Asian Journal of Research in Business and Management
e-ISSN: 2682-8510 | Vol. 7, No. 3, 9-22, 2025
http://myjms.mohe.gov.my/index.php/ajrbm

Mapping the Research Landscape of Entrepreneurial Education: A Bibliometric Analysis of Past, Present, and Future Trends (1988-2025)

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Received: 28 June 2025 | Accepted: 17 August 2025 | Published: 1 September 2025

DOI: https://doi.org/10.55057/ajrbm.2025.7.3.2

Abstract: *This study aims to map the research landscape of entrepreneurial education in higher education by identifying intellectual structures, thematic clusters, and emerging trends from 1988 to 2025. Using a bibliometric approach, the study analyzes 2,270 publications indexed in the Web of Science (WoS) database. Bibliographic coupling and co-occurrence analyses with the aid of VOSviewer to visualize the thematic evolution and conceptual development within the field. Three dominant clusters include: (1) determinants of entrepreneurial intention, emphasizing the role of education, mindset, and institutional support; (2) pedagogical frameworks and learning approaches, focusing on experiential methods and competence-based education; and (3) entrepreneurial ecosystems and institutional influences, highlighting the university's role in fostering innovation and entrepreneurship. Co-occurrence analysis showed important psychological and experiential factors underpinning the field. Analyzing data obtained from the WoS database may leave out relevant literature from other sources. However, the findings provide an in-depth analysis of academic trends and significant suggestions for future study and curricular development. This study contributes to understanding how entrepreneurship education in higher education has evolved and identifies conceptual gaps and opportunities for future research. It will be helpful to scholars, educators, and policymakers alike.*

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

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1. Introduction

According to Vanevenhoven (2013), entrepreneurship education has grown in scope and complexity, moving beyond traditional classroom instruction to a diverse domain that includes psychological, pedagogical, institutional, and ecosystem aspects. A bibliometric analysis of the literature gathered from the Web of Science (WoS) database illustrates the scope and evolution of academic discourse in this field. As of April 2025, 2,270 papers on entrepreneurial education in higher education with index, totaling 15,995 citations—14,201 of which were non-self-citations—for an average of 18.48 citations per item and an H-index of 88. Projections indicate that by December 2025, the number of citations will have increased to around 8,000, with an anticipated 280 articles, resulting in an average of 28.57 citations per item. This study employs

bibliometric techniques, such as co-citation, bibliographic coupling, and co-occurrence analysis, to offer an organized understanding of this developing subject. These approaches thoroughly map the literature's intellectual structures, knowledge domains, and theme shifts (Donthu et al., 2021; Van Eck & Waltman, 2014). The intersection of "entrepreneurial education" and "higher education" is the focus of this study's updated search strategy. Three main thematic clusters through bibliographic coupling analysis: (1) Determinants of Entrepreneurial Intention, (2) Pedagogical Frameworks and Learning Approaches and (3) Entrepreneurial Ecosystems and Institutional Influences. Co-occurrence research also revealed university-based innovation systems, experiential learning, and novel psychological components. By integrating these topic insights, charting research trajectories from 1988 to 2025, and highlighting gaps and opportunities for further research, this study aims to develop to the body of current literature.

2. Methodology

From 1988 to 2025, the development of academic literature on entrepreneurial education in higher education is comprehensively examined in this study using bibliometric analysis. According to Donthu et al. (2021), bibliometric analysis is a widely recognized technique for statistic analyzing the dynamics and organization of scholarly research on a specific topic. The analysis aims to identify significant works, recurring themes, and theoretical connections within the literature.

Data Source and Retrieval Strategy

On April 8, 2025, the dataset from the Web of Science (WoS) core collection relates to its prestigious academic reputation, broad journal coverage, and strict indexing criteria. The following search string is used an exhaustive search. "TS" stands for "entrepreneurial education" as well as "higher education." University education, attitude education, and entrepreneurship training are related phrases. Two thousand two hundred seventy documents were found when the search was narrowed to document titles, abstracts, and keywords.

Analytical Techniques

Using the VOSviewer program, two bibliometric methods are: bibliographic coupling analyzes how often texts cite well-known sources to determine subject groupings and co-occurrence analysis finds important words and new themes in books. In order to maintain analytical clarity and prevent over-filtering or redundancy, thresholds were chosen. The co-occurrence analysis offered more details regarding phrase frequency and conceptual connections, while the bibliographic coupling revealed three significant clusters.

