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Mapping of Scientific Production on Entrepreneurship Education: A Bibliometric Analysis of a Decade

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Abstract. Entrepreneurship education has received much attention due to the increasingly complex and globalised entrepreneurial environment, leading to the rapid development of related academic research. This study aims to provide a bibliometric analysis of 1017 publications related to entrepreneurship education in the Scopus database from 2014 to 2023, drawing a knowledge map to identify key themes, influential contributors, impactful articles, research trends and future research directions. The results of the biblioMagika analysis showed that entrepreneurship education literature is continuously growing, with Agus Wibowo as the most productive author and Wenzhou Medical University in China the most prolific institution that has attracted wide attention. VOSviewer analysis showed close author and country co-authorship and found that the key terms "Entrepreneurship Education", "Entrepreneurial Intentions" and "Entrepreneurship" were at the forefront of research. Furthermore, the thematic and word maps analysed by Biblioshiny reflected the primary themes of the study, guiding future research directions. However, this study was also limited by using fixed keywords to search the literature in the Scopus database, excluding non-English publications. Overall, this study provides a comprehensive picture of entrepreneurship education research, which helps researchers understand the research status of this field and proposes future research avenues.

Keywords: entrepreneurship education; bibliometric analysis; higher education; VOSviewer

1. Introduction

Entrepreneurship education has gained recognition from government education policies worldwide and is an important tool for cultivating young people and communities (Hardie et al., 2023). As one of the fastest-growing fields globally, entrepreneurship education has been widely adopted in schools worldwide,

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including in China (Wang et al., 2022), the United States (Pittaway, 2021), Singapore (Yu et al., 2017), Indonesia (Amalia & von Korflesch, 2021) and Malaysia (Looi & Maritz, 2021). Entrepreneurship education research has rapidly expanded and attracted the attention of many renowned scholars who have significantly contributed to advancing knowledge of entrepreneurship education by publishing literature assessments in academic publications. For example, many have analysed the research on entrepreneurship education in the Web of Science database, spanning different levels of the education field (Cavalcante et al., 2022; Deveci, 2022; Dissanayake et al., 2022).

Although Sreenivasan and Suresh (2023) have mapped the growth trend of nearly 20 years from the perspective of entrepreneurship education research, they have not conducted in-depth research on specific citations, such as articles and authors, countries, journal sources, and many potential fields are still waiting to be studied. On the other hand, some researchers have used systematic analysis to review entrepreneurship education (Banha et al., 2022; Shabbir et al., 2022). Although these in-depth studies examined entrepreneurship education from different perspectives, revealing its current status, future development direction, research hotspots and key influences, there are also some limitations. There are research gaps in the bibliometric analysis of entrepreneurship education in the past 10 years and the specific content of entrepreneurship education papers, such as subject area, publication trends and citation analysis (Ramly et al., 2023).

Furthermore, there is a research gap in entrepreneurship education in citation metrics, highly cited documents, co-authorship analysis, co-occurrence, thematic map, factorial analysis and other aspects in the past decade. With the rapid growth of entrepreneurship education research, it is necessary to explore the forces driving it (Dissanayake et al., 2022). Although previous studies provided a theoretical basis, conducting more comprehensive and in-depth research is still feasible and necessary to fill the above gaps and support the deep development of the entrepreneurship education field. Thus, to fill this gap, this paper aims to conduct a comprehensive bibliometric analysis of entrepreneurship education literature, systematically depict the academic landscape, clarify its key influences, themes, research frontiers, and reveal knowledge networks, providing convenience for future academic efforts. It offers a more comprehensive overview of entrepreneurship education by addressing the following research questions:

1. What is the current landscape of entrepreneurship education research?
2. Which key participants, including authors, institutions, countries and source titles, have played an important role in promoting research on entrepreneurship education?
3. Which source titles have been the primary outlets for entrepreneurship education research?
4. What are the most highly cited and influential papers in the entrepreneurship education field?

5. What are the patterns of co-authorship in the field of entrepreneurship education and how do they vary across different authors, countries/regions, and authors'?
6. What are the major themes and factorial in entrepreneurship education literature over the past decade?
The paper is structured into five sections. Firstly, it provides a literature review of entrepreneurship education. Next, the methodology section introduces the data collection and analysis methods. Subsequently, it reports the analysis results on entrepreneurship education research. A discussion and conclusion follow and lastly it discusses research limitations and future directions.

2. Literature Review

Entrepreneurship education refers to "any educational process aimed at entrepreneurial attitudes and skills" (Ndou et al., 2018). It has practical significance and promotes changing people's attitudes and accelerating global economic prosperity (Ratten & Jones, 2021). Entrepreneurship education research has developed rapidly and covers several aspects, such as entrepreneurship education curriculum (Apostu et al., 2022), and entrepreneurship education in higher education (Breznitz & Zhang, 2022). Studies have shown that entrepreneurship education brings various benefits, enhances entrepreneurial motivation (Ndou et al., 2019), and helps cultivate successful entrepreneurs (Panait et al., 2022). In recent years, bibliometric analysis in entrepreneurship education has mainly focused on 11 studies, including five with data from the Scopus database and six from the Web of Science database. As shown in Table 1, these studies used different data sources and scopes, covering multiple aspects of entrepreneurship education research. Among them, Scopus database studies were in-depth research on entrepreneurship education through word frequency analysis, co-occurrence network analysis, citation indicators and other aspects, including articles, citations, growth trends, publications, authors, countries and collaborations (Ramly et al., 2023). Web of Science database studies used word clouds and topic maps to cover multiple aspects of entrepreneurship education literature, such as countries, universities, journals, authors, articles, trends and keywords (de Pablo et al., 2019; Fagadar, 2021).

Bibliometric analysis is a popular and critical method for exploring and analysing large amounts of scientific data, which helps scholars interpret the nuanced evolution in a particular field and reveal emerging areas (Donthu et al., 2021). As shown in Table 1, numerous studies have attempted to explore entrepreneurship education through bibliometric analyses. However, a careful review of the existing literature revealed several research gaps that provide opportunities for further exploration.

The studies emphasised in Table 1 aim to explore insights from specific dimensions of entrepreneurship education, which include different countries, universities, journals, authors, publications and research trends. However, these studies have yet to explore insights into relevant publications' citations, analyse keywords for themes and their evolution, or conduct factorial analyses. While studies have been conducted covering entrepreneurship education analyses over

different periods, those within the last decade have focused on the Web of Science database and lacked analysis of the latest three years' data. The analyses by Nájera-Sánchez et al. (2023) and Ramly et al. (2023), although covering literature to 2020, did not provide an analysis of the entrepreneurship education literature to 2023, which remains a gap in the research. Thus, this study aims to examine the entrepreneurship education literature in the last decade to detail the progress and evolution in the field so as to understand the latest research trends in entrepreneurship education.

Table 1: Summary of previous studies related to entrepreneurship education bibliometric analysis

Author	Data Source & Scope	TDE	Research Gaps	Bibliometric Attributes Examined
Kakouris and Georgiadis (2016)	Scopus (1980 to 2012)	7,726	Limited to Scopus	Word frequencies, co-occurrence networks, citation indices and impact
de Pablo Valenciano et al. (2019)	Web of Science Core Collection and Scopus (2001 to 2018)	2,872	Limited to articles, Included research areas of Education Educational research	Countries, universities ,journals , authors , articles ,trends, keywords
Johann et al. (2020)	Web of Science (2009 to 2019)	146	Limit to Web of Science	Bibliometric indicators, words, Keyword
Fagadar (2021)	Web of Science (2005-2021)	160	Limited to Web of Science, English, articles	Evolution, authors, articles, journals, countries and institutions, keywords' co-occurrence
Cavalcante Carvalho et al. (2022)	Web of Science (1994 to 2020)	54	Limited to Web of Science, Article content in Portuguese	Authors with the most citations, nationality of authors, documents relating to clusters, keywords, journals, systematic analysis
Nájera-Sánchez et al. (2023)	Scopus(2010-July 2020)	298	Limit to Scopus	Articles, references, bibliographic coupling, consolidated approaches
Dissanayake et al. (2022)	Web of Science (2004 to 2022)	447	Limited to Web of Science, English.	Publication patterns, published works, authors, papers, word clouds and thematic maps
Ramly et al. (2023)	Scopus (2011 to 2020)	1,941	Limited to Scopus	Growth trend, publications, authors, countries, collaborations
Deveci (2022)	Web of Science Core Collection (1991 to 31.10.2020)	352	Limited to Web of Science, English, articles	Use the figure to describe results on years, authors, institutions, journals and countries. Evaluative results on co-authorship, co-citation and co-occurrence keywords
Sreenivasan and Suresh, (2023)	Scopus (2002 to 2023)	2,185	Limit to Scopus	Evolution, countries, sources, publications, three-field plot, authors, conceptual structure

Author	Data Source & Scope	TDE	Research Gaps	Bibliometric Attributes Examined
Fauzan et al. (2023)	Scopus (1977 to 23rd of July 2021)	2,176	Limited to Scopus, articles	Research trends, scientific results, most of the findings are presented in frequencies and percentages

TDE=Total documents examined

3. Methods

Scopus is one of the largest and most comprehensive peer-reviewed literature abstract and citation databases, covering multiple subject areas and implementing strict quality control (Punj et al., 2023). Furthermore, the Scopus database has been widely used for bibliometric analysis (Farooq, 2022). This study used the Scopus database and collected entrepreneurship education research data from 2014 to November 18, 2023. Previous bibliometric studies on entrepreneurship education relied heavily on the Web of Science and Scopus, both commonly used databases by scholars (Gümüş et al., 2020). Scopus, despite its limitations, is the largest single abstract and indexing database ever compared to Web of Science (Burnham, 2006) and the most extensive searched citation and abstract list (Ahmi et al., 2019), with more journals indexed than Web of Science (Falagas et al., 2008). Considering all these aspects, this study chose the Scopus database for data searching. The data collected cover multiple factors, including subject area, document type, source title, affiliation, number of authors per article, publication distribution by country/region, and keywords, among other factors. In terms of data selection, this study mainly focused on articles that have undergone double-anonymised peer review, as such publications are more reliable and rigorous in the academic community (Hu et al., 2023). Books, conference papers, reviews and other publications were excluded from this study to ensure the study's precision. This study was limited to analysing articles published in English to ensure the generalisability and replication of the findings. This decision ensures that the research results can promote international cooperation and be more easily understood and accepted by a broader readership.

