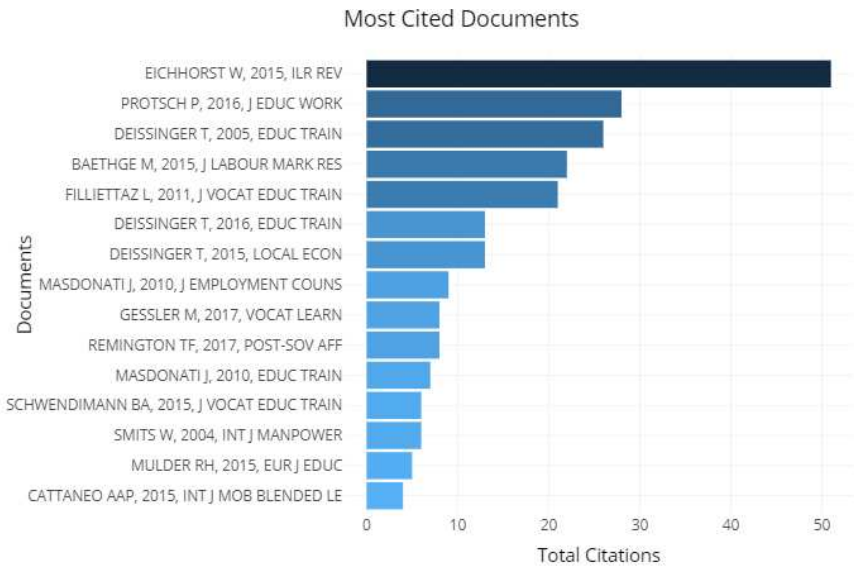

Figure 11: Most Cited Documents

In terms of the most cited references (Figure 12), Wolter and Ryan (2011), Acemoglu (1998), Busemeyer and Trampusch (2012), Euler (2013) and Ryan (2001) stand out.

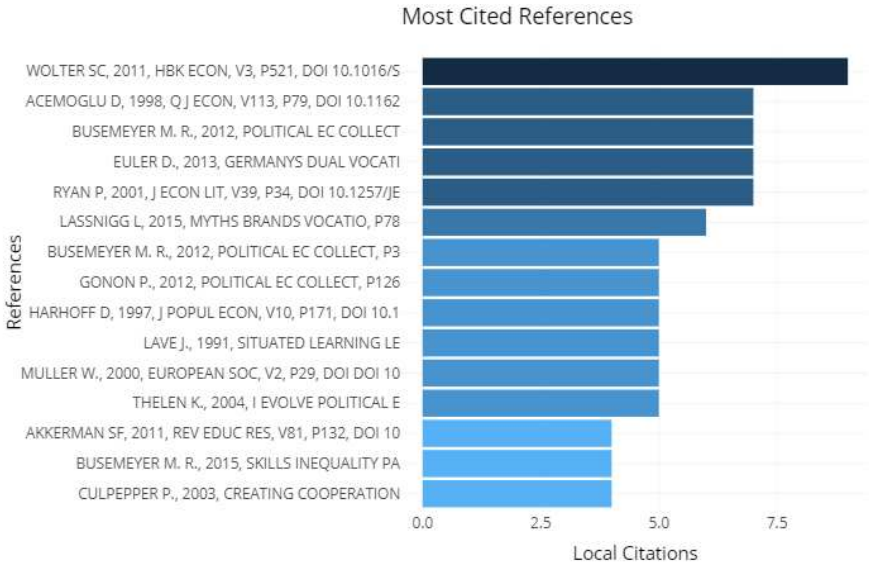

Figure 12: Most Cited Local References

As far as the analysis of keywords is concerned, the authors agree on the use of the following terms (Figure 13): "vocational education and training," "apprenticeship," "dual system," and "apprenticeships." However, other less trivial concepts such as "unemployment," "collective skill formation," "corporatism," and "governance" are also noted. Finally, the names of countries where the Dual VET debate is more present, such as "Germany" or "Spain," also stand out.

Figure 13: Keywords Analysis through Word Cloud

On the other hand, in relation to the Keywords Plus (Figure 13), the main terms represented are "education," "transition," "vocational education," "mode," and "skills." Other words such as "entry," "investment," "returns," "school," and "demand" also have a high presence in the international discourse on Dual VET.