Tools and Visualization

In order to identify clusters based on total link strength (TLS), keyword occurrence, and citation patterns, network maps and bibliometric structures were created using VOSviewer (Van Eck & Waltman, 2014). This analytical method offers a great starting point for examining how the literature on entrepreneurial education has changed over time and for identifying knowledge gaps and potential areas for further study.

Searching Strategy and Data Collection Procedure

On April 8, 2025, the information from the WoS database. This database is due to its extensive journal coverage, stringent indexing standards (Walter & Hinterberger, 2022), and established reputation in scholarly circles (Zhu & Liu, 2020). These features significantly increase the trustworthiness of bibliometric analysis. Higher education and entrepreneurial education are

the main topics of this study. The database's metadata with the following search string: TS= ("entrepreneurial education" and "higher education"). This search returns publications according to their keywords, abstracts, and titles. To guarantee a more comprehensive database search and enhance the analyses, "entrepreneurial education" and "higher education" were broadened and honed using synonyms, related phrases, and variations. Based on the diversified keywords, the following search string is used to retrieve metadata from the database, as shown in Table 1.

Table 1: Search String in WoS Database

Keywords	Justification
"entrepreneurial education" OR "entrepreneurship education" OR "education for entrepreneur*" OR "entrepreneurship training" OR "entrepreneurial learn*" OR "entrepreneurship development program*" OR "entrepreneurial competence* development" OR "entrepreneurial skill*	To identify literature related to Entrepreneurial Education
"higher education" OR university* OR "university education" OR "tertiary education" OR "postsecondary* education"	To identify literature related to Higher Education.

3. Findings and Discussion

Publication Trends and Descriptive Analysis

A literature search conducted using the Web of Science (WoS) database identified 2,270 scholarly publications, which collectively received 15,995 citations—of which 14,201 were non-self-citations—resulting in an average of 18.48 citations per item and an H-index of 88. As of April 2025, these documents had garnered approximately 2,000 additional citations, and projections suggest this number may reach around 8,000 by December 2025, alongside an increase to 280 publications. This growth implies a projected average of 28.57 citations per item (as shown in Table 1 and Figure 1)

Descriptive Analysis

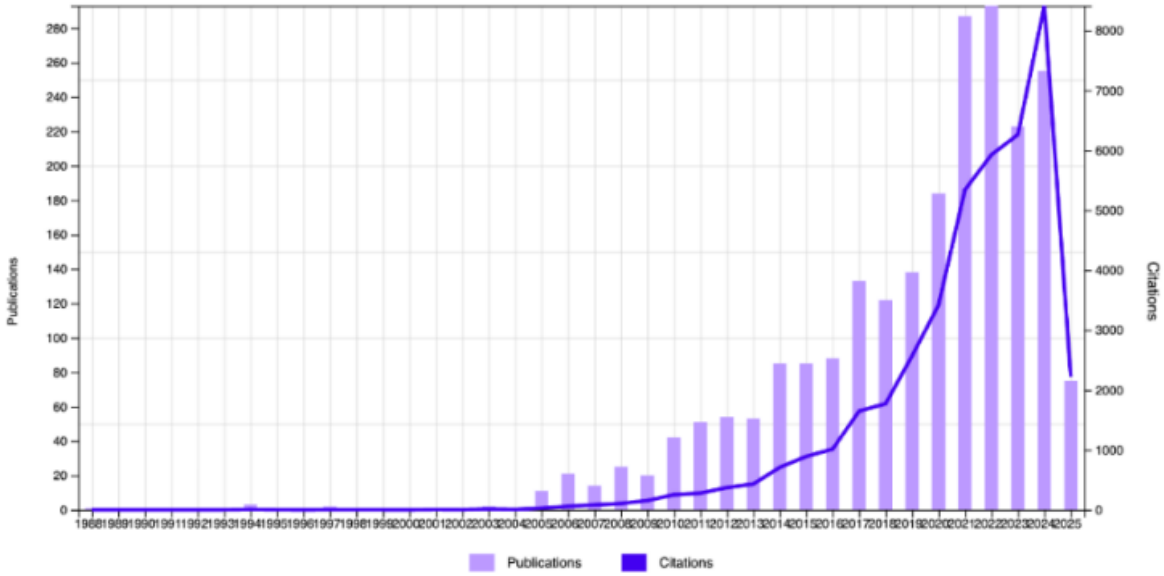

Figure 1: Number of publications and citations on entrepreneurial education in the WoS database from 1988 to 2025
Source: Retrieved from WoS on April 8, 2025