3.1 Data Collection

As shown in Figure 1, this study's data collection methodology was based on the revised PRISMA study protocol (Moher et al., 2009), with a flowchart of search strategies referenced from Zakaria et al. (2021). Using the article title as the primary search field, it focused on searching for literature related to entrepreneurship education to obtain accurate results. The query used was (TITLE ("enterprise education")) OR (TITLE ("start-up education")) OR (TITLE ("startup education")) OR (TITLE ("education for entrepreneurship")) OR (TITLE ("entrepreneurship education")) AND PUBYEAR>2013 AND PUBYEAR<2024 AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (DOCTYPE, "ar")). As illustrated in Figure 1, this study retrieved 1179 documents, constituting an extensive collection of research articles in entrepreneurship education. This study excluded Erratum and publications that were not relevant to the entrepreneurship education content. Manual checking of publication titles, abstracts and publication content was determined.

Following the screening process, which involved filtering out documents unrelated to entrepreneurship education, a final set of 1017 articles was identified for inclusion in this study. This dataset enhanced our understanding of the current state of research in entrepreneurship education, facilitating the identification of emerging trends in the field and establishing a solid foundation for bibliometric research in this field.

3.2 Data Cleaning and Harmonisation

In bibliometric analyses, data cleaning and harmonisation are vital steps in ensuring the accuracy and reliability of results. OpenRefine is an approachable tool for cleaning and harmonising bibliometric data and a powerful tool for dealing with messy data (Ahmi, 2023). BiblioMagika, as an extended bibliometric measurement tool, helps identify any missing data, allowing researchers to find and fill in these gaps manually, ensuring the data set is complete (Punj et al., 2023). Thus, this study applied OpenRefine and biblioMagika to clean and harmonise the author names, affiliations, keywords and other important literature information to ensure the research data's accuracy and consistency. This study chose to clean up the downloaded .csv files from the Scopus database, using biblioMagika to identify missing data, manually fill in these spaces, clean up and harmonise. Similarly, this study used the methods and functions provided by the above tools to identify and edit content such as author names, affiliations and keywords. Then, this study imported cleaned and harmonised data into the original format for analysis. Hence, OpenRefine and biblioMagika tools were considered specialised tools for cleaning and coordinating messy data, improving standardisation and accuracy of research data.

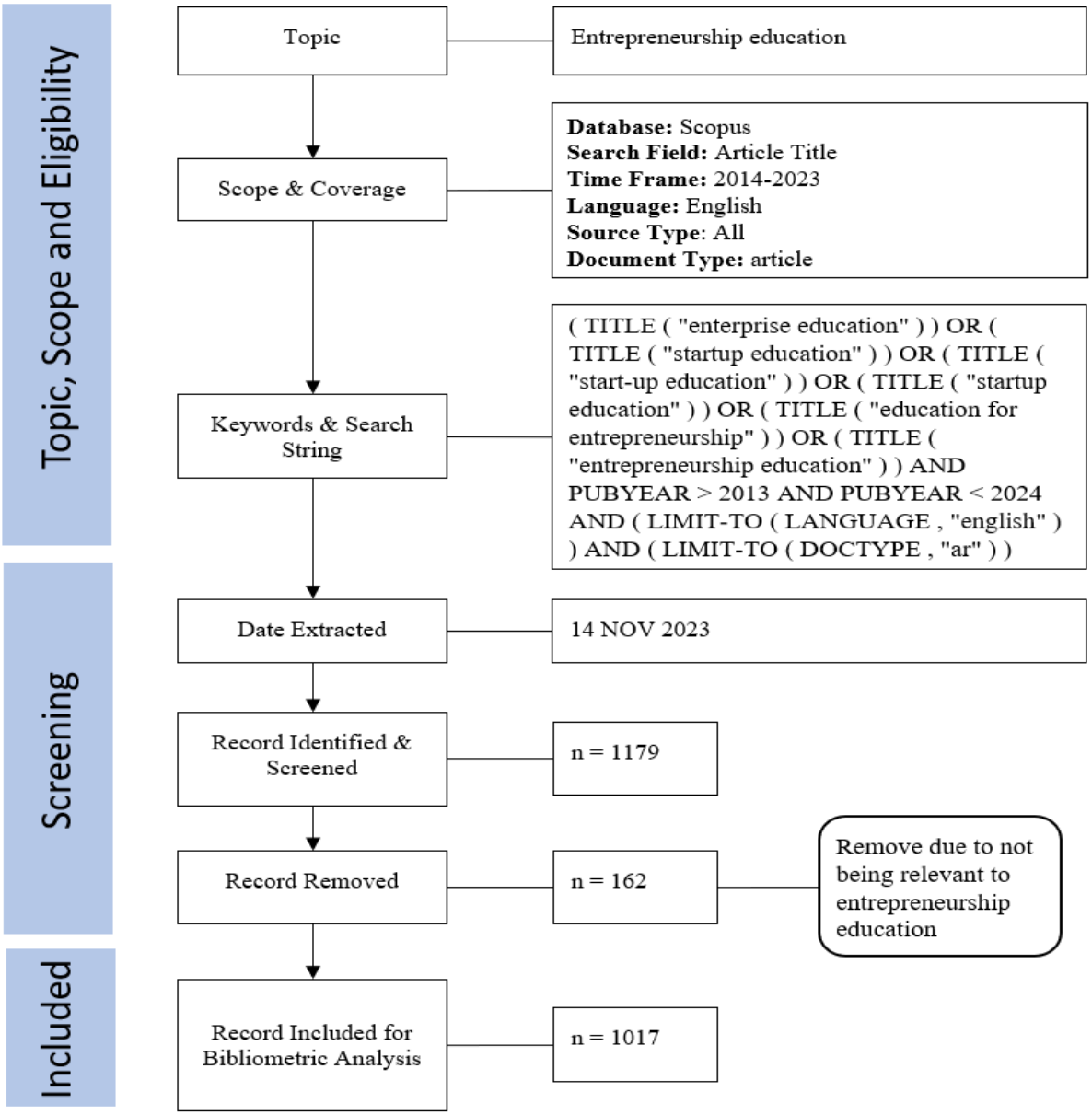

Figure 1: Flow diagram of the search strategy.
Source: Zakaria et al. (2021)

3.3 Data Analysis

Data analysis was crucial in addressing the research questions summarised in the introduction. This study employed Microsoft Excel, biblioMagika, VOSviewer, and Biblioshiny software for data analysis and visualisation. Specifically, using the biblioMagika tool, we analysed the annual publication count, most productive authors, institutions, countries and paper sources in entrepreneurship education. The h-index is a lower limit to a scientist's actual citations, considering productivity and impact, and serves as a measure of a scientist's scholarly achievement (Sidiropoulos et al., 2007). The g-index is defined as the highest ranking, such as the first g publications that received at least g^2 citations (Guns & Rousseau, 2009). The m-index is an individual's h-

index divided by the years since the author's first publication. It is the average yearly increase in the author's h-index over their publishing career (Choudhri et al., 2015). This analysis aimed to identify key contributors and research trends in the field and comprehensively assess the impact and relevance of entrepreneurship education papers. Additionally, we utilised VOSviewer software to conduct co-authorship analysis by authors, co-authorship analysis by country, and author's keyword analysis in entrepreneurship education. The co-authorship analysis revealed collaborative networks and the most influential cooperation partners among the authors, and the country co-authorship analyses revealed the trend of international cooperation. Meanwhile, the author's keyword analysis revealed the themes and concerns of the research articles. Finally, this study employed Biblioshiny software to analyse the entrepreneurship education field in terms of thematic map and evolution to understand thematic hotspots, trends and opportunities for correlation between critical themes. These analyses provided a comprehensive research framework for entrepreneurship education, helping researchers better understand the field's landscape and providing powerful guidance and insights for future research.

4. Results

4.1 Current Landscape

Entrepreneurship education research is multidisciplinary, encompassing various subjects such as social sciences, business management and accounting, economics, econometrics and finance. As shown in Table 2, social sciences accounted for 58.31% of the total publications, business, management and accounting accounted for 56.15%, and economics, econometrics and finance accounted for 19.96%. Engineering and computer science accounted for 10.13% and 9.73%, respectively. It indicates that entrepreneurship education research not only involves education itself, but also covers business, social sciences and technology fields. In addition, entrepreneurship education research also covered multiple disciplinary areas such as psychology, environmental science, mathematics, arts and humanities, energy, and decision science, but each discipline accounted for less than 10%.