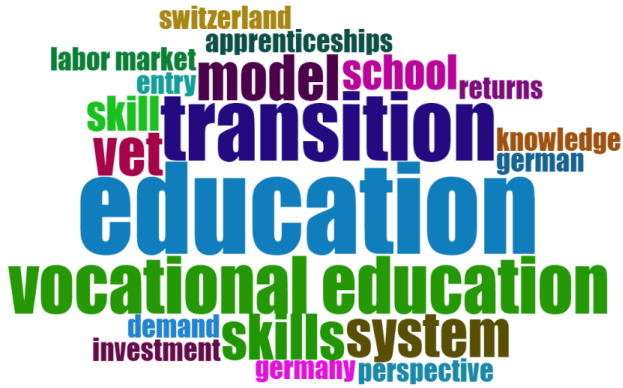

Figure 14: Keywords Plus Analysis through Word Cloud

The coincidence network of these Keywords Plus (Figure 15) shows the existence of three groupings, among which the keywords *transition*, *skills*, and *education* stand out. Around *transition* and *education*, terms such as *Germany*, *Switzerland*, *Labor-market*, and various words referring to the Dual VET system (vet, model, system, etc.) are grouped together. Around *skills*, we find constructs such as *personal values, school, solidarity, discrimination, workers*, or *returns*. Finally, a third family of constructs is found, consisting of *unemployment, skill, trends, entry*, and *perspectives*.

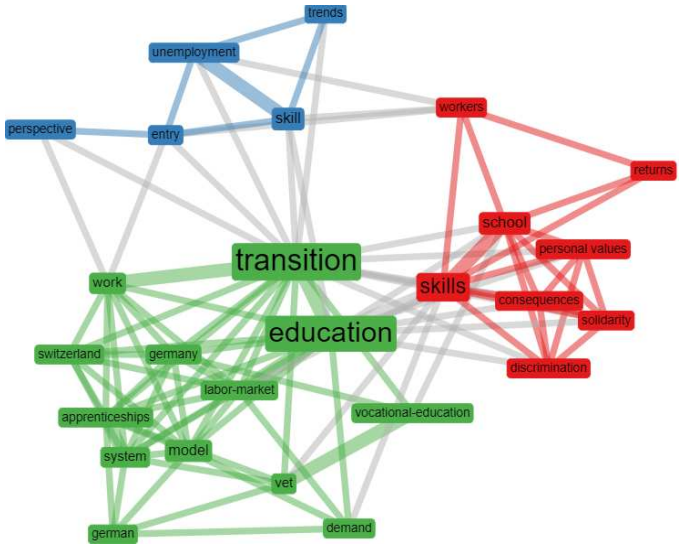

Figure 15: Keyword Plus Matching Network

Intellectual Structure Analysis

This section will show the analysis of the intellectual structure, specifically the co-citation networks. This analysis will consist of the following three parts: authors, documents, and sources.

The network of co-citation between authors (Figure 16) shows the predominance of three authors, the OECD, Euler, and Busemeyer, around which the rest are grouped. In particular, the latter has a central place in the network and receives citations from all three families.

The first of these families is grouped around the OECD and is made up of Ryan, Wolter, and Acemoglu. The family pivoting around Euler is made up of Gonon, Deissinger, and Greinert. Finally, the largest grouping is around Busemeyer and is made up of Thelen, Streeck, Baethge and Wolter, Culpepper, and Anonymous. The exceptions are Guile and Fuller.

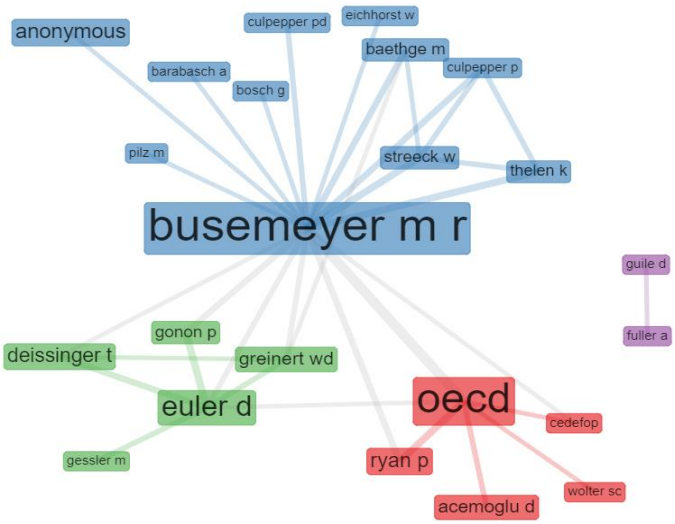

Figure 16: Authors' Co-Citation Network

Secondly, the inter-document co-citation network (Figure 17) yields six networks. Four of them are made up of only two documents, while the other two are made up of five. The first of these families' groups Busemeyer (2015), Gonon and Maurer (2012), and Culpepper (2003). The latter paper links this grouping with the one composed by Thelen (2004) and Busemeyer and Trampusch (2012). The third network is mainly composed of Wolter and Ryan (2011), Acemoglu (1998), and Ryan (2001). The remaining networks, composed of two papers, are Harhoff and Kane (1997) and Winkelmann (1996); Tynjälä (2008) and Eraut (2004); and Fuller and Unwin (2004) and Lave and Wenger (1991).