Bibliographic Coupling

The bibliographic coupling analyzes 2,270 publications, identifying 59 documents that received at least 60 citations. The threshold is based on accurately mapping the scientific landscape within a specific research area. Zupic and Čater (2015) pinpointed that bibliographic coupling analyzes the shared references among citing documents, with total link strength (TLS) being the primary focus of interest. 269 to 423, arranged in order of TLS, Table 1 shows the top 10 documents from the analysis.

- State the number of documents that meet the pre-determined threshold. *(Hint: based on experience, ensure that the number of documents that meet the threshold is below 60).* A too-high threshold can result in over-filtering, causing relevant clusters to miss, while a too-low threshold can lead to generating many clusters, resulting in duplication of themes (Geng et al., 2020)
- The total link strength (TLS) is the central area of interest (Zupic & Čater, 2015).
- Tabulate the top 10 documents with the highest TLS in bibliographic coupling analysis (See Table 2). Sort descending based on the TLS.

Table 2: Top 10 documents in bibliographic coupling analysis

Rank	Publication	No. of Citation	Total link strength
1	(Ahmed et al., 2020) Entrepreneurship education programs: How learning, inspiration, and resources affect intentions for new venture creation in a developing economy	159	423
2	(Karimi et al., 2016) The Impact of Entrepreneurship Education: A Study of Iranian Students' Entrepreneurial Intentions and Opportunity Identification	276	364
3	(Kassean et al., 2015) Entrepreneurship education: a need for reflection, real-world experience, and action	214	357
4	(Fretschner & Weber, 2013) Measuring and understanding the effects of entrepreneurial awareness education	129	297
5	(Saeed et al., 2015) The Role of Perceived University Support in the Formation of Students' Entrepreneurial Intention	223	288
6	(Gerba, 2012) Impact of entrepreneurship education on entrepreneurial intentions of business and engineering students in Ethiopia	117	283
7	(Zhang, 2014) Successful Internet Entrepreneurs Do Not Have To Be College Dropouts: A Model for Nurturing College Students to Become Successful Internet Entrepreneurs	357	271
8	(Nowinski et al., 2019) The impact of entrepreneurship education, entrepreneurial self-efficacy, and gender on entrepreneurial intentions of university students in the Visegrad countries	168	271
9	(Vanevenhoven, 2013) Advances and challenges in entrepreneurship education	128	269
10	(Piperopoulos, 2015) Burst Bubbles or Build Steam? Entrepreneurship Education, Entrepreneurial Self-Efficacy, and Entrepreneurial Intentions	374	269

Note: Sorted based on TLS

Figure 2 presents a VOSviewer network visualization of bibliographic coupling, highlighting three independent clusters: red, green, and blue. Table 3 exhibits the clusters along with the number and representative documents. The following discussion will explore current trends in rural entrepreneurship, with cluster labels derived from an inductive interpretation of the representative articles in each cluster, which are based on the common themes.