Table 2: Subject Area

Subject Area	Total Publications (TP)	Percentage(%)
Social Sciences	593	58.31
Business, Management and Accounting	571	56.15
Economics, Econometrics and Finance	203	19.96
Engineering	103	10.13
Computer Science	99	9.73
Psychology	93	9.14
Environmental Science	52	5.11
Mathematics	48	4.72
Arts and Humanities	38	3.74
Energy	36	3.54
Decision Sciences	24	2.36
Medicine	14	1.38
Health Professions	13	1.28
Agricultural and Biological Sciences	12	1.18
Materials Science	12	1.18

Subject Area	Total Publications (TP)	Percentage(%)
Multidisciplinary	9	0.88
Biochemistry, Genetics and Molecular Biology	8	0.79
Physics and Astronomy	8	0.79
Chemistry	4	0.39
Chemical Engineering	2	0.20
Earth and Planetary Sciences	1	0.10
Neuroscience	1	0.10

These data suggested that entrepreneurship education research is comprehensive and interdisciplinary, encouraging scholars to collaborate across disciplines to help researchers and practitioners better understand this field's disciplinary structure and research direction.

4.2 Publication Trends

Figure 2 provides a comprehensive overview of the research output and citation trends in entrepreneurship education from 2014 to 2023, revealing fluctuations and trends in entrepreneurship education research. Initially, from 2014 to 2017, there was a steady increase in publications, accompanied by a gradual expansion of the co-author network, and the peak period for research output occurred in 2022, characterised by the highest number of publications. However, the data from 2021 to 2023 indicated some challenges, including a decline in total citation counts and fluctuations in average citation counts. These data might indicate saturation of the entrepreneurship education research field, fluctuations in literature quality, citation dispersal and changes in academic citation practices. Overall, these data indicated that entrepreneurship education research has attracted widespread attention, revealing the research trends, academic output, contributions and broad impact of researchers in entrepreneurship education.

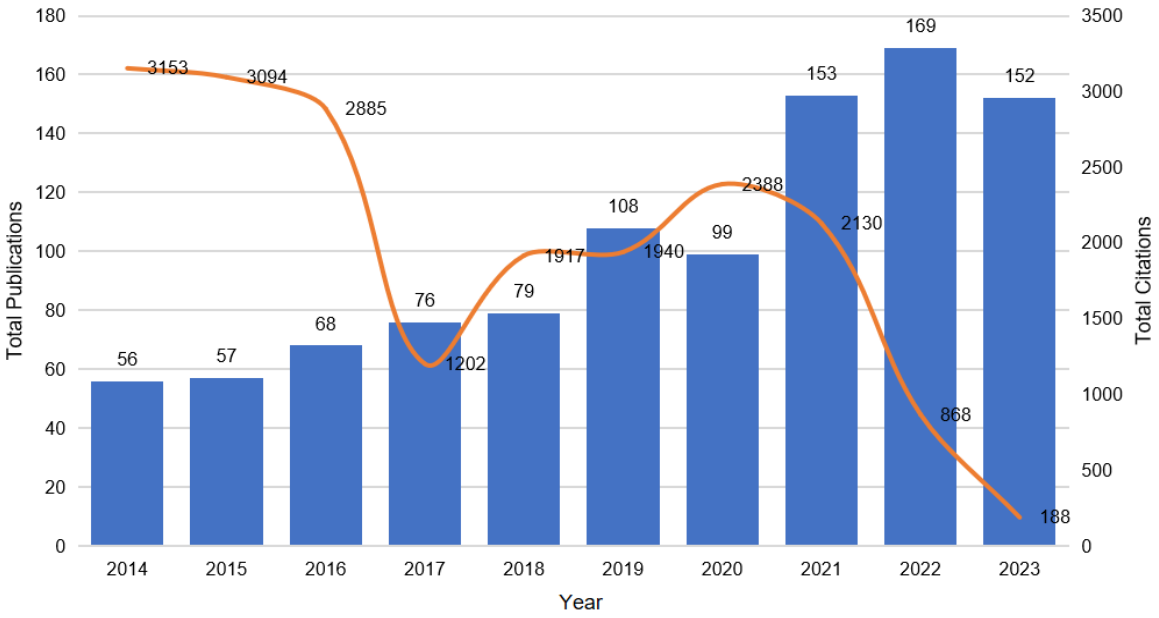

Figure 2: Total Publications and Citations by Year

4.3 Publications by Authors

In the Entrepreneurial Education at Universities study, Dissanayake et al. (2022) reported the top 10 authors who contributed to publications in this field. Thus, based on research needs, this study also reported the 10 authors who contributed the most to publications in the entrepreneurial education field. Table 3 shows these scholars were from various countries, including Indonesia, China, the United Kingdom, Finland, Sweden, Malaysia, France, Denmark, Portugal, Italy, India and Australia. The data comprehensively detailed critical metrics for these high-output authors, encompassing their affiliations, TP (total number of publications), NCP (number of cited publications), TC (total citations), C/P (average citations per publication), C/CP (average citations per cited publication), h-index, g-index and m-index.

Table 3: Top 10 Productive Authors

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	h	g	m
Wibowo, Agus	Universitas Negeri Jakarta	Indonesia	10	7	243	24.30	34.71	5	10	1.00
Narmaditya, Bagus Shandy	Universitas Negeri Malang	Indonesia	9	7	243	27.00	34.71	5	9	1.25
Huang, Yangjie	Hangzhou Normal University	China	8	8	81	10.13	10.13	5	8	1.25
Bell, Robin	University of Worcester	United Kingdom	7	7	212	30.29	30.29	5	7	0.63
Penaluna, Andy	University of Wales Trinity Saint David	United Kingdom	7	7	221	31.57	31.57	7	7	0.70
Pihkala, Timo	Lappeenranta University of Technology	Finland	7	6	144	20.57	24.00	5	7	0.56
Hägg, Gustav	Lund University	Sweden	6	5	128	21.33	25.60	4	6	0.50
Othman, Norasmah	Universiti Kebangsaan Malaysia	Malaysia	6	6	50	8.33	8.33	4	6	0.50
Fayolle, Alain	EMLyon Business School	France	6	6	782	130.33	130.33	4	6	0.44
Blenker, Per	Aarhus University	Denmark	6	5	179	29.83	35.80	5	6	0.50

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=
average citations per publication; C/CP=average citations per cited publication; h=h-index; g=g-index; and m=m-index.

Taking Universitas Negeri in Indonesia as an illustrative example, Agus Wibowo had 10 published papers, seven cited papers, 243 total citations, C/P of 24.30, and C/CP of 34.71. The h-index was 5, g-index was 10, and m-index was 1.00, which demonstrated outstanding research quality and individual contribution. Similarly, Narmaditya Bagus Shandy, from the same university, exhibited commendable performance with nine published papers, seven cited papers, a total citation count of 243, a C/P of 27.00, and a C/CP of 34.71. In the case of Alain Fayolle from France, although with fewer publications, the exceptionally high total citation number was 782, which is a substantial contribution to the field of entrepreneurial research. These data provided a comprehensive understanding of these authors and their contributions to entrepreneurial education.

4.4 Publications by Institutions

For entrepreneurship education research, Fauzan et al. (2023) reported the top 10 institutions contributing to publications in this research area. Therefore, this study also reported only the top 10 institutions that contributed the most to publications in entrepreneurship education. In Table 4, it is seen that Wenzhou Medical University in China achieved significant success with 15 papers, 127 total citations, and an average citation per cited publication value of 9.07. Aarhus University in Denmark enhanced its academic influence with 14 papers, a CSwHC value of 350, and 365 citations. Universitas Negeri Jakarta and Universitas Negeri Malang in Indonesia respectively published 13 and 11 papers with more than 200 total citations, demonstrating significant research activity and exhibiting C/CP values of 27.88 and 29.29, respectively. The University of Huddersfield in the UK also performed well with 11 papers, 150 citations, and a C/CP value of 13.64. Although the Lappeenranta University of Technology in Finland and the Universiti Kebangsaan Malaysia had TP values of 10, their research impact differed. The Lappeenranta University of Technology had a higher TC and C/CP of 26.30, indicating a more significant overall research impact.

Table 4: Top 10 productive institutions contributed to the publications

Institution	Country	TP	TC	NCP	C/P	C/CP	h	g	CSwHC	m
Wenzhou Medical University	China	15	127	14	8.47	9.07	6	11	107	1.50
Aarhus University	Denmark	14	365	13	26.07	28.08	10	14	350	1.00
Universitas Negeri Jakarta	Indonesia	13	223	8	17.15	27.88	5	13	218	0.71
Universitas Negeri Malang	Indonesia	11	205	7	18.64	29.29	4	11	201	0.57
University of Huddersfield	United Kingdom	11	150	11	13.64	13.64	6	11	129	0.60
Lappeenranta University of Technology	Finland	10	263	10	26.30	26.30	8	10	251	0.89
Universiti Kebangsaan Malaysia	Malaysia	10	56	8	5.60	7.00	5	7	51	0.63
University of Malaya	Malaysia	9	225	8	25.00	28.13	4	9	219	0.50
University Malaysia Kelantan	Malaysia	8	58	6	7.25	9.67	5	7	54	0.56
Lund University	Sweden	8	141	7	17.63	20.14	5	8	137	0.63

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P
=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=
g-index; CSwHC = citation sum within h-core; m=m-index.

Meanwhile, the University of Malaya and University Malaysia Kelantan demonstrated high levels of cooperation in TP, TC and h-index. In addition, Lund University in Sweden demonstrated a significant position in entrepreneurship education research with eight papers, 141 total citations, and an average citation per publication value of 17.63. Although the University of Worcester, University of Wales Trinity Saint David, University of Turku, and Universiti Utara Malaysia had the same TP and g-index, they differed in total citations, C/P, C/CP and h-index. These data comprehensively reflected various institutions' contributions to entrepreneurship education research, providing insight into research productivity and future institutional cooperation.

