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Forty-five years of research on entrepreneurship education: a review and bibliometric analysis from the Scopus dataset

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Abstract

In recent years, there has been a significant number of publications related to entrepreneurship education (EE) to the extent that a systematic review of EE trends, changes, and development is needed. Based on the bibliometric analysis, this paper investigates 1782 EE-related documents published between 1977 and 2022 from the Scopus database to assess the growth trajectory of publications, most cited papers, key authors, most prolific countries, and institutions. The results show an explosive growth in the academic literature on EE in the last decade. In addition, the bibliographic coupling of documents and co-occurrence of authors' keywords analyses reveal three primary schools of thought in EE research, including EE in higher education, EE and entrepreneurial intention, and motivation of EE. This paper contributes to the existing literature by providing a comprehensive picture of EE. More importantly, this study calls for more research on the relationship between EE and big data, EE and self-efficacy, and EE and deep learning.

Keywords: Entrepreneurship education, Entrepreneurial intention, Motivation, Innovation, Bibliometric review

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1. Introduction

Entrepreneurship education (EE) has gained increasing attention in higher education since the mid-20th century in America and has spread globally. Scholars emphasize the contribution of EE programs to the passion, knowledge, and skills of learners in entrepreneurship (Meyer *et al.*, 1991; Sherkat and Chenari, 2022). In addition, EE has significant impacts on the community by fostering business start-up rates and online courses (Nabi *et al.*, 2017). EE is an important factor in socio-economic development and national prosperity (Hindle and Rushworth, 2002). However, it also challenges educators and learners due to the increasing usage of online technologies and critical thinking skills (Gunkel, 2017; Ratten and Usmanij, 2020).

Although EE has been explored from different aspects, it is essential for a more profound understanding of tracking EE studies' growth trajectory, changes, and gaps. Thus, this study aims to visualize the trends and provide a more comprehensive knowledge of EE studies over the past forty-five years. Additionally, this study contributes to the literature by reviewing the latest and hottest topics about EE and then suggesting a new direction for further research in the near future.

The next section of this study provides a brief overview of EE, including its definitions and previous bibliometric reviews. After that, the research methodology will be discussed, focusing on data and VOSviewer analyses. Then, the results are analyzed. The study ends with conclusions and the limitations of the research.

2. Conceptual framework

Definitions of entrepreneurship education

Many definitions of EE have been proposed. Linan (2004) described EE as all education and training activities to perform entrepreneurial intention, or elements that impact that intention, such as feasibility, desirability, and knowledge of the entrepreneurial activities. Alberti *et al.* (2004) explained EE as the structured and formal dissemination of competencies needed to become entrepreneurs. According to Hannon (2005), EE can be classified into three categories, including "the contextual application of entrepreneurial characteristics and qualities (entrepreneurship), a state of being (entrepreneurial), and the creation of an entrepreneurial climate and support structure (entrepreneurism)". Boon *et al.* (2013), Ratten and Usmanij (2020) characterized EE as an experience-based learning method to develop entrepreneurial competencies.

Previous bibliometric research on entrepreneurship education

There has been some research on this subject using bibliometric analysis, such as those conducted by Kakouris and Georgiadis (2016), Johann *et al.* (2020), and Deveci (2022). The most significant one was by Kakouris and Georgiadis (2016). Based on 7726 publications with the keyword "entrepreneurship" extracted from the Scopus database in the 1980-2012 period, Georgiadis (2016) reveals that there is poor evidence on the relationship between

entrepreneurship research and the three aspects of EE including lifelong learning, vocational training, and career counseling. They proposed that there were still many research gaps, such as experimental learning, advanced learning processes, and education for innovation. However, this review only identified 345 out of 7726 articles that combined entrepreneurship and education. Johann *et al.* (2020) examined 146 articles from the Web of Science (WoS) database from 2009 to 2019 to broaden the knowledge about design thinking and EE research in the school context. The authors emphasized the important role of design thinking as a valuable tool for teaching entrepreneurship today. Furthermore, Deveci (2022) also investigated WoS sources with 352 abstracts between 1991 and 2020 to document the most cited articles, most prolific authors, most productive journals, and countries that contributed to EE literature. The keywords "enterprise education," "entrepreneurial education," and "entrepreneurship education" were searched and provided descriptive and evaluative results on bibliometric information. A systematic search was not mentioned in this research.