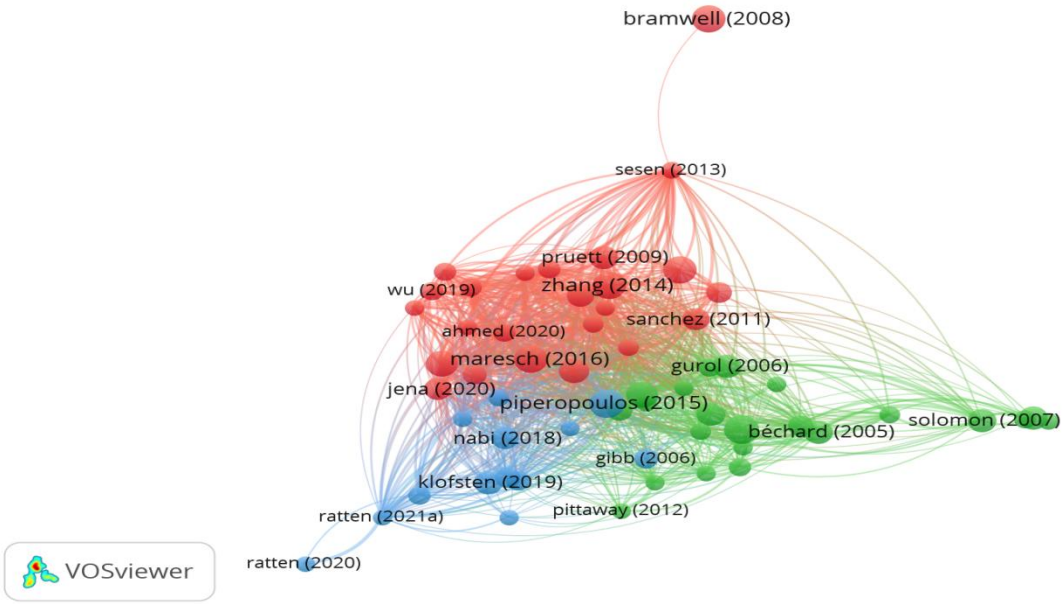

Figure 2: Bibliographic Coupling of Entrepreneurial Education

Table 3: Bibliographic Coupling Analysis on Entrepreneurial Education

Cluster colour	Cluster label	Number of publications	Representative publication
1 (red)	Determinants of Entrepreneurial Intention in Higher Education: The Role of Entrepreneurship Education, Mindset, and University Support	24	(Ahmed, Tariq et al., 2020), (Boldureanu et al., 2020) (Bolton & Lane, 2012) , (Bramwell & Wolfe, 2008),(Fretschner & Weber, 2013) (Gerba, 2012), (Hassan, 2020),(Jena, 2020),(Karimi et al., 2016)(Maresch et al., 2016) (Nowiński & Haddoud, 2019) (Nowiński et al., 2019), (Shinnar et al., 2009), (Saeed et al., 2015), Click or tap here to enter text. (Sánchez, 2011), (Schwarz et al., 2009) (Sesen, 2013), (Vodă & Florea, 2019b) (Walter et al., 2013), (Wardana et al., 2020), (Wu et al., 2019), (Yi, 2021), (Zampetakis et al., 2009) , (Zhang, 2015)
2 (green)	Pedagogical Frameworks and Learning Approaches in University-Based Entrepreneurship Education	22	(Bridgstock, 2013), (Béchard & Grégoire, 2005), (Donnellon et al., 2014) (Gartner & Vesper, 1994), (Gürol & Atsan, 2006), (Heinonen & Poikkijoki, 2006), (Hills, 1988) (Kassean et al., 2015), (Lans et al., 2014), (Matlay & Carey, 2007), (Miller et al., 2012), (Packham et al., 2010), Pittaway, et al (2011), (Pittaway et al., 2011), (Rae, 2010), (Rasmussen, 2006), (Rideout & Gray, 2013), (Smith & Woodworth, 2012), (Solomon, 2007), (Taatila, 2010), (Vanevenhoven, 2013), (Vesper & Gartner, 1997)
3 (blue)	Entrepreneurial Ecosystems and Institutional Influences in University-Based Entrepreneurship Education	13	(Bergmann et al., 2016), (Lazzeroni & Piccaluga, 2003), (Klofsten et al., 2019), (Nabi et al., 2018), (Núñez-Canal et al., 2022) , (Piperopoulos & Dimov, 2015), (Ratten & Usmanij, 2021), (Ratten & Jones, 2021a), (Secundo et al., 2021) , (Wright et al., 2017) (Hahn et al., 2022)

Cluster 1 (Red): Determinants of Entrepreneurial Intention in Higher Education: The Role of Entrepreneurship Education, Mindset, and University Support

This cluster comprises 24 documents that explore the determinants of entrepreneurial intention in higher education, focusing on the roles of entrepreneurship education, entrepreneurial mindset, and institutional support. Ahmed (2020), Boldureanu (2020), Bolton (2012), and Kassean (2015) emphasize that entrepreneurship education influences entrepreneurial intention through experiential learning, exposure to role models, and access to essential resources. Other scholars, including Bramwell (2008), Fretschner (2013), Gerba (2012), Hassan (2020), and Jena (2020), highlight its importance in fostering entrepreneurial mindsets and intentions—particularly in emerging economies—while contributing to regional economic development. Further evidence that self-efficacy, gender, and disciplinary background influence entrepreneurial intention in a variety of educational contexts by Karimi (2016), Maresch (2016), and Nowinski (2019a, 2019b). Furthermore, research by Shinnar et al. (2009), Saeed (2015), Sanchez (2011), and Schwarz (2009) alludes to the importance of students' attitudes, perceived university support, contextual factors, and entrepreneurial competency training in determining entrepreneurial intention.

