

Mapping the Minds: A Global Bibliometric Review of Entrepreneurship Education and Future Frontiers

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Abstract

Over time, Entrepreneurial Education (EE) has arisen as an important research area, providing significant insights into entrepreneurial endeavours. The present study delivered a precise 45-year journey of bibliometric analysis by leveraging over 998 publications in Scopus. This global study of Entrepreneurship Education is deploying Vosviewer to ensure trend assessment, like publication pattern, contributor list, thematic areas, and related frameworks (TPB/ESE), working smoothly. Our findings offer a compelling future for growth in various areas of business, social sciences, and psychology. Additionally, the study presents the implications of entrepreneurial education, entrepreneur self-efficacy, and various innovation contexts of higher education on EE, indicating future research in entrepreneurship and policy development, which is essential for academics and policymakers to foster the worldwide value of entrepreneurship.

Keywords: *Entrepreneurship Education, Bibliometric Analysis, Entrepreneurial Intention, Higher Education.*

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INTRODUCTION

Entrepreneurship education (EE) has emerged as a critical pillar in equipping university students with the skills, mindset, and competencies required to thrive in a complex, innovation-driven global economy. As the world pivots toward knowledge-based and entrepreneurial economies, universities are increasingly tasked with preparing graduates who can create value, solve real-world problems, and drive economic transformation. Scholars such as Iwu (2021) emphasise that entrepreneurship knowledge not only enhances students' capabilities but also plays a vital role in promoting innovation and socio-economic development. In response, EE has become an integral component of higher education curricula worldwide. However, despite its growing prominence, entrepreneurship education faces multiple challenges that limit its effectiveness. One of the most persistent issues is the disconnect between theoretical instruction and practical application. Many institutions still rely heavily on traditional pedagogical methods such as lectures and rote learning, with limited integration of experiential learning, industry collaboration, or mentorship (Duval-Couetil, 2013; Zhang, 2023; Fenton & Barry, 2014). As a result, students are often ill-prepared to navigate the uncertainties and complexities of real-world entrepreneurial ventures. Studies have shown that innovative teaching methods such as project-based learning and industry partnerships can bridge the gap between academic theory and entrepreneurial practice (Jia & Hui, 2022), yet these approaches remain underutilised. Thus, compounding this challenge is the inconsistent quality and delivery of EE across institutions and disciplines. Research highlights significant disparities in curriculum design, instructional methods, and educator preparedness (Ubogu, 2020; Zappe et al., 2023; Ahmad & Khan, 2023). These inconsistencies contribute to unequal learning outcomes and hinder the development of a standardised framework for effective EE that aligns with evolving market demands (Karataş-Özkan et al., 2023; Zhao et al., 2022). Moreover, many educators lack both practical entrepreneurial experience and the pedagogical training needed to deliver

dynamic, student-centred learning (Zhang, 2023; Harima et al., 2021), further weakening the impact of EE. Socio-economic and structural constraints also play a critical role, particularly in developing regions. Limited institutional support, scarce resources, and a lack of mentorship opportunities continue to undermine the success of EE initiatives (Osman et al., 2023). These barriers not only affect students' access to quality entrepreneurship training but may also discourage them from viewing entrepreneurship as a viable career path, thus stifling local innovation and job creation. The rapid advancement of technology and the growing relevance of digital entrepreneurship introduce yet another layer of complexity. Although digital tools have the potential to enhance creativity, engagement, and access to learning (Emrizal, 2024; Jia, 2021), many universities struggle to incorporate these tools effectively into their EE curricula. Challenges include both technological infrastructure limitations and a lack of digital competency among educators and students (Pelegrin et al., 2023; Rosli et al., 2023). These shortcomings were further highlighted during the COVID-19 pandemic, which exposed the fragility of experiential learning models and amplified the need for adaptable, tech-integrated pedagogies (Vecchiarini et al., 2023; Solvoll & Haneberg, 2022). In addition, the cultivation of an entrepreneurial identity defined by traits such as creativity, resilience, and opportunity recognition requires supportive and enabling learning environments. Without sufficient encouragement to take risks, think critically, and experiment, students may struggle to internalise entrepreneurial values and behaviours (Mahmudin, 2023; Prastyaningtyas et al., 2023). Developing this identity is essential for sustaining long-term entrepreneurial engagement and success. In summary, while entrepreneurship education is increasingly acknowledged as a key strategy for economic empowerment and innovation, its current implementation is marred by outdated teaching practices, limited practical exposure, fragmented curricula, technological gaps, and underprepared educators.