Although some studies employed bibliometric methodology to review EE, they only focused on specific periods or perspectives. What makes this study different from the previous bibliometric analysis is the longer time range (from 1977 to June 2022), which enables us to capture the development and explain the three approaches to EE. Moreover, the latest topics that received the greatest attention in literature could also be highlighted. Our analysis employs 1782 documents from the Scopus database and reveals three focal clusters: EE in higher education, entrepreneurship intention, and motivation of EE.

3. Research methodology

Bibliometric analysis was used because it is beneficial in discovering the status and growth of scientific publications on specific topics (De Bakker *et al.*, 2005; Yu *et al.*, 2016; Lee and Hew, 2018). Moreover, this method has been widely used as a quantitative tool to provide descriptive and evaluative results in recent years (Zarczynska, 2012; Ellegaard and Wallin, 2015; Merigo *et al.*, 2015).

The Scopus database was chosen due to its broader coverage of high-quality journals. The search engine found the keyword "entrepreneurship education" in the title, abstract, and keywords of publications. The query string is as follows:

TITLE-ABS-KEY (ENTREPRENEURSHIP EDUCATION) AND (LIMIT-TO (DOCTYPE, "ar")) OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ch") OR LIMIT-TO (DOCTYPE, "bk") AND (LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (LANGUAGE, "English"))

Thus, 1782 Scopus documents of mixed types, including articles, conference papers, books, and book chapters, were filtered. In the next step, we classified these publications to provide bibliometric information: the growth trajectory of publications, most cited papers, key authors, most prolific countries and institutions, bibliographic coupling of documents analysis, and keywords co-occurrence network analysis.

The VOSViewer 1.6.18 software was utilized to examine the similarities between different topics, such as authors, countries, institutions, journals, keywords, and other bibliometric information. Van-Eck and Waltman (2014) confirmed that "the number of co-occurrences of two keywords is the number of publications in which both keywords occur together in the title, abstract, or keyword list". Based on VOSViewer, we expected to visualize the map and explain EE research more clearly.

Instead of the ordinary full-counting method, this study uses the factional counting method, as recommended by Van-Eck and Waltman (2014). In the case of the fractional counting method, highly cited publications play a less important role in constructing a bibliographic coupling network. In the same way, publications with a long reference list play a less important role in the construction of a co-citation network.

4. Results and discussion

4.1 Volume and the growth trajectory of research on entrepreneurship education

The study found that the first paper on EE was published in 1972. Figure 1 shows the number of documents published annually for EE between 1972 and 2021. From 1977 to 2001, the number of publications was minimal, ranging from one to four articles per year, except in 1994 with seven articles. From 2002 to 2010, there was a growing interest in research on EE as the number of publications increased from 6 papers in 2002 to 23 papers in 2009 and 79 papers in 2010. The data show an average increase of 67% per year in this period. After a slight increase between 2011 and 2015, the number of papers increased tremendously to 186 in 2019, and 262 in 2021. It is observed that from 2016 to 2021, there were 1046 papers published, accounting for 58.7% of the total number of papers in this field.