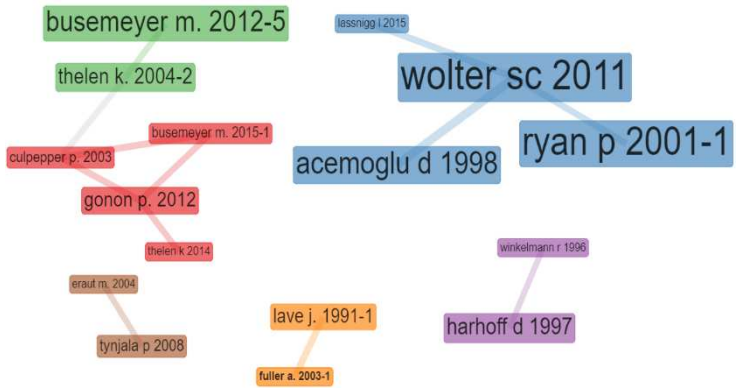

Figure 17: Documents' Co-Citation Network

Finally, to conclude the analysis of the intellectual structure, the source co-citation network (Figure 18) shows the existence of three groups. The first is arranged around the *Journal of Vocational Education and Training* and includes publications such as *Vocations and Learning*, *Oxford Review of Education*, and *Education and Training*. The second, which is close to the first because of the strong link between the main publication of both, is organized around the *Political Economy of Collective Decision-Making*. The most important sources are *Berufsbildung in Wissenschaft und Praxis,* the *Journal of Education and Work*, and the *European Sociological Review*. The third family has the *Quarterly Journal of Economics* as its core, which is related to publications such as the *Journal of Population Economics* and the *Handbook of Behavioral Economics.*

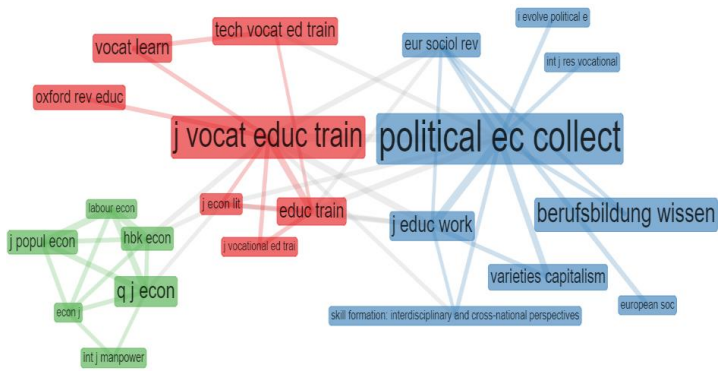

Figure 18: Sources' Co-Citation Network

Social Structure Analysis

Finally, this section will analyze the social structure of the body of documents extracted from WoS according to the following three parameters: authors, institutions, and countries.

The author collaboration network (Figure 19) presents ten groupings, of which seven are made up of four or more authors and three of them are made up of pairs. The most numerous families have their most important nuclei, Cattaneo and Gurtner, accompanied by Zufferey, Schwendimann, or Betrancourt. The second grouping by number of authors is made up of Moles, Lope, Barrientos, Carrasquer, and Artiles, the latter being the most important nucleus. Thirdly, there are five groups of four authors. For example, the third group is led by Marhuenda-Fluixá and Palomares-Montero, and Pineda-Herrero is the most important core in the fourth. The groups of pairs are made up of authors such as Lamamra and Masdonati and Deissinger and Hellwig.