LITERATURE REVIEW

Entrepreneurship education (EE) has garnered significant attention over recent decades, with numerous scholars examining its effectiveness, structure, and evolving pedagogical models. Bae et al. (2014) conducted a meta-analysis indicating a positive relationship between entrepreneurship education and entrepreneurial intention; however, this relationship becomes insignificant when prior entrepreneurial intention is controlled. Martin et al. (2013) also conducted a meta-analysis showing that entrepreneurship education significantly enhances entrepreneurial human capital, including knowledge and skills. Lv et al. (2021) further supported these findings by indicating that structured EE activities, such as business plan competitions, positively affect students' entrepreneurial intentions. Putri (2022) emphasised the role of EE in shaping students' entrepreneurial attitudes and suggested that participation in EE programs leads to more favourable attitudes toward entrepreneurship. Wang et al. (2021) found that a network-based EE model strengthens students' entrepreneurial psychology by fostering collaborative learning environments and peer influence. Neck and Greene (2010) proposed a shift in EE from traditional pedagogies to more dynamic, experiential approaches that emphasise action, emotion, and cognition in learning processes. Mwasalwiba (2010) categorised EE teaching methods into traditional, experiential, and non-traditional, suggesting that the alignment of teaching methods, learning outcomes, and assessment techniques is crucial. Nunfam et al. (2022) found that interactive pedagogical approaches, such as simulations, role-playing, and workshops, have a significant positive impact on students' cognitive and affective learning outcomes. Martínez and Muñoz (2021) proposed a transdisciplinary model of EE that integrates insights from management, education, and psychology to create more holistic learning environments. Zhang (2024) introduced an integrated framework for EE that combines theoretical instruction with experiential learning components, aiming to improve students' readiness for entrepreneurial challenges. Basbeth and Nawi (2020) emphasised the importance of immersive and hands-on learning experiences in enhancing students' entrepreneurial competencies. Slabová and Rolínek (2021) argued that the success of EE programs depends on their ability to provide practice-oriented curricula that mirror real-world entrepreneurial contexts.

Educators play a central role in the success of EE programs. Wei et al. (2023) emphasised that instructors must undergo continuous professional development to remain effective. Chen et al. (2024) argued that the quality of EE depends significantly on the instructors' pedagogical competencies and practical experience in entrepreneurship. Aaboen et al. (2022) found that students perceive EE programs more favourably when instructors demonstrate enthusiasm, expertise, and real-world experience. Radebe and Vezi-Magigaba (2022) identified outdated curricula and poorly trained

instructors as major barriers to effective EE implementation. Karki et al. (2023) reinforced this view by noting the lack of faculty with practical entrepreneurial experience as a limiting factor in EE effectiveness. Technology has also played a transformative role in EE. Wu et al. (2024) reported that digital platforms and online learning tools increase accessibility and engagement in EE programs. Cai et.al (2022) emphasised that integrating technology into EE allows for more personalised and interactive learning experiences, thereby enhancing educational outcomes.

Environmental and psychological factors also shape the impact of EE. Pesha (2022) observed that students' entrepreneurial interests are influenced by family background, socio-economic status, and access to resources. Hidayat et al. (2021) found that the university environment, peer influence, and availability of mentorship significantly affect students' entrepreneurial orientation. Yang (2024) explored the intersection between mental health and EE, concluding that psychological well-being plays a critical role in students' entrepreneurial success. Wei (2023) emphasised the importance of incorporating emotional resilience training into EE to better prepare students for the uncertainties of entrepreneurial ventures. The cultural and national context also plays a critical role in EE design and effectiveness. Lyu et al. (2021) highlighted that cultural values significantly influence students' receptiveness to entrepreneurial education (EE), suggesting that localised curricula may be more effective than standardised models. Complementing this perspective, Sreenivasan and Suresh (2023) identified emerging trends in EE such as a growing emphasis on experiential learning, the integration of digital platforms, and interdisciplinary approaches, underscoring the need for context-sensitive and innovation-driven educational strategies. Mardiani (2024) mapped the global landscape of EE research, identifying key themes and influential publications that have shaped the field. Rashid (2019) suggested that EE has the potential to revitalise vulnerable economies by equipping individuals with the tools needed for self-employment and innovation. Lourenço et al. (2012) highlighted the role of EE in promoting sustainable and socially responsible entrepreneurship. Collectively, these studies underscore the multifaceted nature of EE. The effectiveness of EE depends not only on curriculum and pedagogy but also on instructor quality, technological integration, psychological well-being, cultural context, and socio-economic environment. As the global economy continues to evolve, so too must EE, adapting to new challenges and opportunities. This literature highlights the need for holistic, flexible, and context-sensitive approaches that empower students not only to start businesses but also to become resilient, ethical, and innovative contributors to society.