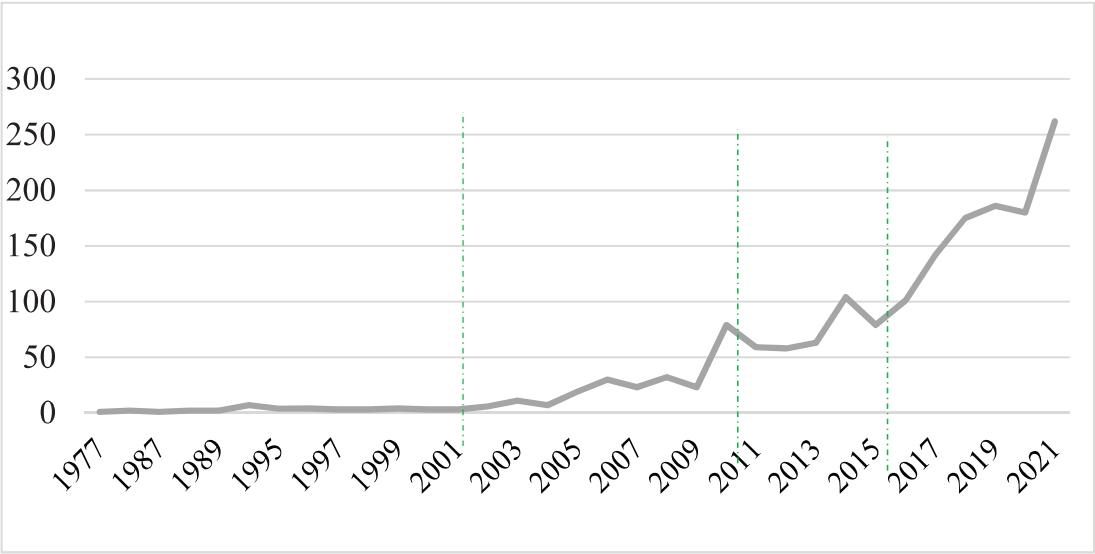

Figure 1. Number of publications over the year

Source: Authors' calculation

4.2 Key authors in entrepreneurship education literature

An analysis of the most prolific authors on EE was conducted. The studies had 3441 authors, among which 2686 were cited at least once.

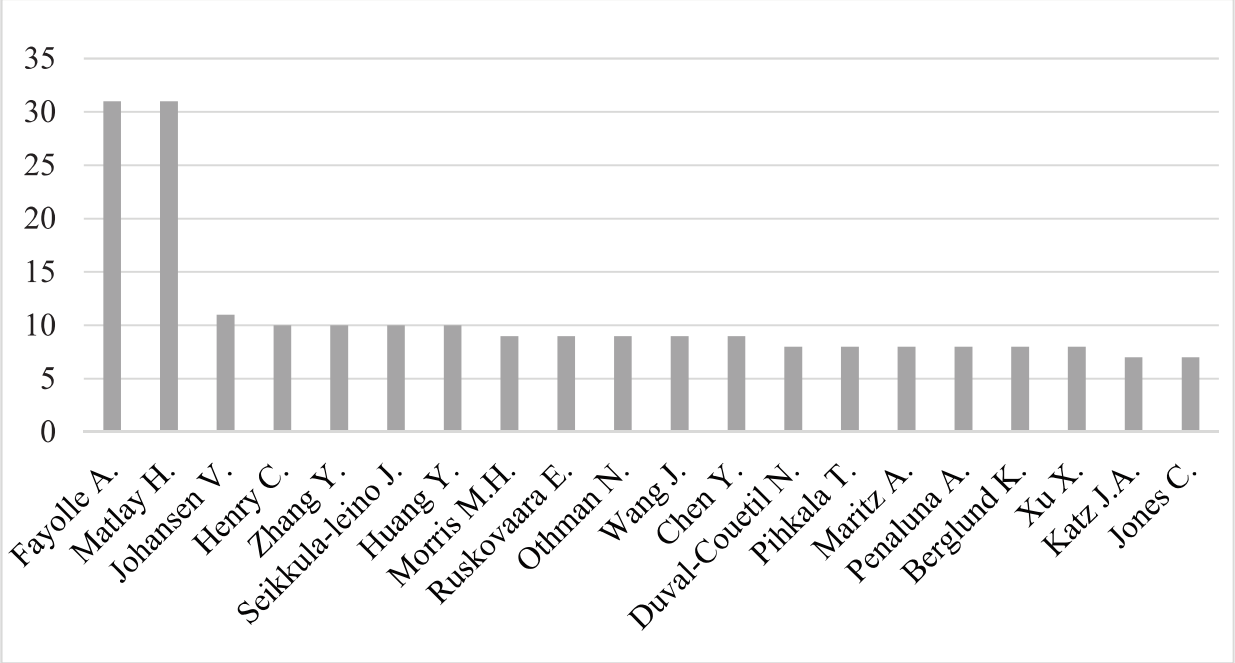

Figure 2. Top twenty authors based on number of publications

Source: Authors' calculation

Figure 2 shows the top twenty prolific authors based on the number of publications. Fayolle and Matlay published their first articles on EE in 2005 and 2003. They also had the highest number of publications, 31, with the number of citations per document being 93.5 and 41.9, respectively. Johansen followed with 11 articles, and other authors in the top twenty had from 7 to 10 publications. Gailly had only 6 publications but ranked first regarding the number of citations at 253.2. Gailly has been known to co-author with Fayolly on several papers on EE. With the same number of publications, at 6 papers, Jill Kickul and Luke Pittaway earned 179,3 and 170 citations per document, respectively. Kuratko (2005) was the author of the most influential article in the selected field titled "The emergence of entrepreneurship education: development, trends, and challenges in the entrepreneurship: theory and practice", cited 1178 times. The article examined the emergence of EE and highlighted the trends and challenges in EE in the 21st century.