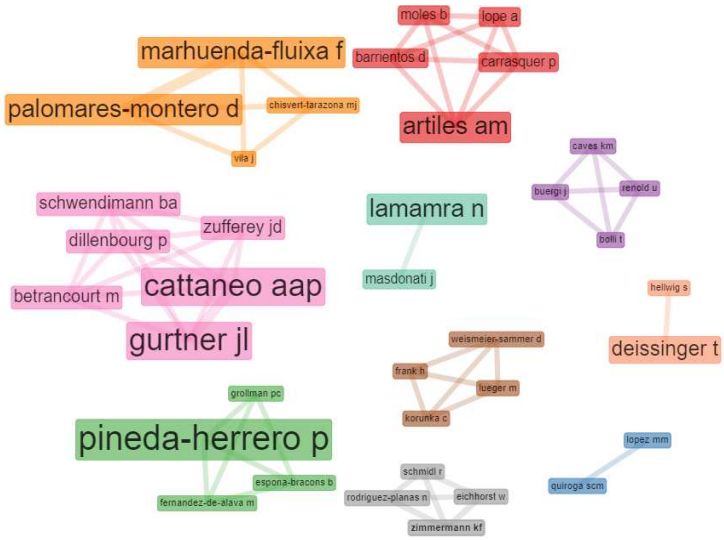

Figure 19: Author Collaboration Network

The network of collaboration between institutions (Figure 20) is made up of ten families. Of these, five are made up of more than two institutions. The most numerous have six nuclei. The first family is made up of the Universitat Autòmoma de Barcelona and the Federal Institute of Vocational Education and Training (BIBB), as main nuclei linked to the German Economic Institute, the University of the Balearic Islands, and the University of Cologne. The second grouping has as its main element the University of Bern, accompanied by the University of Munich, the German Institute of Economic Research (DIW), and the Swiss Coordination Centre for Research in Education. The third family consists of the Swiss Federal Institute of Vocational Education and Training as the main institution, together with the University of Fribourg, the University of Geneva, and the École Polytechnique Fédérale de Lausanne. The University of Zurich, the University of Wuppertal, and the University of Konstanz are three institutions. The two-entity cooperative entities include those formed by the University of Glasgow and the University of Glasgow; the University of Glasgow and

Universidad de Barcelona; the Oslo and Arkeshus University College of Applied Sciences and University of Oslo collaboration unit; and, finally, the Institute of Advanced Studies in Education (IASE) and the Research Group on Equity in Education.

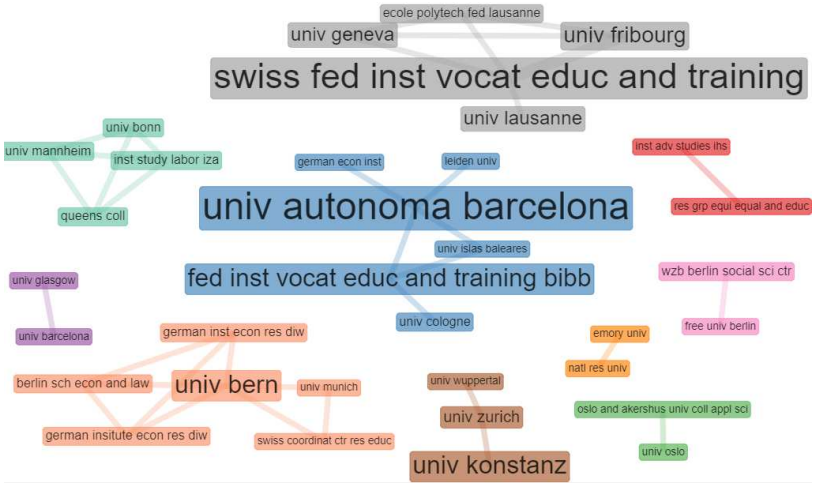

Figure 20: Institutional Collaboration Network

Finally, the network of collaboration between countries (Figure 21) shows how Germany occupies a central place in international production. The strongest link is between Switzerland and Germany, with a total of four joint publications, which, together with Canada (1), form one of the groups. The second strongest link with Germany is with Spain (2). The latter country forms a family together with the United Kingdom (1) and the Netherlands (1). Finally, the US and Russia form the last of the groupings, linked to Germany by the collaboration between Germany and the US (1).

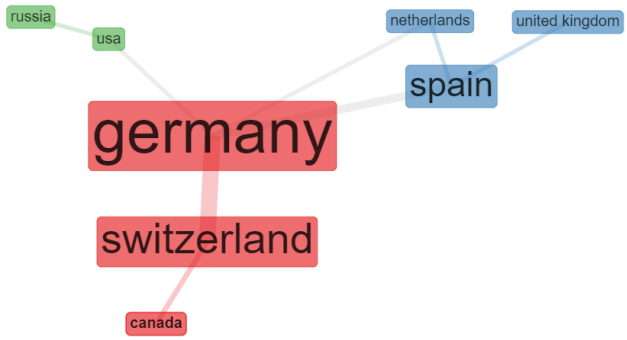

Figure 21: Networking between Countries

Discussion and Conclusion

The main objective of this study was to collect and systematize the most relevant findings on dual vocational education. To this end, a systematic literature review was carried out using the WoS database, which after applying different inclusion/exclusion criteria, yielded seventy-

three documents. These studies were subjected to bibliometric analysis using Biblioshiny. This bibliometric analysis has provided a global picture of the field of research on dual vocational training. The geographical and temporal distribution of the scientific production, the analysis of sources, keywords, authors, and their affiliations, as well as the social and intellectual structure analyzed, provide evidence of interest in this field of study. In the following text, the most relevant results will be highlighted and discussed with the literature.