METHODOLOGY

The present study leverages 2 methods (Bibliometric analysis & network analysis) to analyse the area of entrepreneurship education among university students. The data had been extracted from a well-known collection of literature database, which is Scopus. Numerous aspects of research, such as publication trends, authorship, institutional affiliations and important points in the field of entrepreneurship education, have also been explored. By using Vosviewer, the study aimed to identify literature trends globally and a holistic understanding of the current landscape of entrepreneurship education in university education. By combining both methods (Statistical analysis from Scopus & Vosviewer), this study aims to uncover major patterns and collaborations, but also highlights emerging areas of interest, resulting in substantive findings on the field. In accordance with the methods established by Zakaria et al. (2020).

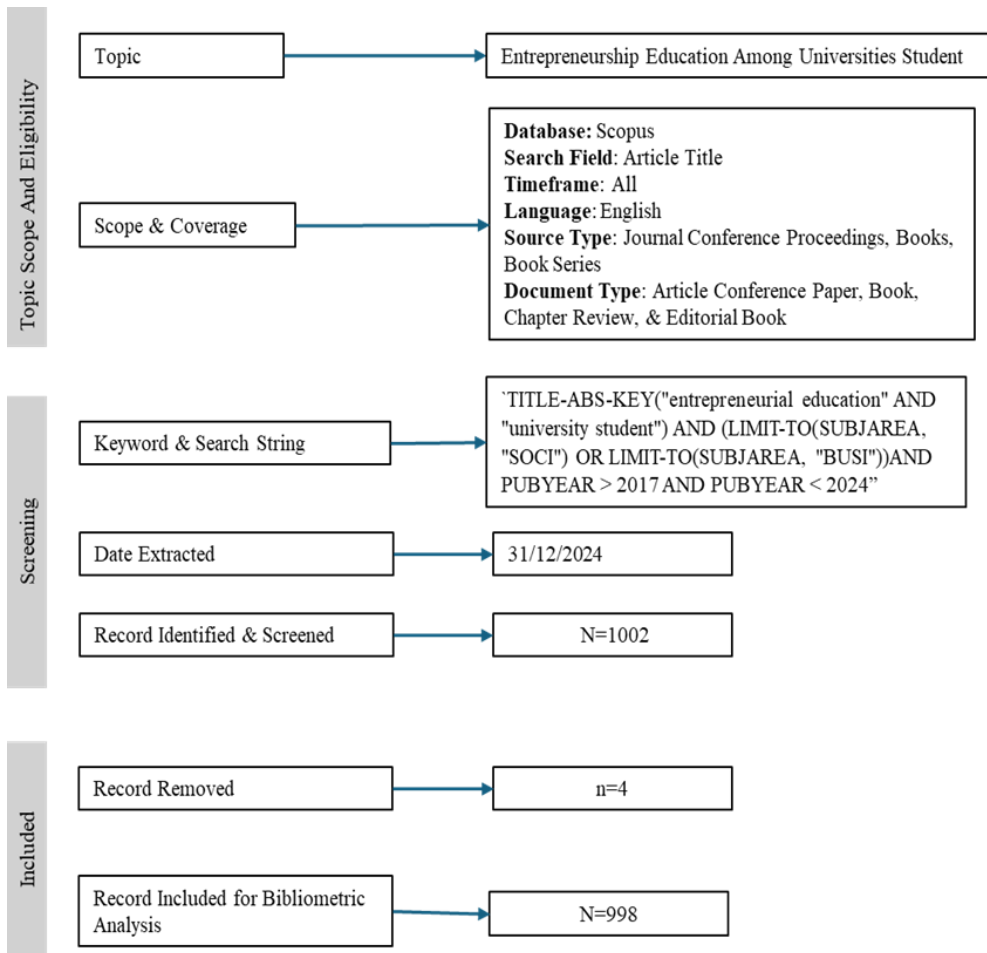


Figure 1: Flow Diagram of Search Strategy
Source of Figure 1: Zakaria et. al (2020)

We searched for articles from 1984 to 2024 using keywords like "entrepreneurial" and "education", yielding 998 publications without restrictions on language or country, ensuring diverse perspectives.

Table 1. Keyword Search Outcome

Keywords	Publications Year	Publication Status
Entrepreneurial Education AND University Student	1981-2024	Final

Source of Table 1: Author's work using Ms Excel

Therefore, the search query used for the analysis is as follows:

TITLE-ABS-KEY ("entrepreneurial education" AND "university student")
AND (LIMIT-TO(SUBJAREA, "SOCI") OR LIMIT-TO(SUBJAREA, "BUSI"))
AND PUBYEAR > 2017 AND PUBYEAR < 2024

A search string was applied to the Article title database to find key studies. Clustering techniques identified relationships between publications through direct citations. Bibliographic data was then imported into VOSviewer to generate network maps showing author and country co-authorships, as well as keyword co-occurrences.