4.3 Most prolific countries and publishers

Based on the number of documents, an analysis of the most prolific countries in the research field with citations and citations per document is presented in Table 1. China tops the list with 308 publications, followed by the United States (277 publications) and the United Kingdom (194 publications). It is worth noticing that these three countries contributed nearly 44% of the

total publications in this field. Although China had the highest number of articles, citations per document were only 2.83. The United States and the United Kingdom had the highest citations, at 10,511 and 8,165, respectively. Other countries, including Malaysia, Germany, France, Finland, Indonesia, Australia, Italy, India, Spain, Sweden, Portugal, Canada, Denmark, South Africa, Ireland, Russian Federation, and Norway had fewer publications, ranging from 36 to 70. France and Ireland had the highest citations per document, at 53.83 and 53.59, respectively.

Table 1. Number of publications on entrepreneurial education groups by countries

ID	Country	Documents	Percent (%)	Citations	Citations per document
1	China	308	17.28	871	2.83
2	United States	277	15.54	10511	37.95
3	United Kingdom	194	10.89	8165	42.09
4	Malaysia	70	3.93	581	8.30
5	Germany	67	3.76	1388	20.72
6	France	59	3.31	3176	53.83
7	Finland	58	3.25	1406	24.24
8	Indonesia	56	3.14	309	5.52
9	Australia	52	2.92	1570	30.19
10	Italy	50	2.81	521	10.42
11	India	50	2.81	305	6.10
12	Spain	49	2.75	1726	35.22
13	Sweden	49	2.75	1095	22.35
14	Portugal	45	2.53	662	14.71
15	Canada	41	2.30	1593	38.85
16	Denmark	39	2.19	719	18.44
17	South Africa	38	2.13	339	8.92
18	Ireland	37	2.08	1983	53.59
19	Russian Federation	36	2.02	149	4.14
20	Norway	35	1.96	1061	30.31

Source: Authors' calculation

The papers included in the dataset were published in 623 academic journals. Figure 3 shows a list of journals with the highest number of EE-related documents. The top five journals are the Journal of Education and Training (108 articles), Journal of Entrepreneurship Education (87 articles), Industry and Higher Education (56 articles), Frontiers in Psychology (51 articles), and International Journal of Management Education (36 articles). The Journal of Education and Training is also known for the highest number of citations, at 4102 times, followed by the Journal of Small Business Management, at 3207 times.