First, in terms of the temporal distribution of the studies, the first documents date back to 2004. This date coincides with the beginning of the development of the Copenhagen process with the original Communiqué (EC 2002) and the Maastricht Communiqué (EC 2004). Therefore, the beginning of scientific production in the twenty-first century on Dual VET coincides in time with a process that promotes the reform and harmonization of vocational training systems in the European Union. In fact, one of the first productions (Deissinger and Hellwig 2005) examines both the history of the development of the German vocational training system—the benchmark for dual vocational training—and the challenges it faces today after jumping on the bandwagon of the European reform agenda. The flow of production was cut off until 2010, coinciding in time with the Great Recession, when a period of growth in production was observed until an exponential leap in 2015. It is worth noting that, given the economic devastation experienced during those years, the countries affected placed the political and media spotlight on the academic and vocational training systems for their ineffectiveness. Vocational training systems were blamed for high unemployment rates due to their inability to train workers with the necessary skills for the new labor demands. In Europe, the Copenhagen process continues with the Bruges Communiqué (EC 2010) and Riga (EC 2015), reinforced by the ravages of the economic crisis. The economic recovery coincided in time with the exponential increase in scientific production on duality in vocational education and training. EU and national actors are seeking to avoid a repeat of the Great Recession and are reflecting on the need for social, structural, and economic reforms. Germany's dual vocational education and training system is seen as a successful model for vocational education and training reform due to its resilience in terms of internal functioning parameters and the employability of its graduates. Likewise, in Latin America—especially Mexico—in view of the economic growth scenario, the focus was on improving the job training of employees or future employees of large German companies, especially in the automotive sector. This process has been carried out by German companies themselves, local governments, and various German institutions such as the Chamber of Commerce. Consequently, there is growing interest in research on this model, its characteristics, its transfer possibilities, and so on, which is triggering scientific production on the subject. Future research should determine whether, after the end of the reform cycles, scientific production on vocational education and training continues to increase or whether interest in the subject is waning.

Secondly, the geographical distribution of scientific production on this subject is located in Europe, North America, and Central Asia. This distribution coincides with what has been discussed earlier. The predominant region is Europe, the cradle of the German model of success

and which is immersed in a reform process for vocational training in the member countries. The leading countries are Germany and Switzerland, both with a Germanic model of vocational training but with differences in duality. Behind them is Spain, which in 2012 began to reform its national vocational training system in order to increase its duality. The countries of the Anglo-Saxon sphere appear among the top positions, but it is worth noting the presence of other areas such as Mexico, Russia, and Thailand. Mexico is committed to automobile production, led by German companies, which shows a certain influence of this socioeconomic reality on production and scientific interest. Thailand and Russia are in the process of reforming their national vocational training systems with the aim of boosting the competitiveness of their economies. Further analysis should focus on whether the geographical expansion of interest in this field of research continues and understand the motivation for it. Likewise, further analysis should also investigate the scientific, governmental, social, and economic aspects that facilitate dual vocational education and training research in the different regions.

On the other hand, the analysis of the sources leads to the conclusion that, despite being part of the field of educational research, journals with education as a general theme have little interest in publishing on dual vocational training. On the contrary, the main sources of scientific production are journals specialized in vocational training, employment, or economics and industry. However, the ranking demonstrates an interest in comparative education in this area, which is closely related to an interest in policy transfer. Possible lines of research should delve into the global understanding of the field of vocational education and training to elucidate whether this type of publication dynamics and editorial interest is repeated throughout the area or whether it is exclusive to dual vocational education and training.

The keyword analysis also gives us a general idea of the subject matter of the document collection. The keywords, ignoring the search words used when collecting the documents, tell us about unemployment, corporatism, governance, and collective skill formation, as well as the names of countries such as Germany and Spain. The keywords plus yield results in words such as transition, labor market, skills, investment, returns, and entry. These results are complemented by the analysis of the keyword-plus matching network, which allows us to configure an incipient map of interests within this research field. A recurring interest is the issues of employment and unemployment, which converges with the motivation that the political and social interest in dual vocational training in educational reform arouses. This model is presented as a tool in the fight against unemployment and precariousness. The use of terms such as corporativism and corporate social responsibility denotes questions of solidarity and social commitment, basic aspects for the functioning of the German system, and relevance in times of recession or economic recovery. Likewise, terms related to training content speak to one of the major concerns of this training system—the content of the curriculum. Finally, the investment and profit terms represent the challenge of making the system profitable for the employers involved in training. At this point, a content analysis of the body of documents would be advisable in order to deepen the understanding of what is discussed and concluded in the different texts, as well as the methodology used.

The analysis of authors, on the other hand, yields a relevant conclusion; Deissinger's place is predominant both in terms of the number of publications and impact. This author, linked to CEDEFOP, focuses on Germanic dual vocational training systems, analyzing their characteristics and limitations, as well as their exportability. In a context of a wave of reforms in European and Latin American vocational training systems, the relevance of this type of study is foreseeable. The second author, if we combine the rankings of impact and number of documents, would be Cattaneo. This is explained by his eminent interest in studying the use of the application of ICTs in this type of vocational training system. Cattaneo's work seeks to address the existing problem of integrating learning from two different contexts—the school and the workplace. They are closely followed by Protsch and Solga. These authors address issues of inequality concerning access to training positions in the company, another of the fundamental factors when implementing a dual vocational training system. Finally, it is worth mentioning the presence of Marhuenda, a researcher focused on analyzing the details of the implementation process of dual vocational training in Spain. Therefore, it is concluded that the most relevant authors focus on the internal functioning of the German model and its exportability, the implementation process, and the resolution of the challenges of the system itself.