4.5 Publications by Countries

Scholars reported the top 10 countries contributing to publications in the field of research (Chin & Chew, 2021). Hence, this study also reported the 10 countries that contributed most to entrepreneurship education research publications. Table 5 shows China led in total publications (203) and the number of cited publications (153), with an average citation per paper of 6.76 and an average citation per cited publication of 8.97. The United States and the United Kingdom followed closely, with total citations of 3367 and 3316, respectively. They exhibited high collaboration networks, with CSwHC values of 2600 and 2592. In addition, the United States also had the highest m-index, indicating its significant contribution to the m-index among all countries. While countries like Indonesia, Malaysia and South Africa were less prolific, they still made notable contributions to entrepreneurship education. Despite lower publication numbers, Spain had a higher average citation per paper, total citations and average citations per cited publication, highlighting the significant impact of its publications in the field. These data revealed different countries' research activities and collaboration levels in entrepreneurship education, providing valuable insights for international collaboration.

Table 5: Top 10 Countries contributed to the publications

Country	TP	TC	NCP	C/P	C/CP	h	g	CSwHC	m
China	203	1372	153	6.76	8.97	20	37	695	2.00
United States	113	3367	99	29.80	34.01	25	58	2600	2.50
United Kingdom	108	3316	100	30.70	33.16	24	57	2592	2.40
Indonesia	64	576	42	9.00	13.71	13	24	455	1.30
Malaysia	59	627	48	10.63	13.06	13	25	470	1.30
South Africa	37	452	33	12.22	13.70	11	21	369	1.10
Spain	34	1280	31	37.65	41.29	14	34	1168	1.40
Australia	34	1151	32	33.85	35.97	17	33	1016	1.70
Finland	33	563	31	17.06	18.16	14	23	462	1.56
Germany	33	708	31	21.45	22.84	12	26	617	1.20

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index; CSwHC = citation sum within h-core; m=m-index.

4.6 Publications by Source Titles

For studying entrepreneurial education at universities, Dissanayake et al. (2022) reported the 10 source titles that contributed the most to publications in this research area. Hence, based on the factual information and needs of this study, Table 6 provides a detailed overview of the most active source titles in entrepreneurial education, each publishing at least 11 journal articles. *Education and Training* stood out among these journals with an impressive highest TP of 74 and 72 cited papers, highlighting its primary position in research dissemination. The substantial impact was evident in key indicators such as its TC of 1972, C/P at 26.65, C/CP of 27.39, a high h-index of 25 and g-index of 42, highlighting its influential contributions.

Frontiers in Psychology and the *International Journal of Management Education* were also key publications that received considerable attention. The former performed well with 60 papers and an h-index of 11. The latter attracted widespread attention with 55 papers and a C/P of 32.64, highlighting their importance and high quality of research in the field. Other influential contributors such as *Industry and Higher Education*, *Entrepreneurship Education and Pedagogy*, and *Sustainability* (Switzerland), all showed high levels of TC, h-index, g-index, CSWH and m-index, indicating that their published articles had significant academic influence in the field. Notably, despite not leading in TP, the *Journal of Small Business Management* stood out with a remarkably high TC of 1596, C/P of 145.09 and C/CP of 159.60, emphasising the impactful nature of its published articles.

Table 6: Most active source titles

Source Title	TP	NCA	NCP	TC	C/P	C/CP	h	g	CSWH	m
Education and Training	74	184	72	1972	26.65	27.39	25	42	1469	2.50
Frontiers in Psychology	60	211	52	440	7.33	8.46	11	18	274	2.20
International Journal of Management Education	55	157	52	1795	32.64	34.52	22	42	1531	2.20
Source Title	TP	NCA	NCP	TC	C/P	C/CP	h	g	CSWH	m
Journal of Entrepreneurship Education	51	172	50	551	10.80	11.02	15	19	317	1.50
Industry and Higher Education	41	111	36	532	12.98	14.78	13	21	400	1.30
Entrepreneurship Education and Pedagogy	35	91	30	430	12.29	14.33	11	20	350	1.83
Sustainability (Switzerland)	25	97	22	497	19.88	22.59	11	22	438	1.38
International Journal of Entrepreneurial Behaviour and Research	12	37	12	472	39.33	39.33	10	12	462	1.00

Studies in Higher Education	11	37	10	647	58.82	64.70	9	11	638	1.50
Journal of Entrepreneurship in Emerging Economies	11	35	10	169	15.36	16.90	8	11	162	0.80
Journal of Small Business Management	11	33	10	1596	145.09	159.60	10	11	1596	1.11
International Journal of Entrepreneurship and Small Business	11	30	8	36	3.27	4.50	3	5	26	0.38

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=
average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index. m = m-index; CSwHC = citation sum within h-core, m=m-index.

While relatively lower in TP and TC, journals like *Education Sciences*, *International Journal of Entrepreneurship*, *Administrative Sciences*, *Mathematical Problems in Engineering, International Journal of Emerging Technologies in Learning* and *Journal of Small Business and Enterprise Development* contributed significantly to the breadth of entrepreneurial education research. Table 6 provides a comprehensive insight into the primary source titles and their impact on entrepreneurial education, assessing their impact factor, the number of published articles in entrepreneurial education, and the influence of these articles in the field, research output and academic influence, providing important references for selecting appropriate publication venues.

4.7 Highly Cited Documents

This study delved into the most highly cited papers in entrepreneurship education, examining works that significantly influenced the trajectory of entrepreneurship education research. Table 7 presents the top 10 highly cited articles significantly impacting entrepreneurship education.

Table 7: Top 10 highly cited articles

No.	Author(s)	Title	TC	C/Y
1	Bae et al. (2014)	The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review	907	90.70
2	Fayolle and Gailly (2015)	The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence	615	68.33
3	Rauch and Hulsink (2015)	Putting entrepreneurship Education where the intention to Act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior	425	47.22
No.	Author(s)	Title	TC	C/Y
4	Piperopoulos and Dimov (2015)	Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self-Efficacy, and Entrepreneurial Intentions	411	45.67
5	Zhang et al. (2014)	The role of entrepreneurship education as a predictor of university students' entrepreneurial intention	396	39.60
6	Maresch et al. (2016)	The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineer-	322	40.25

		ing versus business studies university programs		
7	Karimi et al. (2016)	The Impact of Entrepreneurship Education: A Study of Iranian Students' Entrepreneurial Intentions and Opportunity Identification	282	35.25
8	Nowiński et al. (2019)	The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries	276	55.20
9	Barba-Sánchez & Atienza-Sahuquillo (2018)	Entrepreneurial intention among engineering students: The role of entrepreneurship education	272	45.33
10	Walter and Block (2016)	Outcomes of entrepreneurship education: An institutional perspective	246	30.75

The article by Bae et al. (2014), titled "The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review", stood out at the top with 907 citations and an average of 90.70 citations per year, indicating its enduring and substantial influence. Next, Fayolle and Gailly's paper (2015) titled "The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence" had a total citation value of 615 and an average of 68.33 citations per year. Their study explored the impact of entrepreneurship education programmes on participants' attitudes and intentions towards entrepreneurship, garnering widespread attention.

Rauch and Hulsink (2015) focused on the impact of entrepreneurship education on entrepreneurial behaviour, while Piperopoulos and Dimov (2015) delved into the relationship between entrepreneurship education, entrepreneurial self-efficacy and entrepreneurial intentions. These top 10 highly cited articles covered insight into research on various aspects of entrepreneurship education, including its impact on entrepreneurial behaviour, intentions, and other relevant factors, forming a multidimensional research framework. Notably, eight articles specifically concentrated on entrepreneurship education and entrepreneurial intentions. In contrast, others explored the effects of entrepreneurship education on entrepreneurial behaviour, entrepreneurial self-efficacy, gender, and more, presenting a considerable depth and breadth of the research landscape. These highly cited articles had a significant academic influence on entrepreneurship research, providing important theoretical and empirical support for understanding the mechanisms of entrepreneurship education's impact, advancing practical applications, and guiding future research directions.

4.8 Co-authorship Analysis

4.8.1 Co-authorship by Author

Figure 3 provides a network visualisation map showing the collaboration intensity among authors in entrepreneurship education. The size of each circle in the figure represents the number of articles by that author, while the thickness of the connecting lines indicates the strength of collaboration. Colours were employed to identify the different clusters of collaboration. The study set a minimum article threshold of three per author, identifying 111 out of 2425 who met this criterion. The visualisation of this author network provides insights into

the primary collaboration structures within entrepreneurship education research.