RESULTS AND DISCUSSIONS

Finding indicates there are 998 publications collected on December 30, 2024. After a cross-validation was deployed, 2 papers were classified as not suitable for inclusion. The study analysed the Scopus database for entrepreneurial education publications, finding that the majority are primarily in English, with 61 publications representing 96.3%, indicating English as the primary language for sharing research insights on this subject. The least used languages are French, Korean, Slovenian, and Chinese, which represent 0.1%.

Language of Publications

Table 2. Language

Language	Total Publication	Percentages(%)
English	961	96.3
Spanish	32	3.2
Portuguese	10	1.00
Russian	6	0.6
Chinese	1	0.6
Slovenian	1	0.1
Korean	1	0.1
French	1	0.1

Source of Table 2: Author's work using Ms Excel

Document and Source Types

According to data in Table 3, a total of 753 papers, contributing to 75.5% were categorised as articles based on the overall distribution. Articles have a reputation as extensive research publications that include novel contributions, methodologies, and analyses. Numerous studies indicate a substantial focus on empirical research and intellectual contributions in acknowledging entrepreneurship education.

Table 3. Document Type

Document Type	Total Publication	Percentages (%)
Article	753	75.5
Conference Paper	157	15.7
Book Chapter	64	6.4
Review	13	1.3
Book	6	0.6
Retracted	3	0.3
Editorial	1	0.1
Conference Review	1	0.1

Source of Table 3: Author's work using Ms Excel

Conference papers, accounting for 15.7% of publications, represent 157 publications and research findings or promoting feedback and discussion within the academic community. The total number of publications on entrepreneurial education is 64%, with 64 book chapters, 1.3% review articles, and 0.1% editorials. Book chapters provide a detailed examination of entrepreneurial intention, while review articles summarise existing research and identify gaps. Editorials offer expert opinion and insights on the state of research in the field. The conference reviews comprise 0.1% of publications, highlighting research findings and trends. Books, accounting for 0.6%, offer a comprehensive view of entrepreneurial intention. Errata are present, 0.3% (6), which is a smaller but significant contribution to the academic conversation. In conclusion, journal articles and conference papers dominate the entrepreneurship education research area, focusing on empirical studies and knowledge-sharing. Book chapters, reviews, and books contribute to comprehensive analyses that advance broader understanding.

Table 4. Source Type

Source Type	Total Publication	Percentages
Journals	773	77.45
Conference Proceedings	124	12.42
Books	57	5.71
Book Series	44	4.41
Total	5174	100%

Source of Table 4: Author's work using Ms Excel

Table 4 shows 773 primary journals (77.45%) in entrepreneurship education research, ensuring quality and dependability through rigorous peer-review procedures. Conference proceedings account for 12.42% of publications. Books, accounting for 5.71%, offer comprehensive coverage and in-depth analysis of the topic, providing better perspectives, theoretical frameworks, and practical insights on entrepreneurship education among university students. The occurrence of books seeks to provide an in-depth understanding of the topic, potentially targeting a wider audience beyond the realm of academia.. Whereby, book series comprising multiple volumes or editions account for 4.41% of the total publications on entrepreneurship education among university students. These sources offer in-depth examinations from various perspectives, with journals and conference proceedings dominating the landscape. Books and book series provide extensive coverage and analysis for both academic and general readers.

Year of Publications/Evolution of Published Studies

Year	Publication	Percentage (%)
2024	154	15.43
2023	129	12.93
2022	135	13.53
2021	115	11.52
2020	86	8.62
2019	95	9.52
2018	64	6.41
2017	61	6.11
2016	28	2.81
2015	19	1.90
2014	27	2.71

Source of Table 5: Author's work using Ms Excel

Table 5 shows the annual growth for 10 years of related publications. The year 2024 exhibits the highest amount of publications (154) compared to all other years analysed. The cumulative percentage column reflects the proportion of the entire publications gathered over time. The graph shows that more than half of the articles (about 50%) were concentrated across the past five years (2020-2024). This data shows that the research field of entrepreneurial education is dynamic and evolving in the research area.

Subject Area

Subject Area	Total Publication	Percentage (%)
Business Management & Accounting	500	26.1
Social Sciences	496	25.9
Economics, Econometrics & Finance	205	10.7
Engineering	162	8.5
Computer Science	153	8
Environmental Science	60	3.1
Psychology	51	2.7
Decision Sciences	48	2.5
Mathematics	46	2.4
Energy	40	2.1