In terms of affiliations, there is a notable presence of Spanish research centers among the group of German-speaking centers. This is due to the reform process of Spanish vocational training initiated in 2012; the main objective of this was to increase its duality following the principles of the German model. Thus, alongside the University of Bremen and the Swiss Federal Institute for Vocational Education and Training, there is the Universitat Autónoma de Barcelona. Future analyses will have to check whether the Germanic predominance in affiliations continues or whether affiliations from other regions interested in this area, such as Spain, grow to a position close to it.

The social structure of the field of dual vocational education and training shows some international collaboration. First of all, there are numerous collaborations between German-speaking authors and institutions, especially between Germany and Switzerland. This is to be expected due to the long tradition of this vocational training model in this European region. However, the collaboration of authors from this region with Latin authors, especially Spanish, is striking. The interest in the implementation of dual vocational training has started to create international networks of Germanic researchers and researchers from countries interested in reforming their vocational training systems in order to increase duality. In future analyses, it could be analyzed whether these networks are maintained over time, are a one-off collaboration, or have opened the door to the creation of new international networks between colleagues in the field of research.

Finally, the intellectual structure points to the presence of Busemeyer as a central author in the co-citation network. Busemeyer focuses on collective competence formation, its analysis from a political and economic point of view, collectivity, and segmentation in vocational training systems. In these networks, Culpepper focuses on the analysis of skills training in Germany and cooperation between the various actors involved, and Euler focuses

on the transferability of the German vocational training system as a model of good practice. We also find organizations such as the OECD and CEDEFOP. It would be of interest for future analyses to see whether these authors continue to be among the most cited references over the decades. If the answer is no, it would be worthwhile to look more closely at changes in interests and contextual changes and whether these lead to a focus on new topics.

In conclusion, research on dual vocational education and training is an area that has experienced intense growth recently but is still very fragmented. Although its geographical expansion has gone hand in hand with a certain increase in international collaboration, the networks of collaboration between authors and institutions outside the German-speaking world are in an initial part of the consolidation process. The presence of Latin American authors is still very low, despite the relevance that the model is gaining in the region under pressure from German businessmen with regional interests. On the other hand, research topics, as can be inferred from the analysis of keywords and the authors referenced, are differentiated into the following two streams: (1) research on transfer and implementation and (2) work centered on the challenges presented by the system where it is already a reality. The first dynamic is driven by the reform cycle undertaken in different regions of the world, especially in Southern Europe and Latin America, but also in Asia, especially in India and Thailand. The second focus of interest responds to the demands for constant updating and improvement of the German system due to the economic, technological, and social changes that have been occurring at breakneck speed since the beginning of the twenty-first century. However, there is a link between the two dynamics. The Copenhagen process has boosted the transfer of the model to the southern European regions, but it has also influenced the German model in aspects such as modularization or the introduction of certain competences and their accreditation.

As future lines of research, consideration should be given to answering the different questions raised throughout this conclusion, as well as to checking the evolution of the research area over time and the different socioeconomic and political changes. Future research will also have to take into account the limitation of the language barrier, which prevents the analysis of references specific to the German-speaking world, the leader in this field of research. Furthermore, a qualitative analysis of the collected references would be necessary to gain a deeper understanding of the different topics covered by the WET research.

To establish and analyze the intellectual and social structure of the area, the number of studies limited the bibliometric analysis because this type of analysis is more effective the greater the number of references analyzed. Similarly, this study was limited by the fact that the citations were not yet counted by the end of 2020, and not all the works for this year were yet published.

Acknowledgment

The study, on which this article is based, was part of the support for university teacher training FPU19/02739 and FPU19/00942 and of the project of excellence "P21_00162" which is financed by Junta de Andalucía- Department of University, Research and Innovation.

Conflict of Interest

The authors declare that there is no conflict of interest.

REFERENCES

Acemoglu, Daron. 1998. "Why Do New Technologies Complement Skills? Directed Technical Change and Wage Inequality." *Quarterly Journal of Economics* 113 (4): 1055–1089. https://www.jstor.org/stable/2586974.

Alemán Falcón, Jesús A. 2015. "The Dual System in the German Vocational Training: School and Enterprise." *Educacao e Pesquisa* 41 (2): 495–511. https://www.researchgate.net/publication/286099010_The_dual_system_in_the_German_vocational_training_School_and_enterprise.

Baethge, Martin, and Andra Wolter. 2015. "The German Skill Formation Model in Transition: From Dual System of VET to Higher Education?" *Journal for Labour Market Research* 48 (2): 97–112. https://doi.org/10.1007/s12651-015-0181-x.