Cluster 2 (Green): Pedagogical Frameworks and Learning Approaches in University-Based Entrepreneurship Education

Twenty-two documents in this cluster highlight the importance of learning approaches and educational frameworks in university-based entrepreneurship education. According to scholars, through experimental methods and multidisciplinary integration, entrepreneurship education in higher education is becoming more diverse (Bridgstock, 2013; Béchard & Grégoire, 2005; Donnellon et al., 2014; Gartner & Vesper, 1994). The field continues to develop through a range of pedagogical approaches to address contextual challenges and diverse student profiles, necessitating competence-based frameworks, real-world application, and critical reflection (Gürol & Atsan, 2006; Heinonen & Poikkijoki, 2006; Hills, 1988; Kassean et al., 2015; Lans et al., 2014; Matlay & Carey, 2007). In order to foster a comprehensive entrepreneurial mindset, recent research also highlights the significance of fostering social competencies, educator perspectives, collaborative learning models, and supportive institutional cultures (Miller et al., 2012; Packham et al., 2010; Pittaway et al., 2011; Pittaway & Thorpe, 2012; Rae, 2010). Research in entrepreneurship education focuses on action-based learning, social identity construction, and effect evaluation (Rasmussen & Sørheim, 2006; Rideout & Gray, 2013; Smith & Woodworth, 2012; Solomon, 2007; Taatila, 2010). Finally, evaluating the effectiveness and advancement of entrepreneurship education has emerged as a crucial measure in guiding its future development (Vanevenhoven, 2013; Vesper & Gartner, 1997).

Cluster 3 (Blue): Entrepreneurial Ecosystems and Institutional Influences in University-Based Entrepreneurship Education

This cluster comprises 13 documents highlighting the Entrepreneurial Ecosystems and Institutional Influences in University-Based Entrepreneurship Education. First,(Bergmann et al., 2016), (Lazzeroni & Piccaluga, 2003), (Klofsten et al., 2019), (Nabi et al., 2018), the concept of the entrepreneurial university underscores its pivotal role in fostering student entrepreneurship and promoting socioeconomic development through conducive institutional environments and early-stage entrepreneurship education. (Núñez-Canal et al., 2022), (Secundo et al., 2021) highlighted that COVID-19 reshaped higher education by demanding greater digital competence from educators and enabling innovation in entrepreneurship education through digital redesign. Finally, Entrepreneurship education is evolving to enhance self-efficacy, shape entrepreneurial intentions, and support student startups within an emerging

academic ecosystem (Piperopoulos & Dimov, 2015; Ratten & Usmanij, 2021; Ratten & Jones, 2021b; Wright et al., 2017).

Co-occurrence Analysis

- The analysis uses the same database to identify the most frequent keywords used in the literature.
- State the number of keywords that meet the pre-determined threshold. *(Hint: based on experience, ensure that the number of keywords that meet the threshold is below 60)*. A too high threshold can result in over-filtering, causing relevant clusters, while a too low threshold can generate many clusters, resulting in duplication of themes (Geng et al., 2020).
- List the top 15 most frequently used keywords (see Table 4).

Table 4: Top 15 keywords in the Co-occurrence analysis

Rank	Keyword	Occurrences	Total link strength
1	Education	285	1282
2	Entrepreneurship education	283	1048
3	Impact	162	885
4	Entrepreneurship	161	559
5	Self-efficacy	131	774
6	Students	112	526
7	Entrepreneurial intention	103	549
8	Innovation	96	398
9	Intentions	81	402
10	University	76	346
11	Performance	63	319
12	Models	60	347
13	Gender	59	345
14	Behavior	55	290
15	Knowledge	55	243

Note: Sorted based on number of occurrences.