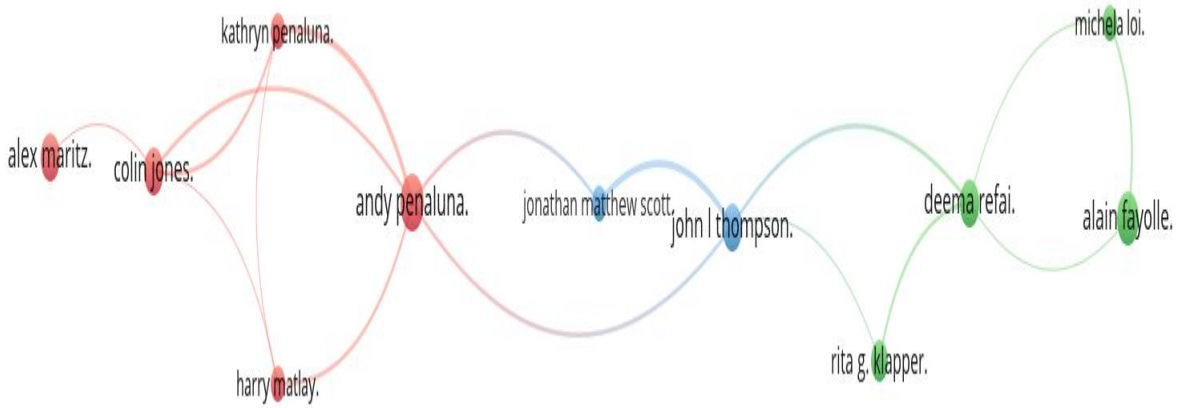

Figure 3: Network visualisation map of the co-authorship by authors

The results revealed that the categorisation of collaborating authors can be divided into three main clusters, represented by red, green, and blue colours. These three clusters exhibited different characteristics and collaboration patterns. Cluster 1 (red) comprised five authors: Alex Maritz, Andy Penaluna, Colin Jones, Harry Matlay, and Kathryn Penaluna. This cluster might represent a group of closely collaborating researchers with a common interest in a particular direction, with high collaboration intensity. Cluster 2 (green) consisted of four authors: Alain Fayolle, Deema Refai, Michela Loi, and Rita G. Klapper. This cluster might have unique research themes or methods with close collaboration relationships. Cluster 3 (blue) included two authors, John I. Thompson and Jonathan Matthew Scott. This cluster might represent a more minor but closely collaborative team, focusing on a specific aspect of entrepreneurship education research. By visualising the network of collaborating authors, the researcher could better understand the collaborative relationships between different researchers within the field of entrepreneurship education, which could facilitate deeper collaborations and exploration of research directions.

4.8.2 Co-authorship by Countries

Figure 4 presents a visualisation map showing the collaborative intensity among countries/regions in entrepreneurship education. The figure shows co-authorship networks among countries/regions with at least six relevant entrepreneurship education publications. The collaborations among these countries/regions were divided into eight groups, each distinguished by a different colour. The first category included the Czech Republic, Denmark, Finland, Norway, Poland and Sweden, which showed a relatively high intensity of cooperation and formed a close network. The second category encompassed Bangladesh, Estonia, Iran, Kazakhstan, Netherlands and the Russian Federation, which also exhibited some degree of cooperation intensity and formed another collaborative network. The third category contained Canada, India, Oman, Pakistan, Saudi Arabia and the United Arab Emirates, which exhibited a collaborative network in entrepreneurship education. The fourth category comprised Germany, Ghana,

Ireland, New Zealand, Nigeria and South Africa, which exhibited another relatively independent cooperation network. The fifth category covered Brazil, France, Italy, Portugal, Ukraine and the United Kingdom, which formed another independent cooperation network. The sixth category consisted of China, Greece, South Korea, Thailand and the United States, which also exhibited close cooperation in entrepreneurship education. The seventh category included Australia, Indonesia, Malaysia, Taiwan and Vietnam, which formed another collaborative network. The eighth category involved Mexico and Spain, which exhibited a relatively small cooperation network.

Figure 4 illustrates the strength of cooperation in entrepreneurship education among different countries/regions over the past decade. The findings showed that global collaboration in entrepreneurship education exhibits diversity and breadth. These findings have positive implications for promoting research and practice in entrepreneurship education among different countries worldwide and help deepen the global understanding of entrepreneurship education.

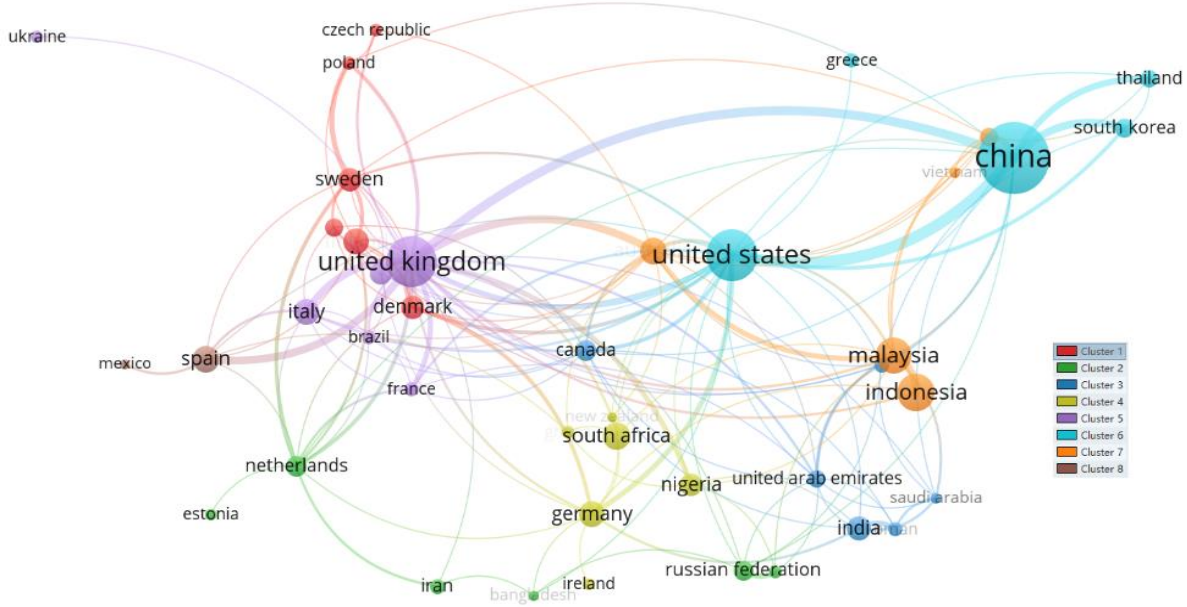

Figure 4: Network visualisation map of the co-authorship by countries countries/regions

4.8.3 Co-occurrence analysis of author's keywords

Co-occurrence network analysis can provide a deeper insight into the complex associations between different concepts (Punj et al., 2023), and the author's keyword co-occurrence analysis enables to identify research foci and core themes in entrepreneurship education. The co-occurrence relationships among these keywords are shown in Figure 5, where keywords sharing common themes are seamlessly grouped into seven clusters, reflecting the key themes in the research field. Specifically, these seven clusters included 13, 11, 11, 10, 9, 7, and 3 items, respectively. Each cluster corresponded to a colour: red, green, blue, yellow, purple, sky blue and orange (in Table 8).

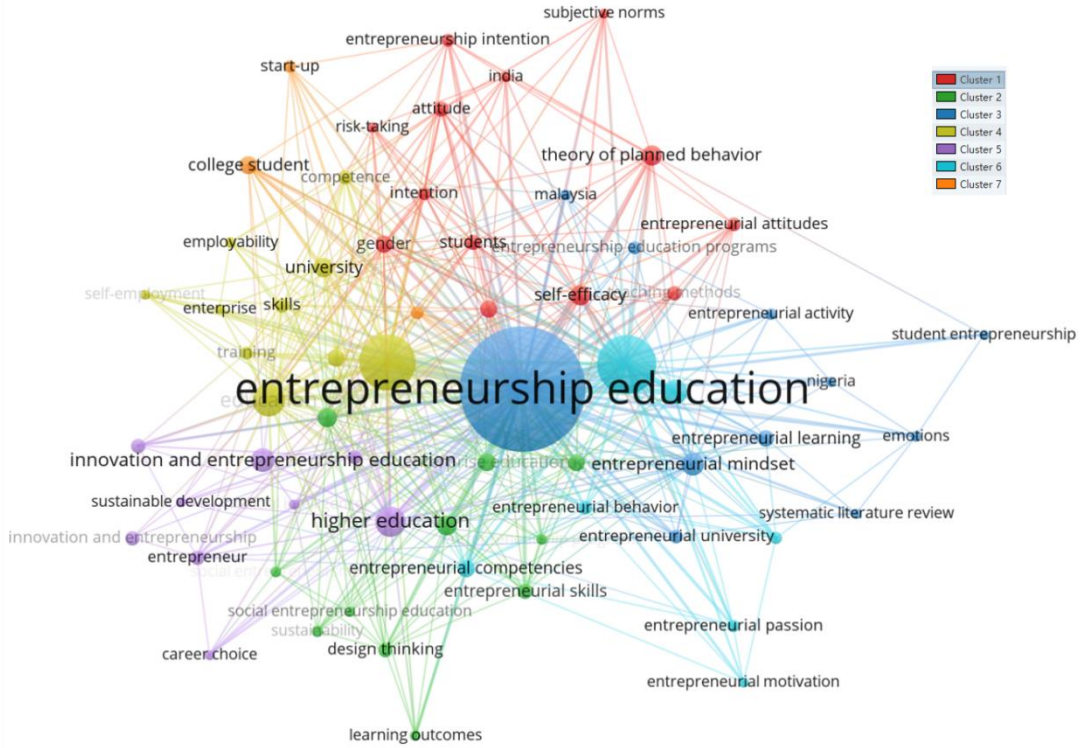

Figure 5: Network visualisation of the author's keywords

Table 8: Author's keywords cluster

Cluster	Colour	Keywords
Cluster 1	Red	attitude, entrepreneurial attitudes, entrepreneurship intention, gender, high education institutions, India, intention, risk-taking, self-efficacy, students, subjective norms, teaching methods, theory of planned behavior
Cluster 2	Green	design thinking, enterprise education, entrepreneurial skills, entrepreneurship program, experiential learning, innovation, learning outcomes, pedagogy, social entrepreneurship, social entrepreneurship education, sustainability
Cluster 3	Blue	emotions, entrepreneurial activity, entrepreneurial learning, entrepreneurial mindset, entrepreneurial university, entrepreneurship education, entrepreneurship education programs, Malaysia, Nigeria, student entrepreneurship, systematic literature
Cluster 4	Yellow	competence, education, employability, enterprise, entrepreneurship, learning, self-employment, skills, training, university.
Cluster 5	Purple	artificial intelligence, career choice, creativity, curriculum, entrepreneur, higher education, innovation and entrepreneurship, innovation and entrepreneurship education, sustainable development
Cluster 6	Sky Blue	entrepreneurial behavior, entrepreneurial competencies, entrepreneurial intention, entrepreneurial motivation，entrepreneurial passion, entrepreneurial self-efficacy, opportunity recognition
Cluster 7	Orange	college student, covid-19, start-up