Booth, Andrew, Diana Papaionnou, and Anthea Sutton. 2012. *Systematic Approaches to a Successful Literature Review.* London: SAGE.

Busemeyer, Marius R. 2015. *Skills and Inequality: The Political Economy of Education and Training Reforms in Western Welfare States*. Cambridge: Cambridge University Press.

Busemeyer, Marius, and Christine Trampusch, eds. 2012. *The Political Economy of Collective Skill Formation Systems*. Oxford: Oxford University Press.

Codina, Luis. 2018. *Systematised Literature Reviews: General Procedures and Framework for Humanities and Social Sciences*. Barcelona: Universitat Pompeu Fabra, Departamento de Comunicación, Máster Universitario en Comunicación Social.

Creswell, John. 1998. *Qualitative Inquiry and Research Design: Choosing among Five Traditions*. Thousand Oaks, CA: SAGE.

Culpepper, Pepper D. 2003. *Creating Cooperation: How States Develop Human Capital in Europe*. Ithaca, NY: Cornell University Press.

Deissinger, Thomas, and Silke Hellwig. 2005. "Apprenticeships in Germany: Modernising the Dual System." *Education and Training* 47 (4–5): 312–324. https://doi.org/10.1108/00400910510601896.

EC (European Commision). 2015. "Riga Conclusions 2015." https://education.ec.europa.eu/document/riga-conclusions-2015.

EC (European Commission). 2002. "Declaration of the European Ministers of Vocational Education and Training, and the European Commission, Convened in Copenhagen on 29 and 30 November 2002, on Enhanced European Cooperation in Vocational Education and Training. 'The Copenhagen Declaration.'" https://eric.ed.gov/?id=ED477824.

EC (European Commission). 2004. "Maastricht Communiqué on the Future Priorities of Enhanced European Cooperation in Vocational Education and Training (VET)." https://www.cedefop.europa.eu/files/communique_maastricht_priorities_vet.pdf.

EC (European Commission). 2010. "The Bruges Communiqué on Enhanced European Cooperation in Vocational Education and Training for the Period 2011–2020." https://www.cedefop.europa.eu/files/bruges_en.pdf.

EC (European Commission). 2012. "Communication from the Commission to the European Parliament, the European Council, The Council, the European Economic and Social Committee and the Committee of the Regions. Rethinking Education: Investing in Skills for Better Socio-Economic Outcomes. Publications Office of the European Union." https://www.cedefop.europa.eu/en/content/rethinking-education-investing-skills-better- socio-economic-outcomes.

Eichhorst, Werner, Nuria Rodriguez-Planas, Ricarda Schmidl, and Klaus Zimmermann. 2015. "A Road Map to Vocational Education and Training in Industrialized Countries." *ILR Review* 68 (2): 314–337. https://doi.org/10.1177/0019793914564963.

Eraut, Michael. 2004. "Informal Learning in the Workplace." *Studies in Continuing Education* 26 (2): 247–273. https://doi.org/10.1080/158037042000225245.

Euler, Dieter. 2013. *Germany's Dual Vocational Training System: A Model for Other Countries?* Gütersloh, DE: Bertelsmann Stiftung.

Eurostat. 2022. December 2021: Euro Area Unemployment at 7.0%. EU at 6.4% (No. 16/2022; Euroindicators). https://ec.europa.eu/eurostat/documents/2995521/14233878/3-01022022-AP- EN.pdf/cfe71acd-ef6c-b52b-085f-838598dd9a88?t=1643651817091.

Ferreira, Ignacio, Gerard Urrútia, and Pablo Alonso-Coello. 2011. "Systematic Reviews and Meta-analyses: Conceptual Basis and Interpretation." *REC Publications* 64 (8): 788–696. https://doi.org.10.1016/j.recesp.2011.03.029.

Fuchs, Martina, and Judith Wiemann. 2018. "The Export of Germany's "Secret of Success" Dual Technical VET: MNCs and Multiscalar Stakeholders Changing the Skill Formation System in Mexico." *Cambridge Journal of Regions Economy and Society* 11 (2): 373–386. https://doi.org/10.1093/cjres/rsy008.

Fuller, Alison, and Lorna Unwin. 2004. "Young People as Teachers and Learners in the Workplace: Challenging the Novice–Expert Dichotomy." *International Journal of Training and Development* 8 (1): 32–42. https://doi.org/10.1111/j.1360-3736.2004.00194.x.

Gonon, Philipp, and Markus Maurer. 2012. "Educational Policy Actors as Stakeholders in the Development of the Collective Skill System: The Case of Switzerland." In *The Political Economy of Collective Skill Formation*, 126–149. Oxford: Oxford University Press.

Gough, David, Sandy Oliver, and James Thomas. 2012. "Introducing Systematic Reviews." In *An Introduction to Systematic Reviews*, 1–16. London: SAGE.