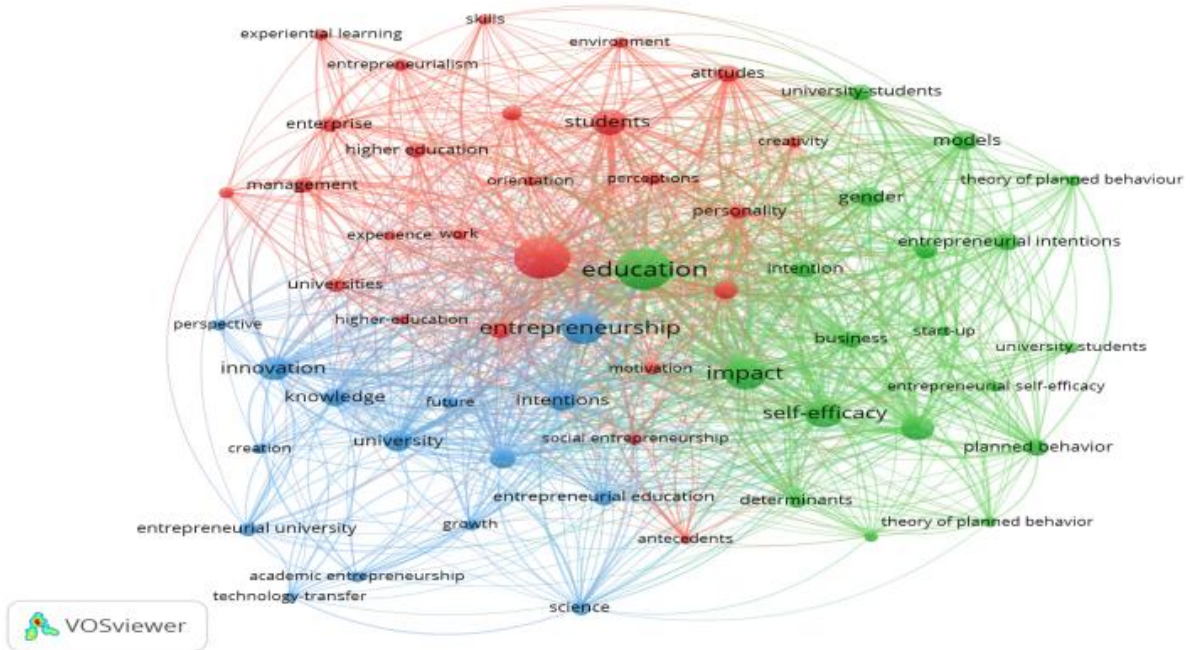

Figure 3: Co-occurrence analysis on Entrepreneurial Education

Table 5: Summary of Co-occurrence Analysis on Entrepreneurial Education

Cluster colour	Cluster label	No. of keywords	Representative Keywords
1 (red)	Psychological and Experiential Dimensions of Entrepreneurial Education in Higher Education	25	Antecedent, attitudes, behavior, challenges, creativity, enterprise, enterprise education, entrepreneurialism, entrepreneurship education, environment, experience, experiential learning, higher education, management, model, motivation, orientation, perceptions, personality, skills, social entrepreneurship, students, universities, work
2 (green)	Determinants of Entrepreneurial Intention among University Students: A Behavioral and Modeling Perspective	19	Business, determinants, education, engineering students, entrepreneurial intention, entrepreneurial-intention, entrepreneurial self-efficacy, gender, impact, intention, models, planned behavior, pls-sem, self-efficacy, startup, theory of planned behavior, theory of planned behaviors, university student,
3 (blue)	The Entrepreneurial University and Experiential Learning: Bridging Education, Innovation, and Knowledge Creation	15	Academic entrepreneurs, challenges, competencies, creation, education, enterprise, enterprise education, entrepreneurial learning, entrepreneurial university, entrepreneurialism, entrepreneurship, entrepreneurship education, experience, experience learning, future, growth, innovation, intentions, knowledge, management, model

Cluster 1 (Red): Psychological and Experiential Dimensions of Entrepreneurial Education in Higher Education

This cluster consists of 25 documents that explore the psychological and experiential dimensions of entrepreneurial education in higher education. The psychological dimension encompasses antecedents, attitudes, behaviors, creativity, motivation, orientation, perceptions, personality traits, and entrepreneurial skills. Meanwhile, the experiential dimension involves enterprise education, experiential learning, social entrepreneurship, university environments, and students' engagement with real-world entrepreneurial contexts.