Source of Table 6: Author's work using Ms Excel

The distribution of research papers among various disciplines offers significant insights within the multidisciplinary domain of entrepreneurship education. As pointed out in Table 6, the majority of publications (26.1%) are categorised under Business, Management & Accounting, highlighting the vital role these disciplines play in shaping research related to entrepreneurship. Social Sciences account for 25.9% of the total publications, reflecting the field's focus on understanding human behaviour and societal influences in entrepreneurship activities. Economics, Econometrics & Finance represent 10.7% of the publications, indicating a significant interest in the financial aspects of entrepreneurship, such as funding, investment, and market dynamics. Meanwhile, Engineering (8.5%) and Computer Science (8%) underscore the growing intersection of technology and entrepreneurship, where innovation

and digital transformation are critical factors in business success. Smaller but notable contributions come from Environmental Science (3.1%) and Psychology (2.7%), proposing more attention on the psychological factors influencing entrepreneurial behaviour and the rising need for sustainable entrepreneurship. Similarly, Decision Sciences (2.5%) reflects the importance of strategic decision-making in entrepreneurial ventures. Other areas, such as Energy (2.1%) and Mathematics (2.4%), indicate great interest, specifically as entrepreneurship extends its reach into diverse areas of study. This data highlights the breadth of research that contributes to an understanding of entrepreneurship across multiple disciplines. This diverse body of research highlights the multidisciplinary nature of entrepreneurship education studies, and a high concentration of publications in business-related fields and social sciences reflects the importance of understanding both organisational and human factors in entrepreneurship.

Most Active Source Titles

Table 7: Source Title

Sources Title	Total Publications	Percentage (%)
Sustainability Switzerland	31	3.11
Education & Training	30	3.01
Frontiers In Psychology	29	2.91
International Journal of Management Education	28	2.81
Proceedings Of The European Conference on Innovation & Entrepreneurship Ecie	23	2.30
Journal of Entrepreneurship Education	20	2.00
ASEE Annual Conference and Exposition Conference Proceedings	17	1.70
Internal Journal Of Entrepreneurial Behaviour and Research	16	1.60
Industry & Higher Education	14	1.40
Cogent Education	10	1.00

Source of Table 7: Author's work using Ms Excel

Table 7 highlights numerous sources that contribute to the entrepreneurship education interest, including journals and conference proceedings. The most active source is Sustainability Switzerland, with 31 publications (3.11%), followed by Education & Training with 30 publications (3.01%). Other key sources are the Frontiers in Psychology with 29 publications (2.02%), the International Journal of Management Education with 28 publications (2.01%), and the Proceedings of the European Conference on Innovation & Entrepreneurship Ecie with 23 publications (2.30%). These findings highlight the broad range of platforms researchers use to explore entrepreneurship education.

Keywords Analysis

Table 8: Author Keyword Analysis

Author Keyword	Total Publication	Percentage (%)
Entrepreneurial Education	684	68.54
Entrepreneurial Intention	294	29.46
Entrepreneurship	244	24.45
Students	229	22.95
Higher Education	191	19.14
Entrepreneurial Self Efficacy	81	8.12
Education Computing	57	5.71
Engineering Education	53	5.31
Teaching	43	4.31
Innovation	43	4.31

Source of Table 8: Author's work using Ms Excel

Table 8, which highlights author keyword analysis, reveals the most frequently encountered terms in research on entrepreneurship education. The most common keyword, with 684 publications (68.54%), is Entrepreneurial Education, indicating its role in this field of study. The keyword Entrepreneurial intention appears in 294 publications (29.46%), indicating a strong focus on the broader subject of entrepreneurial interest. Entrepreneurship is mentioned in 244 publications (24.45%), highlighting the broader view and perspective toward the entrepreneurial landscape. Similarly, Students are a key term in 229 publications (22.95%), suggesting significant interest in studying entrepreneurial intention among the student population. Entrepreneurial Self-Efficacy & Education Computing are other important keywords, appearing in 81 (8.12%) and 57 (5.71%) publications, respectively. These terms emphasise

the role of confidence in an individual's ability to achieve success, a critical factor in entrepreneurship. Other significant keywords include Engineering Education (53 publications, 5.31 %), Teaching (43 publications, 4.31%) and Innovation (43,4.31%), showing increasing interest in the educational aspects of entrepreneurship besides innovative practices in entrepreneurial research. Overall, the author's keyword analysis highlights important research themes in the entrepreneurship education research area, which entailed both personal and external determinants influencing entrepreneurship behaviour.