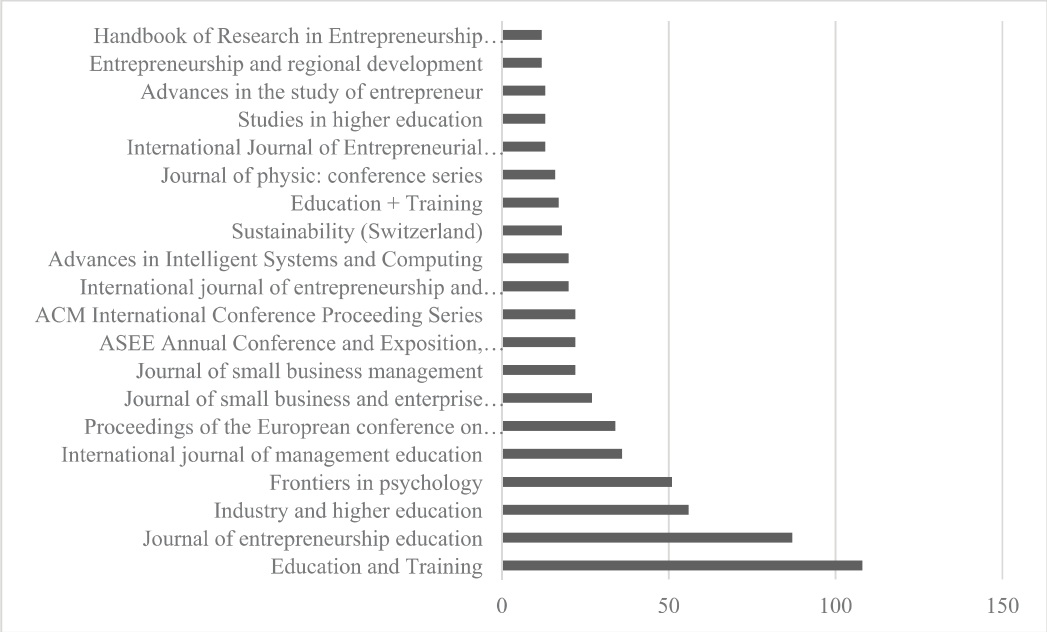

Figure 3. Top twenty journals with maximum publication on EE

Source: Authors' calculation

4.4 Three approaches to entrepreneurship education

The first and largest cluster (red color) showed the publications about EE in higher education. Leading authors in this school of thought include Kuratko (2005) with 1178 citations, Pittaway and Cope (2007) with 789 citations, Katz (2003) with 665 citations, Neck and Greene (2011) with 604 citations, Gorman *et al.* (1997) with 572 citations, Henry *et al.* (2005) with 361 citations, and Fayolle and Gailly (2008) with 353 citations. These scholars emphasized the increase in EE courses in colleges and universities. They also discussed the curriculum, teaching method, learning process, and experiential learning. Also, studies on this theme have investigated the importance of EE in higher education institutions (Mitchell and Co, 2006; Matlay, 2014) and the critical role of educators in nurturing entrepreneurism in students (Vesper *et al.*, 1997; Carayannis *et al.*, 2003; Hannon, 2005). Neck and Greene (2008) introduced practice-based methods, including coursework, serious games and simulations, design-based thinking, and reflective practice to improve entrepreneurship ability in students. However, Henry *et al.* (2005) questioned whether entrepreneurs can be taught or are born. Their results pointed out the need to evaluate entrepreneurship programs to ensure that some aspects of entrepreneurship can be taught successfully. This point of view was in line with Cooper *et al.* (2004), Blenker *et al.* (2011) and Pittaway and Edwards (2012). The second cluster (green color) represents the relationship between EE and entrepreneurial intention. Key scholars in this school of thought are Bae *et al.* (2014) with 678 citations, Martin *et al.* (2013) with 641 citations, Nabi *et al.* (2017) with 475 citations, Fayolle and Gailly (2015) with 464 citations, Von Graevenitz *et al.* (2010) with 428 citations, Piperopoulos and Dimov (2015) with 297 citations, Rauch and Hulsink (2015) with 296 citations, Zhang *et al.* (2014) with 295 citations. They described the role of EE as a predictor of entrepreneurial intention

in higher education institutions. For example, Zhang *et al.* (2014) employed Ajzen's theory of planned behavior and Shapero's entrepreneurial event model, as well as entrepreneurial cognition theory, to insist that EE and entrepreneurial intention have a significant positive relationship. Other scholars supported these results, such as Fayolle and Gailly (2015), Rauch and Hulsink (2015), Entrialgo and Iglesias (2016), and Jena (2020). However, in some research, the correlation between EE and entrepreneurial intentions showed mixed results. Bae *et al.* (2014) stated that the linkage between EE and post-entrepreneurial intention was insignificant. Von Graevenitz *et al.* (2010) found that intentions declined somewhat, although the EE program yielded significant positive effects on students' entrepreneurial skills. This result aligns with the studies of Volery *et al.* (2013) and Nabi *et al.* (2018). Furthermore, this second school of thought also concerns the moderating role of gender (Shinnar *et al.*, 2014; Westhead and Solesvik (2016) or entrepreneurial family background (Jena, 2020) in the relationship between EE and entrepreneurial intention.