Harari, Michael, Heather Parola, Christopher Hartwell, and Amy Riegelman. 2020. "Literature Searches in Systematic Reviews and Meta-Analyses: A Review, Evaluation, and Recommendations." *Journal of Vocational Behavior* 118:103377. https://doi.org/10.1016/j.jvb.2020.103377.

Harhoff, Dietmar, and Thomas J. Kane. 1997. "Is the German Apprenticeship System a Panacea for the U.S. Labor Market?" *Journal of Population Economics* 10 (2): 171–196. https://doi.org/10.1007/s001480050037.

ILO (International Labour Organization). 2017. *ILO Toolkit for Quality Apprenticeships—Vol. 1: Guide for Policy Makers*. Geneva: ILO.

INE (National Statistical Institute Spain). 2020. *Labour Force Survey (EPA) Fourth Quarter 2019*. Madrid: INE.

Lave, Jean, and Etienne Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. New York: Cambridge University Press.

Martínez-Izquierdo, Luis, and Mónica Torres-Sánchez. 2022a. "Dual Vocational Education and Training Systems' Governance Model and Policy Transfer: The Role of the European Union in Its Diffusion." *Social Sciences* 11 (9): 403. https://doi.org/10.3390/socsci11090403.

Martínez-Izquierdo, Luis, and Monica Torres-Sánchez. 2022b. "Dual Vocational Education and Training and Policy Transfer in the European Union Policy: The Case of Work-Based Learning and Apprenticeships." *Cogent Education* 9 (1): 2154496. https://doi.org/10.1080/2331186X.2022.2154496.

Moher, David, Aalessandro Liberati, Jennifer Tetzlaff, and Douglas G. Altman. 2010. "Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement." *International Journal of Surgery* 8 (5): 336–341. https://doi.org/10.1371/journal.pmed.1000097.

Moral-Muñoz, José A., Enrique Herrera-Viedma, Antonio Santisteban-Espejo, and Manuel J. Cobo. 2020. "Software Tools for Conducting Bibliometric Analysis in Science: An up-to-date Review." *El Profesional de La Información* 29 (1): 1. https://doi.org/10.3145/epi.2020.ene.03.

OECD (Organisation for Economic Co-operation and Development). 2010. "Learning for Jobs." https://www.oecd-ilibrary.org/education/learning-for-jobs_9789264087460-en.

OECD (Organisation for Economic Co-operation and Development). 2018. "Seven Questions about Apprenticeships." https://doi.org/10.1787/9789264306486-en.

Protsch, Paula, and Heike Solga. 2016. "The Social Stratification of the German VET System." *Journal of Education and Work* 29 (6): 637–661. https://doi.org/10.1080/13639080.2015.1024643.

Ryan, Paul. 2001. "The School-to-Work Transition: A Cross-National Perspective." *Journal of Economic Literature* 39 (1): 34–92. https://www.jstor.org/stable/2698454.

Stern, Cindy, and Jos Kleijnen. 2020. "Language Bias in Systematic Reviews: You Only Get Out What You Put In." *JBI Evidence Synthesis* 18 (9): 1818–1819. https://doi.org.10.11124/JBIES-20-00361.

Thelen, Kathleen. 2004. *How Institutions Evolve: The Political Economy of Skills in Germany, Britain, the United States, and Japan*, 1st ed. Cambridge: Cambridge University Press.

Tynjälä, Päivi. 2008. "Perspectives into Learning at the Workplace." *Educational Research Review* 3 (2): 130–154. https://doi.org/10.1016/j.edurev.2007.12.001.

Wiemann, Judith. 2017. "Export of German-Style Vocational Education: A Case Study in the Automotive Industry in Puebla, Mexico." *International Journal of Automotive Technology and Management* 17 (2): 208–222. https://doi.org/10.1504/IJATM.2017.084805.

Winkelmann, Rainer. 1996. "Employment Prospects and Skill Acquisition of Apprenticeship-Trained Workers in Germany." *ILR Review* 49 (4): 658–672. https://doi.org/10.1177/001979399604900405.

Wolter, Stefan C., and Paul Ryan. 2011. "Apprenticeship." In *Handbook of the Economics of Education*, edited by Eric A. Hanushek, Stephen Machin, and Ludger Woessmann, 521–576. Amsterdam: Elsevier.

ABOUT THE AUTHORS

Luis Martínez-Izquierdo: Teaching and Research Staff, Department of Pedagogy, University of Granada, Granada, Spain
Email: luismartinez@ugr.es

Javier Mula-Falcón: Teaching and Research Staff, Department of Didactics and School Organization, University of Granada, Granada, Spain
Corresponding Author's Email: javiermf@ugr.es

Mónica Torres-Sánchez: Associate Professor, Department of Theory and History of Education and MIDE., University of Malaga, Málaga, Spain
Email: motorres@uma.es