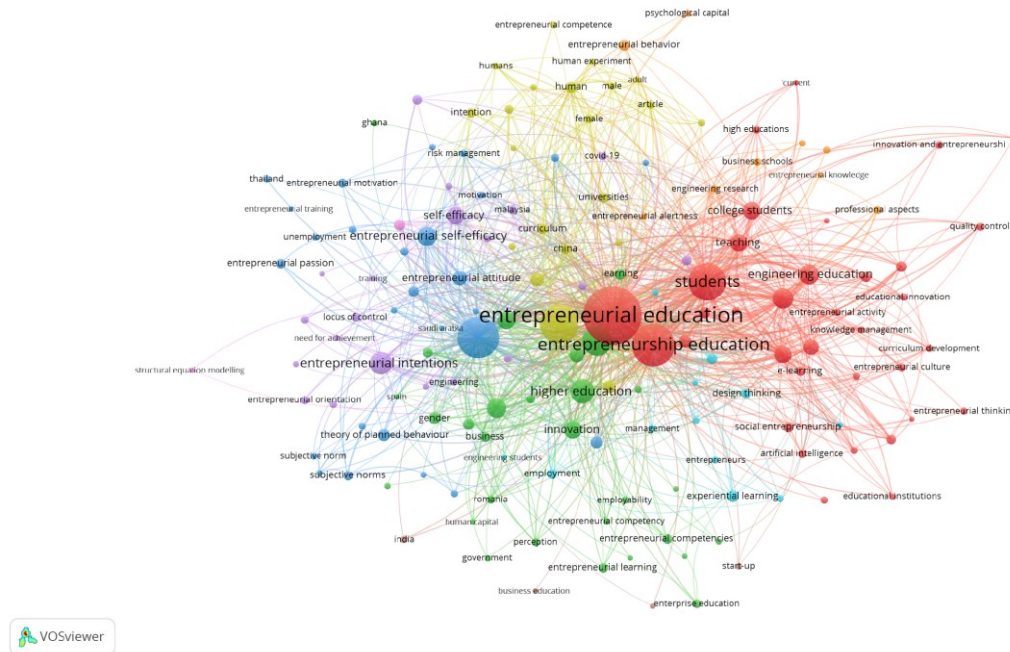


Figure 1: Network Visualisation Map of the Author's Keywords

Geographical Distribution of Publications - Most Influential Countries

Table 9. Top 10 Countries Contributing to the Publications

Country	Total Publication	Percentage (%)
China	127	12.73
United States	95	9.52
Malaysia	81	8.12
United Kingdom	68	6.81
India	63	6.31
Spain	54	5.41
Indonesia	54	5.41
Brazil	49	4.91
South Africa	32	3.21
Romania	32	3.21

Source of Table 9: Author's work using Ms Excel

Table 9 shows the top 10 geographical distribution publications related to the entrepreneurship education study. China leads with 127 publications (12.73%), followed closely by the United States with 95 publications (9.52%) and Malaysia with 81 publications (8.12%). The United Kingdom and India contribute 68 (6.81%) and 63 (6.57%) publications, respectively. Spain and Indonesia rank sixth with 54 publications (5.41%), while Brazil follows with 49 publications (4.91%). Other contributors include South Africa (32 publications, 3.21%), Romania (32 publications, 3.21%). The data highlights the concentration of research outcomes in several countries, with China and the United States as the leading contributors. Nevertheless, countries like Malaysia and Indonesia also demonstrate significant involvement in this research area, indicating a growing interest in entrepreneurial intentions

in the Southeast Asian region. The presence of various countries on the co-authorship map suggests a collaborative effort in this field, with many countries meeting the co-authorship criteria for various publications.

Authorship

Table 10. Authorship (Network Map)

Author Name	No of Documents	Percentage (%)
Wibowo, A.	18	1.80
Narmaditya, B.S.	17	1.70
Duong, C.D	11	1.10
Kusumojanto, D.D	8	0.81
Saptono, A.	8	0.81
Chang, J.C	5	0.50
Lackeus, M.	5	0.50
Ramirez-Montoya, M.S.	5	0.50
Adelaja, A.A	4	0.40
Feder, E.S	4	0.40
Garcia-Gonzalez	4	0.40
Hsiao, H.S	4	0.40

Source of Table 10: Author's work using Ms Excel

Table 10 presents authorship analysis for researchers who have published multiple documents in the field of entrepreneurial intention. The table highlights Wibowo, A. as the most prolific author with 18 documents (1.8%), followed by Nardmaditya, B.S. with 17 documents (1.7%) and Duong, C.D. with 11 documents (1.1%). Other contributors include Kusumojanto, D.D., A. (8 documents), Sapton, A. (8 documents), Chang, J.C. (5 documents), Lackeus, M. (5 documents) and Ramirez-Monotoya, M.S. (5 documents). This data underscores the active participation of these authors in advancing the research on entrepreneurial intention. Notably, authors such as Adelaja, A.A (4 documents), Feder, E.S. (4 documents), Garcia-Gonzalez. (4 documents), and Hsiao, H.S. (4 documents) further enrich the field. In total, 12 authors are recognised for their contributions, exhibiting an extensive array of authors and their affiliations that signify a global representation of academia. This worldwide perspective emphasises the understanding of entrepreneurship education, as it allows for the exploration of varied regional contexts, challenges, and solutions in entrepreneurship education among university students.