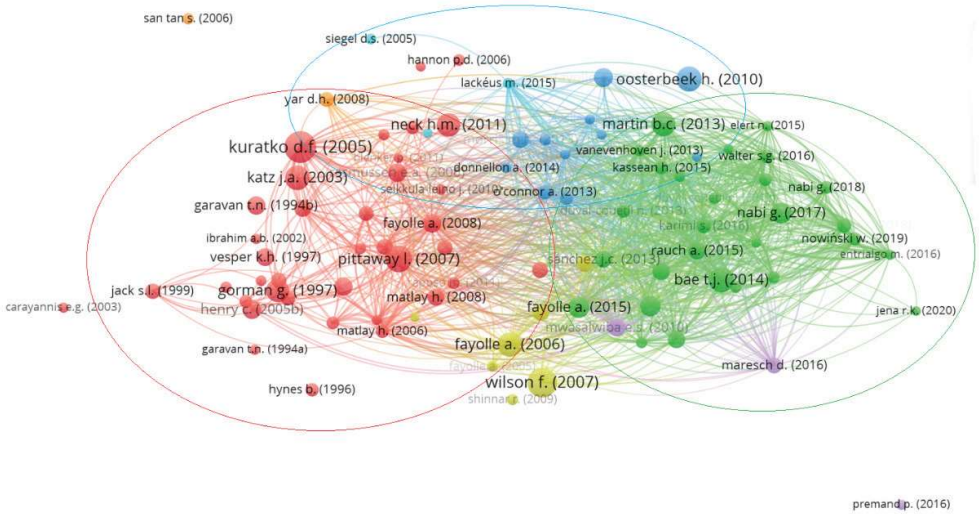

Figure 4. Science mapping of documents related to entrepreneurship education based on bibliographic coupling analysis between 1977 and 2022.

Notes: The network shows 97 documents, minimum number of citations per document: 80. With a threshold of 80 minimum citations per document, the bibliographic coupling of documents results presented 97 documents. However, only 92 documents are grouped into 7 clusters: Cluster 1 (38 documents), Cluster 2 (28 documents), Cluster 3 (11 documents), Cluster 4 (7 documents), Cluster 5 (3 documents), Cluster 6 (3 documents), Cluster 7 (2 documents). It should be noted that EE literature focused on three conceptual themes.

Source: Authors' calculation

The third cluster (blue color) is associated with the motivation of EE. Although smaller than the first and second clusters, it includes more influential researchers and higher citation impact. Most cited papers in this theme can be listed as Oosterbeek *et al.* (2010) with 690 citations, Fayolle (2013) with 360 citations, Morris *et al.* (2013) with 277 citations, O'Connor (2013) with 188 citations, Packham *et al.* (2010) with 168 citations, Pache and Chowdhury (2012) with 115 citations.

Students in EE programs have different forms of motivation for studying entrepreneurship. Hytti *et al.* (2010) revealed that they had intrinsic and extrinsic motivation, likely impacting students' outcome satisfaction. Pache and Chowdhury (2012) insisted that social EE made students aware of different logic, including social welfare, commercial, and public-sector logic, and acquired skills to create innovative hybrid strategies. Examining other motivations implied that EE involves the development of entrepreneurial identity (Donnellon *et al.*, 2014) or competency development (Morris *et al.*, 2013). Additionally, there is an increasing tendency for government policy to develop entrepreneurship because of its apparent economic benefit (O'Connor, 2013).

Table 2. Top 20 keywords that occurred the maximum number of times in various publications related to EE

#	Keywords	Occurrences	Total link strength
1	Entrepreneurship education	770	961
2	Entrepreneurship	250	485
3	Education	165	373
4	Entrepreneurial intention	111	214
5	Higher education	78	181
6	Entrepreneurialism	60	162
7	Innovation	48	87
8	Entrepreneurial education	41	51
9	Innovation and entrepreneurship education	41	25
10	Experiential learning	35	67
11	Entrepreneurial self-efficacy	33	70
12	Gender	30	76
13	Entrepreneurial intentions	30	65
14	Innovation and entrepreneurship	29	23
15	Students	26	76
16	Training	25	59
17	Universities	24	67
18	Entrepreneurial learning	23	50
19	Pedagogy	23	48
20	University	19	45