In Figure 5, nodes represent keywords, and larger nodes correspond to keywords with higher frequency of occurrence, such as entrepreneurship education, entrepreneurial intention, entrepreneurship, education, entrepreneurial self-efficacy, innovation and entrepreneurship education, entrepreneurial mindset, etc. These keywords with relatively large nodes in the

network indicate their heightened attention in the research field. Notably, there are close connections between specific keywords, such as entrepreneurship education and high education, entrepreneurship intention, theory of planned behaviour, college student, attitude, entrepreneurial competencies, entrepreneurial mindset, entrepreneurial skills, entrepreneurial attitudes, etc. The relatively thick connecting edges between these keywords indicates a close relevance in the research. It further emphasises the core position of these keywords in entrepreneurship education research. Keyword co-occurrence analysis provides an avenue for an in-depth understanding of the research focus in entrepreneurship education and direction for future research.

4.9 Thematic Map Analysis

Figure 6 shows the thematic map of entrepreneurship education research. The results are presented whereby the density and centrality of the entrepreneurship education thematic map are divided into four main theme quadrants.

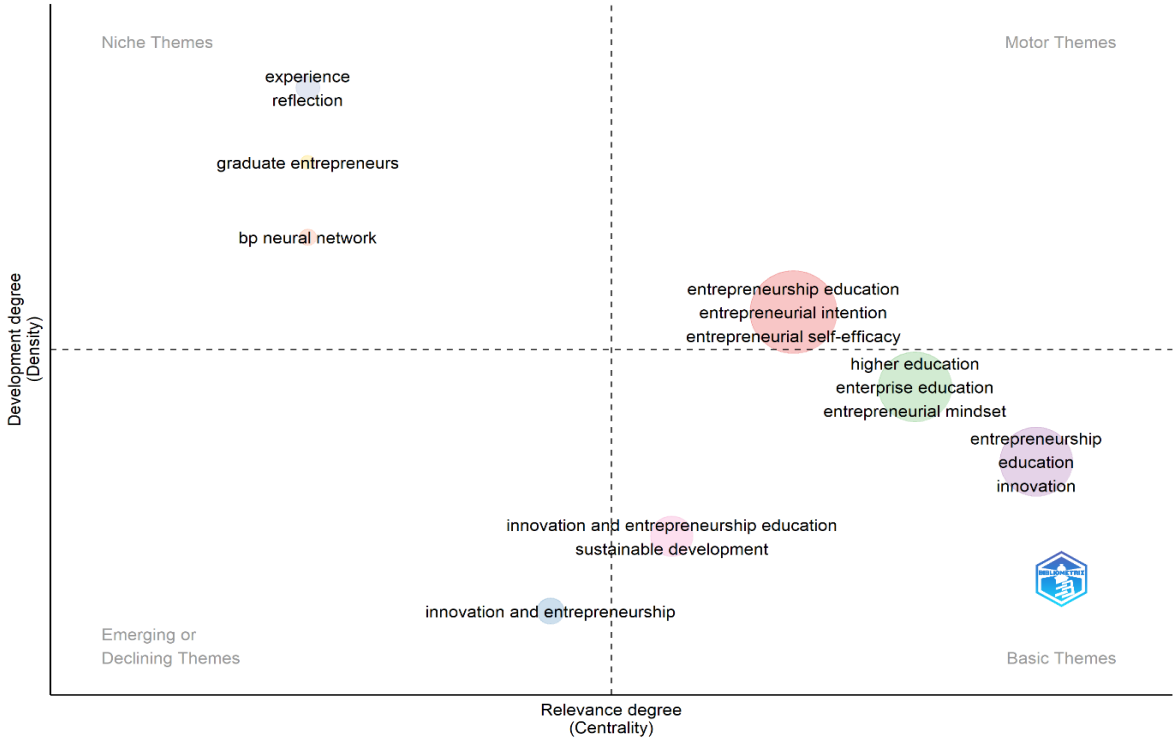

Figure 6: Thematic map of entrepreneurship education research

In the upper-right quadrant, entrepreneurship education, entrepreneurial intention and entrepreneurial self-efficacy emerge as high-density and centrality-driving solid themes. It is considered the forefront and hotspot in entrepreneurship education research. Typically, these themes attracted researchers' attention, and in-depth exploration might lead to new theories, methods and perspectives. Keywords in the upper-left quadrant, such as experience, reflection, graduate entrepreneurs, and bp neural network, belong to niche themes. Themes in this quadrant are relatively unique and uncommon, providing researchers with opportunities for in-depth investigation and potential for innovation. In the lower left quadrant, the keywords innovation and entrepreneurship education, sustainable development, and innovation and

entrepreneurship belong to both Emerging or Declining themes and Basic themes. It is suggested they have a complex status in research, remaining of novelty and significance in certain aspects but could be gradually losing attention in others. Nevertheless, they still hold fundamental importance, representing essential concepts or core issues.

Similarly, keywords in the lower-right basic themes, including higher education, enterprise education, entrepreneurial mindset, entrepreneurship, education and innovation, serve as focal points and core concepts in entrepreneurship education research. These themes reflect sustained scholarly interest, and related studies contributed to establishing basic knowledge in the field. This analysis helped to reveal the foci of entrepreneurship education research and helped researchers better understand the literature and developmental trends in the field.

4.10 Factorial Analysis

This study employed Multiple Correspondence Analysis (MCA) to present the potential relationships among different keywords in entrepreneurship education in a lower-dimensional space. As shown in Figure 7, MCA generated a word map for entrepreneurship education, where each dot represents a keyword, and the distance between the dots reflects the strength of the relationship between the keywords. Keywords with close distances indicate close relationships, while less relevant keywords appear farther apart. Figure 7 shows three clusters in entrepreneurship education research, with Cluster 1 being the primary cluster, representing diverse perspectives in entrepreneurship education research. This cluster includes keywords such as “entrepreneurship education”, “innovation and entrepreneurship education”, “university”, “curriculum”, “higher education institutions,” and “college student”. These terms indicate high attention paid to entrepreneurship education and cover terms related to higher education, such as “higher education” and “college student”, emphasising that the primary focus of entrepreneurship education is college students. Additionally, keywords like “pedagogy”, “entrepreneurial mindset”, “entrepreneurial competencies”, “entrepreneurial learning” and “experiential learning” further highlight the specific content areas within entrepreneurship education. This cluster suggests potential research explorations into aspects of “entrepreneurship education”, “experiential learning”, and “curriculum” in “higher education institutions” as well as “entrepreneurial competencies” in “higher education institutions”, along with a focus on “entrepreneurial competencies”.

Cluster 2 concentrates on exploring other aspects of entrepreneurship education, with specific attention to keywords such as “entrepreneurial intention”, “entrepreneurial self-efficacy”, “self-efficacy”, “theory of planned behaviour” and “gender”. These keywords indicate a growing interest in entrepreneurship education’s psychological and behavioural aspects, highlighting the breadth of research. Cluster 3 contains keywords “education”, “students” and “attitude”, emphasising a concentrated focus on education, students and attitude in entrepreneurship education. This cluster suggests that these three aspects represent critical areas of interest, research concept and specific focal areas, providing a multidimensional perspective on highlighting entrepreneurship

education. The analysis highlighted core dynamism and diversity, helping researchers identify research gaps and new opportunities in the field.