Most Influential Institutions

Table 11. Most Influential Institutions

Institution	Total Publication	Percentage (%)
Universitas Negeri Jakarta	22	2.20
Universitas Negeri Malang	17	1.70
Universiti Kebangsaan Malaysia	12	1.20
National Economics University Hanoi	12	1.20
Universiti Malaysia Kelantan	10	1.00
Universiti Utara Malaysia	9	0.90
Suan Sunandha Rajabhat Universiti	9	0.90
Chalmers University of Technology	8	0.80
Universita Degli Studi di Napoli Federico	8	0.80
Universiti Teknologi Malaysia	8	0.80
Bucharest University of Economic Studies	8	0.80
Technology de Monterrey	7	0.70

Source of Table 11: Author's work using Ms Excel

Table 11 illustrates the institutional analysis within research contributions in the field of entrepreneurial intention, focusing on institutions with a minimum of four publications. Universitas Negeri Jakarta leads the list with 22 publications (2.20%), demonstrating its significant impact in this research area. Following closely is Universitas Negeri Malang with 17 publications (1.7%), indicating a great engagement with the topic. Universiti Kebangsaan Malaysia & National Economics University Hanoi also contribute notably, with 12 (1.2%) and 12 (1.2%) publications, respectively. Further down the list, Universiti Malaysia Kelantan stands out with 10 publications

(1.00%), showcasing its active involvement in research on entrepreneurial intention. Other key institutions include Universiti Utara Malaysia & Suan Sunandha Rajabhat Universiti with 9 publications (0.9%), meanwhile Chalmers University of Technology & Universita Degli Studi di Napoli Federico with 8 publications (0.8%), both of which underline the collaborative nature of research in this domain.

Citation Analysis

Table 12: High-Cited Articles

Authors	Title	Year	Cited by
Sanchez et.al., (2013)	The impact of an entrepreneurship education program on entrepreneurial competencies and intention	2013	434
Nowiński et al., (2019)	The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries	2019	400
Sánchez (2011)	University training for entrepreneurial competencies: Its impact on intention of venture creation	2011	319
Jones & English (2004)	A contemporary approach to entrepreneurship education	2004	318
Rae (2010)	Universities and enterprise education: Responding to the challenges of the new era	2010	199
Ahmed et al., (2020)	Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy	2020	193
Vodă & Florea (2019)	Impact of personality traits and entrepreneurship education on entrepreneurial intentions of business and engineering students	2019	187
Liu et al.,(2019)	Research on the effects of entrepreneurial education and entrepreneurial self-efficacy on college students' entrepreneurial intention	2019	183
Vanevenhoven (2013)	The impact of entrepreneurship education: Introducing the entrepreneurship education project	2013	178
Lackéus (2014)	An emotion-based approach to assessing entrepreneurial education	2014	143

Source of Table 12: Author's work using Ms Excel

The field of entrepreneurship education has seen significant scholarly attention, as evidenced by several influential studies that have shaped its discourse. Among the most highly cited works, Sánchez (2013) examines the *impact of entrepreneurship education programs on entrepreneurial competencies and intentions*, amassing 434 citations. This study underscores the critical role of structured educational initiatives in fostering entrepreneurial skills and mindsets. Similarly, Sánchez (2011), with 319 citations, complements these findings by focusing on the effect of university training on competencies and venture creation intentions. In a cross-cultural context, Nowiński et al. (2019) investigate the *interplay between entrepreneurship education, self-efficacy, and gender across university students in the Visegrad countries*. With 400 citations, their study emphasises the importance of demographic and cultural factors in shaping entrepreneurial intentions. Another notable contribution is by Jones and English (2004), whose contemporary approach to entrepreneurship education has garnered 318 citations, highlighting its pioneering influence on fostering innovation through educational frameworks. Rae (2010) explores how universities respond to the challenges of enterprise education, securing 199 citations for its insights into aligning academic strategies with the evolving demands of entrepreneurship. Ahmed et al. (2020), with 193 citations, focus on developing economies, illustrating how learning, inspiration, and resource access through entrepreneurship education programs affect venture creation intentions. This practical perspective provides valuable insights into resource-constrained environments. Vodă and Florea (2019) analyse *the influence of personality traits and education on entrepreneurial intentions among business and engineering students*. Their work, cited 187 times, bridges the gap between personal characteristics and educational impact. Liu et al. (2019), with 183 citations, contribute further by *exploring the effects of entrepreneurial self-efficacy and education on college students*, emphasising psychological enablers of entrepreneurial activity. The entrepreneurship education project by Vanevenhoven and Liguori (2013), cited 178 times, highlights methodologies for assessing the impact of such programs, showcasing their academic and practical relevance. Lastly, Lackéus (2014) offers a novel, emotion-based approach to evaluating entrepreneurship education, earning 143 citations and bringing attention to the emotional dimensions of entrepreneurial learning. Overall, these studies illustrate the dynamic and multidimensional nature of entrepreneurship education research. Foundational works by Sánchez lead in citations, emphasising the link between education and entrepreneurial competencies.