Source: Authors' calculation

The results of the keywords co-occurrence network analysis can be seen in Table 2. The results described that the most recurring keywords were "Entrepreneurship education" (770 occurrences), "Entrepreneurship" (250 occurrences), "Education" (165 occurrences), "Entrepreneurial intention" (78 occurrences), "Entrepreneurialism" (60 occurrences), and "Innovation" (48 occurrences). The minimum threshold of 5 occurrences per keyword was set, resulting in 132 items with 10 clusters. The most significant cluster with 20 keywords

shows that "Entrepreneurship education" is linked to "higher education", "education", "business education", "knowledge", "skill", "e-learning", "attitude", "start- up", etc. This result of the keywords co-occurrence network reaffirms the first theme of EE literature - *EE in higher education*. Furthermore, the second theme, EE and entrepreneurial intention, is also emphasized with the keyword "Entrepreneurial intention" (occurrences: 111, total link strength: 214). In this sense, keywords co-occurrence network analysis can provide important evidence on the basic keywords of the schools of thought under review.

4.5 Topical trends in entrepreneurship education literature

Figure 5 represents the network visualization map of the co-occurrence of keywords with the latest topic trend highlighted by lighter shaded nodes, namely: "innovation and entrepreneurship", "big data", "COVID-19", "academic entrepreneurship", "entrepreneurial competence", "individual entrepreneurial orientation", "entrepreneurial attitude", "entrepreneurial passion", "self-efficacy", and "deep learning". One of the hot topics is "innovation and entrepreneurship" (41 occurrences). Researchers revealed that a lack of innovation ability has led to poor performance in EE (Li, 2021; Liu, 2021; Afeli and Adunlin, 2022). As a result, it proposes some suggestions for stakeholders to develop an effective system of innovation and EE to satisfy the needs of individuals, communities, and society (Cooke, 2021; Duan *et al.*, 2021). In addition, other latest topics also widen the future trends in EE studies, such as EE and big data, EE and self-efficacy, and EE and deep learning.