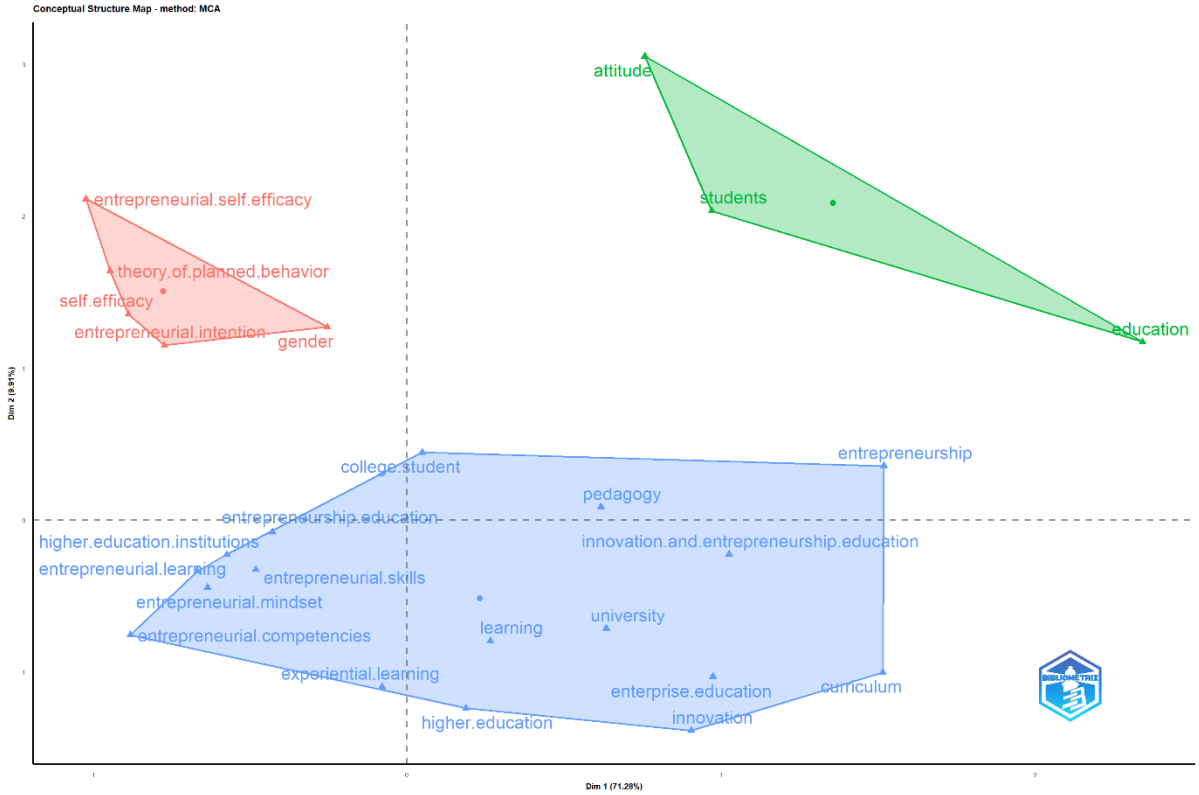

Figure 7: Word map of the author 's keywords in entrepreneurship education

5. Discussion

This study provided an insightful assessment of 1017 research articles on entrepreneurship education published between 2014 and November 2023 using bibliometric analysis methods, revealing the field's multidisciplinary characteristics and development trends. This study found that the disciplinary areas involved in entrepreneurship education were consistent with the results of Shabbir et al. (2022), indicating that entrepreneurship education has a significant impact not only in the fields of business and management but also in other disciplines, such as social sciences, especially in recent years, where it has been more inclined towards social science fields. This study found that the number of research papers on entrepreneurship education has increased significantly in the past decade, which is consistent with the research of Sreenivasan and Suresh (2023), reflecting the continued attention of academics in this field. This study showed that research papers on entrepreneurship education have a high citation rate, emphasising the importance of research collaboration and its impact on academics. This study, like that of Sreenivasan and Suresh (2023), found that Agus Wibowo of the Indonesian Universitas Negeri Jakarta is a prolific author, indicating his significant contribution to entrepreneurship education. Unlike that study, this study found that China is leading in entrepreneurship education research, followed by the United States and the United Kingdom. It could be due to the Chinese government's emphasis and policy promotion of this field. China's large

population and abundant research talent have contributed to its outstanding performance in entrepreneurship education. This study also found that other countries have relatively less research on entrepreneurship education and suggested global support for entrepreneurship education in these regions to promote the field globally. Regarding journal sources, the study's findings were consistent with the results of Fagadar (2021); both agree that *Education and Training* has the most publications. Additionally, this study also found that *Frontiers in Psychology*, *International Journal of Management Education* and *Journal of Entrepreneurship Education* are also important. Highly cited articles such as Bae et al. (2014), Fayolle and Gailly (2015) and Rauch and Hulsink (2015) focused on the relationship between entrepreneurship education and entrepreneurial intentions. This finding was consistent with the study by Nájera-Sánchez et al. (2023), suggesting that entrepreneurial intention was a research focus in this area and has attracted widespread attention.

This study revealed the researchers with the highest collaboration intensity in entrepreneurship education research through co-authorship analyses, including Alex Maritz, Andy Penaluna, Colin Jones, Harry Matlay and Kathryn Penaluna. The close collaboration between these scholars demonstrates their core position in entrepreneurship education. The visualisation map of countries and regions indicated that China, the United Kingdom, the United States, Malaysia and Indonesia have the highest number of publications in entrepreneurship education research, and their cooperation is close. It indicated that the cooperation between countries/regions is not limited by geographical regions, providing possibilities for knowledge transfer, integration, and enhancement (Wahid et al., 2020).

The co-occurrence analysis of the author's keywords further revealed the core themes of entrepreneurship education research, where "entrepreneurship education", "entrepreneurial intention", "entrepreneurship", "education", "higher education" and "entrepreneurial self-efficacy" are the most closely collaborated keywords, reflecting the research priorities and hotspots in the field. Additionally, the word maps generated from the thematic mapping and multiple correspondence analysis (MCA) of entrepreneurship education research indicated that entrepreneurship education, entrepreneurial intention, entrepreneurial self-efficacy, innovation, entrepreneurship education and higher education were highly focussed themes, which was consistent with the findings of Sreenivasan and Suresh (2023). It indicated that the research focus on entrepreneurship education has mostly stayed the same over the last 30 years, and these themes will also be the focus of future research. Overall, this study provided essential references and directions for future researchers by analysing profound and comprehensive research on entrepreneurship education.

6. Conclusion

In view of the demand for economic development, entrepreneurship education will remain a hot topic in educational research for the next few decades. This study showed that academic interest in entrepreneurship education has increased significantly since 2014, and related publications have steadily risen. This field has not only received widespread attention in several countries, but

the diversity and depth of its research topics are expanding. This study delves into the prospects, key trends, major contributors, source titles, cooperation networks among authors and countries, important keywords, and noteworthy topics in entrepreneurship education. These findings are crucial for understanding and assessing emerging trends in entrepreneurship education and provide important guidance for future research exploring this area, helping researchers and practitioners better understand and engage with the development of entrepreneurship education in recent years.

Although this study provides a comprehensive perspective to examine entrepreneurship education over the past decade, its reliance on the Scopus database presents certain limitations. The choice of Scopus as the sole data source was based on ensuring consistency in data collection and analysis, reducing data inconsistencies that may arise when combining multiple databases, and thus comprehensively understanding the research dynamics of entrepreneurship education. However, future research could consider adopting a multi-database approach to obtain more comprehensive and complementary insights. Furthermore, this study was limited to using specific keywords and bibliometric analysis methods. Future research could deepen the understanding of entrepreneurship education by using more diverse keywords and different periods and combining other methods such as meta-analysis, systematic analysis and content review. Using this method and expanding data sources will provide researchers with richer resources to promote further research on entrepreneurship education in the same direction or interdisciplinary fields.

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8. References

Ahmi, A. (2023). OpenRefine: An approachable tool for cleaning and harmonizing bibliographical data. *AIP Conference Proceedings*, *2827*. https://doi.org/10.1063/5.0164724

Ahmi, A., Elbardan, H., & Ali, R. H. R. M. (2019). Bibliometric analysis of published literature on industry 4.0. *2019 International Conference on Electronics, Information, and Communication (ICEIC)*, 1–6. https://doi.org/10.23919/ELINFOCOM.2019.8706445

Amalia, R. T., & von Korflesch, H. F. O. (2021). Entrepreneurship education in Indonesian higher education: Mapping literature from the Country's perspective. *Entrepreneurship Education*, *4*(3), 291–333. https://doi.org/10.1007/s41959-021-00053-9

Apostu, S. A., Mukli, L., Panait, M., Gigauri, I., & Hysa, E. (2022). Economic growth through the lenses of education, entrepreneurship, and innovation. *Administrative Sciences*, *12*(3), 74. https://doi.org/10.3390/admsci12030074

Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review. *Entrepreneurship Theory and Practice*, *38*(2), 217–254. https://doi.org/10.1111/etap.12095

Banha, F., Coelho, L. S., & Flores, A. (2022). Entrepreneurship Education: A Systematic Literature Review and Identification of an Existing Gap in the Field. *Education Sciences*, *12*(5), 336. https://doi.org/10.3390/educsci12050336

Barba-Sánchez, V., & Atienza-Sahuquillo, C. (2018). Entrepreneurial intention among engineering students: The role of entrepreneurship education. *European Research on Management and Business Economics*, *24*(1), 53–61. https://doi.org/10.1016/j.iedeen.2017.04.001

Breznitz, S. M., & Zhang, Q. (2022). Entrepreneurship education and firm creation. *Regional Studies*, *56*(6), 940–955. https://doi.org/10.1080/00343404.2021.1878127

Burnham, J. F. (2006). Scopus database: A review. *Biomedical Digital Libraries*, *3*(1), 1–8. https://doi.org/10.1186/1742-5581-3-1

Cavalcante Carvalho, A. J., Oliveira Corrêa, R., Gomes de Carvalho, G. D., & Olave, M. E. L. (2022). Entrepreneurial education in basic education: Identifying challenges from a bibliometric analysis and systematic review. *Revista de Empreendedorismo e Gestao de Pequenas Empresas*, *11*(2). https://doi.org/10.14211/ibjesb.e2032

Chin, H., & Chew, C. M. (2021). Profiling the research landscape on electronic feedback in educational context from 1991 to 2021: A bibliometric analysis. *Journal of Computers in Education*, *8*(4), 551–586. https://doi.org/10.1007/s40692-021-00192-x

Choudhri, A. F., Siddiqui, A., Khan, N. R., & Cohen, H. L. (2015). Understanding Bibliometric Parameters and Analysis. *RadioGraphics*, *35*(3), 736–746. https://doi.org/10.1148/rg.2015140036

de Pablo Valenciano, J., Uribe-Toril, J., & Ruiz-Real, J. L. (2019). Entrepreneurship and education in the 21st century: Analysis and trends in research. *Journal of Entrepreneurship Education*, *22*(4), 1–20.