Meanwhile, recent contributions by Ahmed et al. (2020) and Nowiński et al. (2019) reflect an increasing focus on contextual, demographic, and practical applications, indicating an evolution in the field toward greater inclusivity and relevance.

DISCUSSION

Entrepreneurial education (EE) has emerged as a critical driver in cultivating entrepreneurial intentions (EI), particularly among university students. A synthesis of recent studies confirms that EE not only enhances students' entrepreneurial knowledge and competencies but also significantly influences their entrepreneurial mindset and self-efficacy, both essential psychological determinants for entrepreneurial success (Hou et al., 2019; Wang, 2021; Saadat et al., 2021). The centrality of EE, based on Figure 1, is consistently underscored across the literature, suggesting its pivotal role in preparing students for entrepreneurial endeavours in both developed and developing economies. Prominent themes that emerge from this body of research include entrepreneurial competencies, human capital development, business development, and the effectiveness of education models in entrepreneurship training. These concepts converge around EE as the nucleus of educational innovation aimed at fostering entrepreneurial growth. Practical pedagogical strategies such as design-thinking workshops, pitch simulations, and creativity-based learning have been shown to significantly enhance entrepreneurial self-efficacy (ESE), which in turn is closely tied to increased entrepreneurial motivation and intention (Hou et al., 2019; Wang, 2021). Importantly, ESE consistently emerges as a mediating variable in the EE–EI relationship. Studies by Wu et al. (2022) and Dharmanegara et al. (2022) provide robust evidence that ESE fully mediates this relationship, indicating that simply providing entrepreneurial knowledge is insufficient unless accompanied by methods that build students' confidence in their capabilities. Therefore, entrepreneurship programs must go beyond theoretical instruction to include experiential learning that strengthens self-belief and practical skills, thereby reinforcing entrepreneurial behaviour and intention. The influence of EE also extends to broader socio-economic outcomes. Entrepreneurship education contributes to the cultivation of traits such as risk-taking, creativity, and innovation qualities that are not only critical for individual success but also for fostering entrepreneurial resilience and sustainable development (Pedrini, 2017; Saadat et al., 2021; Mónico et al., 2021). These attributes are particularly valuable in developing countries, where entrepreneurship serves as a key instrument for job creation and economic diversification (Wang, 2021). However, the effectiveness of EE varies significantly across regions due to differing socio-economic and institutional contexts. In developed countries, EE is often embedded within comprehensive educational frameworks supported by robust ecosystems involving universities, industry, and policy stakeholders (Bahrami et al., 2023; James, 2024). Practical exposure through incubators, mentorship programs, and startup internships enhances the real-world applicability of theoretical knowledge. In contrast, developing nations often face systemic challenges, including underfunded institutions, inadequate faculty training, and limited access to experiential learning opportunities (Ezema et al., 2020; Mahmood et al., 2021). Cultural factors such as fear of failure and limited entrepreneurial role models further hinder the effectiveness of EE in these settings (Makhkamova et al., 2023). Curriculum design plays a pivotal role in shaping entrepreneurial competencies. In high-income countries, curricula emphasise innovation, soft skills, and critical thinking, aligning with global trends in entrepreneurial success (Ibragimovich et al., 2023; Cai et al., 2022). Meanwhile, EE programs in developing contexts often rely heavily on rote learning and theory-based content, creating a disconnect between educational offerings and entrepreneurial realities (Abdullah et al., 2023). This results in a skills gap that impedes students' ability to initiate or manage entrepreneurial ventures effectively. The role of educators is equally significant in fostering an entrepreneurial mindset. In well-resourced systems, instructors often bring practical entrepreneurial experience, serving as mentors and role models. Conversely, in resource-constrained settings, the lack of such experience among faculty limits the efficacy of EE. Targeted investments in educator training and international collaboration could help bridge this gap (Mahmood et al., 2021). Future studies should prioritise evaluating the real-world outcomes of entrepreneurial education (EE), focusing on measurable indicators such as startup success, innovation, and graduate employability. More research is also needed to explore how EE programs can better integrate soft skills like leadership, teamwork, and adaptability, which are essential for navigating entrepreneurial uncertainty. Additionally, future work should examine how EE models can be made more inclusive by addressing cultural, gender, and socio-economic factors. As digital transformation reshapes education, there is a pressing need to investigate how

digital tools and online platforms can enhance the scalability, personalisation, and engagement of EE. Finally, research should explore strategies to involve key stakeholders such as policymakers, industry partners, and alumni in building dynamic, responsive entrepreneurship ecosystems within academic institutions.

CONCLUSIONS

The bibliometric review offers an in-depth analysis of the entrepreneurship education research over the past several decades. By recognising key patterns, reputable articles, and emerging topics, it offers important insights and an outline for prospective research in the field of study.

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