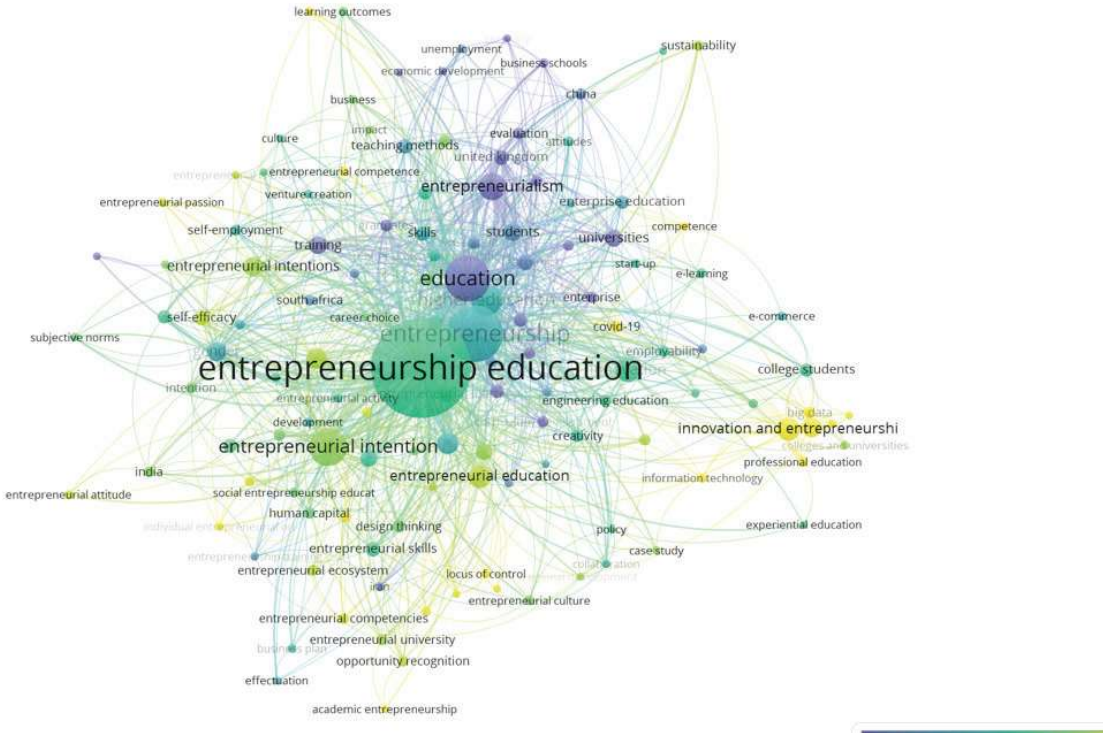

Figure 5. Network visualization map of co-occurrence of keywords

Notes: 132 keywords, minimum number of occurrences of a keyword: 5

Source: Authors' calculation

5. Conclusion

In this paper, we conducted bibliometric analyses of the publications on EE published between 1977 and June 2022. By exploring and reviewing 1782 Scopus-indexed documents, the research provided a broad picture of the literature. Twenty-five years from the first articles in 1977 to 2001, the interest in EE nearly stayed constant (25 years, 39 publications). The number of research papers has grown enormously during the 2002-2010 period and the 2016-2023 period, peaking at 262 publications in 2021. Deveci (2022) examined a bibliometric study on EE in educational contexts and found a similar trend after 2001. However, due to the shorter period, the author determined that most articles were published in 2017. Our results demonstrated that research on EE may continue to grow over the next decade.

Professor Alain Fayolle is the most prolific author with the highest number of publications at 31, and the highest number of citations at 2900. He is currently a professor at Emlyon Business School (France), known as the most productive institution in terms of the number of publications. The results revealed that China, the United States, and the United Kingdom are the leading countries for EE research. The United States ranked second in the number of publications but had the highest citations. Furthermore, the journal with the highest number of publications and citations is the Journal of Education and Training. Regarding the productive journals, the current research findings coincide to a certain extent with that of Deveci (2022) and Gabrielsson *et al.* (2020).

Our research contributes to the literature by providing a comprehensive understanding of the topics of EE. We analyzed the keywords and identified three main conceptual themes in EE literature, including EE in higher education, the relationship between EE and entrepreneurial intention, and the motivation of EE. More importantly, we revealed that recent studies have investigated how to promote the integration of EE and innovation under the Background of "Internet +" (Lin and Zhou, 2022) or based on big data (Yang and Xie, 2022; Hao *et al.*, 2021) or through the application of information technology (Yadan and Mengdan, 2021). Our findings suggest that later research should pay attention to certain aspects such as “innovation and entrepreneurship”, “self-efficacy”, and “deep learning”.

With the development of information technology, the inherent traditional teaching method is declining. Schools and universities need a novel teaching method to cultivate students. Big data, as an important new driver of innovative EE in the Internet era, promotes the reform of teaching platforms and the personalization of education. At the same time, future research on EE and big data should be addressed. We propose new topics, such as developing EE curriculum reform based on big data analysis and exploring EE’s big data teaching model.

In addition, our research results question how university students’ attitudes toward EE affect entrepreneurial self-efficacy, especially in the post-pandemic context. Self-efficacy refers to individuals’ conscious beliefs in their skills and abilities to accomplish tasks and reach goals. When people are confident, they tend to perform better on tasks. Furthermore, self-efficacy is an important entrepreneurial characteristic in educational settings in promoting students’

entrepreneurial intention. Hence, some research directions should be considered, such as the benefits of entrepreneurial education to entrepreneurship self-efficacy and the mediating effect of self-efficacy in the relationship between EE and entrepreneurial intention.

Finally, little is known about the mechanism of deep learning that can be applied to EE. Taking advantage of deep learning technologies such as fault tree analysis (FTA), it is possible to analyze the factors of EE or evaluate the reliability of IEE classroom teaching for college teachers and students. Deep learning is a subfield of machine learning research and a very useful method for exploring EE based on interpreting images, audio, and texts. Therefore, this is the new "room" for further research.

The most significant limitation of this paper is that we only rely on the studies indexed by the Scopus database. While it is a comprehensive source, some studies might have contributed significantly to the research on EE but are outside the Scopus database. Further studies may overcome this limitation with other databases like the Web of Science to perform similar analyses. In addition, the database only includes papers written in English, and papers written in other languages were not included. Finally, the review only uses VOSviewer as the main instrument to generate, visualize, and analyze bibliometric networks. Therefore, other scholars may use different instruments to understand the data further and detect additional research gaps.

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