Deveci, İ. (2022). Review of entrepreneurship education literature in educational contexts: Bibliometric analysis. *Participatory Educational Research*, *9*(1), 214–232. https://doi.org/10.17275/per.22.12.9.1

Dissanayake, H., Iddagoda, A., & Popescu, C. (2022). Entrepreneurial Education at Universities: A Bibliometric Analysis. *Administrative Sciences*, *12*(4), 185. https://doi.org/10.3390/admsci12040185

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fagadar, C. F. (2021). Entrepreneurial Competencies and Higher Education Institutions: A bibliometric study. *Journal of E-Learning and Higher Education*, *2021*. https://doi.org/10.5171/2021.804268

Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *The FASEB Journal*, *22*(2), 338–342. https://doi.org/10.1096/fj.07-9492LSF

Farooq, R. (2022). A review of knowledge management research in the past three decades: A bibliometric analysis. *VINE Journal of Information and Knowledge Management Systems, 54*(2). https://doi.org/10.1108/VJIKMS-08-2021-0169

Fauzan, F., Sulistyo, S., Mustikowati, R. I., & Wilujeng, S. (2023). A bibliometric analysis of research on entrepreneurship education, 1977-2021. *Jurnal Manajemen Indonesia*, *23*(1), 1. https://doi.org/10.25124/jmi.v23i1.4232

Fayolle, A., & Gailly, B. (2015). The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence. *Journal of Small Business Management*, *53*(1), 75–93. https://doi.org/10.1111/jsbm.12065

Gümüş, S., Bellibaş, M. Ş., Gümüş, E., & Hallinger, P. (2020). Science mapping research on educational leadership and management in Turkey: A bibliometric review of international publications. *School Leadership & Management*, *40*(1), 23–44. https://doi.org/10.1080/13632434.2019.1578737

Guns, R., & Rousseau, R. (2009). Real and rational variants of the h-index and the g-index. *Journal of Informetrics*, *3*(1), 64–71. https://doi.org/10.1016/j.joi.2008.11.004

Hardie, B., Highfield, C., & Lee, K. (2023). Attitudes and values of teachers and leaders towards entrepreneurship education. *Research Papers in Education*, *38*(4), 690–714. https://doi.org/10.1080/02671522.2022.2028891

Hu, D., Thien, L. M., Ahmi, A., & Mohamed, A. (2023). The 100 Most-Cited Research Publications on Servant Leadership: A Bibliometric Analysis. *SAGE Open*, *13*(3), 21582440231194220. https://doi.org/10.1177/21582440231194220

Johann, D. A., Nunes, A. de F. P., Santos, G. B. dos, Silva, D. J. C. da, Bresciani, S. A. T., & Lopes, L. F. D. (2020). Mapping of scientific production on design thinking as a tool for entrepreneurship education: A bibliometric study of a decade. *World Journal of Entrepreneurship, Management and Sustainable Development*, *16*(4), 271–285. https://doi.org/10.1108/WJEMSD-05-2019-0028

Kakouris, A., & Georgiadis, P. (2016). Analysing entrepreneurship education: A bibliometric survey pattern. *Journal of Global Entrepreneurship Research*, *6*(1), 6. https://doi.org/10.1186/s40497-016-0046-y

Karimi, S., Biemans, H. J., Lans, T., Chizari, M., & Mulder, M. (2016). The impact of entrepreneurship education: A study of Iranian students' entrepreneurial intentions and opportunity identification. *Journal of Small Business Management*, *54*(1), 187–209. https://doi.org/10.1111/jsbm.12137

Looi, K. H., & Maritz, A. (2021). Government institutions, entrepreneurship education and entrepreneurship education programmes in Malaysia. *Education+ Training*, *63*(2), 271–291. https://doi.org/10.1108/ET-07-2020-0217

Maresch, D., Harms, R., Kailer, N., & Wimmer-Wurm, B. (2016). The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technological Forecasting and Social Change*, *104*, 172–179. https://doi.org/10.1016/j.techfore.2015.11.006

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group*. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, *151*(4), 264–269. https://doi.org/10.7326/0003-4819-151-4-200908180-00135

Nájera-Sánchez, J.-J., Pérez-Pérez, C., & González-Torres, T. (2023). Exploring the knowledge structure of entrepreneurship education and entrepreneurial intention. *International Entrepreneurship and Management Journal*, *19*(2), 563–597. https://doi.org/10.1007/s11365-022-00814-5

Ndou, V., Mele, G., & Del Vecchio, P. (2019). Entrepreneurship education in tourism: An investigation among European Universities. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *25*, 100175. https://doi.org/10.1016/j.jhlste.2018.10.003

Ndou, V., Secundo, G., Schiuma, G., & Passiante, G. (2018). Insights for shaping entrepreneurship education: Evidence from the European entrepreneurship centers. *Sustainability*, *10*(11), 4323. https://doi.org/10.3390/su10114323

Nowiński, W., Haddoud, M. Y., Lančarič, D., Egerová, D., & Czeglédi, C. (2019). The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries. *Studies in Higher Education*, *44*(2), 361–379. https://doi.org/10.1080/03075079.2017.1365359

Panait, M., Hysa, E., Petrescu, M. G., & Fu, H. (2022). Universities–Players in the Race for Sustainable Development. In C.Machado & J.P. Davim (eds,), *Higher Education for Sustainable Development Goals* (pp. 23–42). River Publishers.

Piperopoulos, P., & Dimov, D. (2015). Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions. *Journal of Small Business Management*, *53*(4), 970–985. https://doi.org/10.1111/jsbm.12116

Pittaway, L. (2021). *Entrepreneurship education in higher education: A review of the US context*. https://doi.org/10.2139/ssrn.3942514

Punj, N., Ahmi, A., Tanwar, A., & Abdul Rahim, S. (2023). Mapping the field of green manufacturing: A bibliometric review of the literature and research frontiers. *Journal of Cleaner Production*, *423*, 138729. https://doi.org/10.1016/j.jclepro.2023.138729

Ramly, S. N. F., Ahmad, N. J., Mohamed, A., & Yakob, N. (2023). Innovation and Entrepreneurship in Education: A Bibliometric Analysis. *Journal of Science and Mathematics Education in Southeast Asia*, *45*, 222–248.

Ratten, V., & Jones, P. (2021). Entrepreneurship and management education: Exploring trends and gaps. *The International Journal of Management Education*, *19*(1), 100431. https://doi.org/10.1016/j.ijme.2020.100431

Rauch, A., & Hulsink, W. (2015). Putting entrepreneurship education where the intention to act lies: An investigation into the impact of entrepreneurship education on entrepreneurial behavior. *Academy of Management Learning & Education*, *14*(2), 187–204. https://doi.org/10.5465/amle.2012.0293

Shabbir, M. S., Batool, F., & Mahmood, A. (2022). Trends in entrepreneurship education: A systematic literature review. *Higher Education, Skills and Work-Based Learning*, *12*(6), 1040–1056. https://doi.org/10.1108/HESWBL-05-2022-0105

Sidiropoulos, A., Katsaros, D., & Manolopoulos, Y. (2007). Generalized Hirsch h-index for disclosing latent facts in citation networks. *Scientometrics*, *72*(2), 253–280. https://doi.org/10.1007/s11192-007-1722-z

Sreenivasan, A., & Suresh, M. (2023). Twenty years of entrepreneurship education: A bibliometric analysis. *Entrepreneurship Education*, *6*(1), 45–68. https://doi.org/10.1007/s41959-023-00089-z

Wahid, R., Ahmi, A., & Alam, A. S. A. F. (2020). Growth and Collaboration in Massive Open Online Courses: A Bibliometric Analysis. *The International Review of Research in Open and Distributed Learning*, *21*(4), 292–322. https://doi.org/10.19173/irrodl.v21i4.4693

Walter, S. G., & Block, J. H. (2016). Outcomes of entrepreneurship education: An institutional perspective. *Journal of Business Venturing*, *31*(2), 216–233. https://doi.org/10.1016/j.jbusvent.2015.10.003

Wang, C., Zheng, P., Zhang, F., Qian, Y., Zhang, Y., & Zou, Y. (2022). Exploring quality evaluation of innovation and entrepreneurship education in higher institutions using deep learning approach and fuzzy fault tree analysis. *Frontiers in Psychology*, *12*, 767310. https://doi.org/10.3389/fpsyg.2021.767310

Yu, M.-C., Goh, M., Kao, H.-Y., & Wu, W.-H. (2017). A comparative study of entrepreneurship education between Singapore and Taiwan. *Management Decision*, *55*(7), 1426–1440. https://doi.org/10.1108/MD-06-2016-0415

Zakaria, R., Ahmi, A., Ahmad, A. H., Othman, Z., Azman, K. F., Ab Aziz, C. B., Ismail, C. A. N., & Shafin, N. (2021). Visualising and mapping a decade of literature on honey research: A bibliometric analysis from 2011 to 2020. *Journal of Apicultural Research*, *60*(3), 359–368. https://doi.org/10.1080/00218839.2021.1898789

Zhang, Y., Duysters, G., & Cloodt, M. (2014). The role of entrepreneurship education as a predictor of university students' entrepreneurial intention. *International Entrepreneurship and Management Journal*, *10*(3), 623–641. https://doi.org/10.1007/s11365-012-0246-z