Cluster 2 (Green): Determinants of Entrepreneurial Intention among University Students: A Behavioral and Modeling Perspective

This cluster comprises 19 documents that examine the determinants of entrepreneurial intention among university students from both behavioral and modeling perspectives. The behavioral perspective emphasizes self-efficacy, gender, impact, intention, and theoretical frameworks like the Theory of Planned Behavior. Meanwhile, the modeling perspective focuses on variables including business education, student background (e.g., engineering), PLS-SEM analysis, and constructs related to entrepreneurial intention among university students.

Cluster 3 (Blue): The Entrepreneurial University and Experiential Learning: Bridging Education, Innovation, and Knowledge Creation

This cluster comprises 15 documents that explore the entrepreneurial university concept and experiential learning as bridges connecting education, innovation, and knowledge creation. In education, key bridging themes include academic entrepreneurship, enterprise education, and the role of higher education institutions. Innovation through themes such as innovation challenges, competencies, and entrepreneurial intention. Meanwhile, knowledge creation, entrepreneurial learning, experiential learning, knowledge management, and growth-oriented models.

4. Implications, Research Gap, Limitations, and Suggestion

This bibliometric study offers several important implications for theory, practice, and future research within the field of entrepreneurial education in higher education: Theoretical implications, the findings enrich the theoretical understanding of entrepreneurial education by clarifying its key conceptual clusters—particularly the determinants of entrepreneurial intention, pedagogical strategies, and institutional ecosystems. Practical implications for Educators and Universities, the insights from this study can assist curriculum developers and university administrators in designing more effective entrepreneurship programs. Policy implications at the policy level, this study provides evidence supporting greater investment in entrepreneurship education to foster innovation, youth employment, and regional economic development.

Implications for Future Research

The study reveals gaps in longitudinal evaluation and cross-cultural comparative studies within entrepreneurship education research. Future studies should explore the long-term outcomes of educational interventions, diverse institutional settings, and digital pedagogies.

Research Gap

Much of the literature focuses on entrepreneurial intention, mindset, and self-efficacy; however, few studies have integrated these constructs into comprehensive theoretical models that capture the interaction between personal, pedagogical, and institutional variables. The dominant use of quantitative cross-sectional designs, particularly through surveys, restricts understanding of causal mechanisms and long-term impacts of entrepreneurship education. There is limited use of longitudinal, experimental, or mixed-methods approaches that could better capture developmental trajectories and more profound learning experiences over time. Most studies are concentrated in Western and developed country contexts, creating an imbalance in global representation. Emerging economies, especially in Asia, Africa, and Latin America, are underrepresented despite their unique socioeconomic challenges and innovation potential.

Limitations

Although this study provides a comprehensive bibliometric overview of entrepreneurial education research in higher education, but the analysis is limited to data retrieved exclusively from the Web of Science (WoS) database, which may omit relevant publications indexed in other databases such as Scopus, Dimension, etc. Second, the bibliometric techniques used—bibliographic coupling and co-occurrence—focus primarily on quantitative mapping and do not evaluate individual studies' qualitative content or theoretical depth. Third, while the clustering and keyword analysis offer thematic insights, interpretations may be subject to researcher bias, especially in the inductive labeling of clusters.

Suggestions for Future Research

In light of these limitations, several directions for future research are: Broaden Database Coverage, future studies should include multi-database sources (e.g., Scopus, Dimensions, or ProQuest) to capture more inclusive and diverse literature, particularly from non-English and regionally indexed journals. Incorporating qualitative and Mixed Methods, bibliometric studies by systematic literature reviews, meta-analyses, or case-based content analyses to gain deeper insights into pedagogical effectiveness, learning outcomes, and institutional strategies. Explore Longitudinal and Experimental Designs. More long-term empirical studies are needed to examine the sustainability of entrepreneurial intention and behavior post-graduation.

Experimental research designs can help assess the causal effects of specific interventions or teaching models and develop integrated theoretical models.

5. Conclusion

The research landscape on entrepreneurial education in higher education from 1988 to 2025 is thoroughly bibliometric analyzed in this study. The study effectively maps the field's intellectual structure, thematic evolution, and future directions using bibliographic coupling and co-occurrence analysis on 2,270 academic papers indexed in the Web of Science (WoS). The findings identify three major issue groups. The elements influencing entrepreneurial intention are the subject of the first cluster. The second cluster is devoted to learning approaches and educational frameworks. Institutional influences and entrepreneurial ecosystems are the main topics of the third grouping. In addition to exposing interconnected psychological and experiential elements, co-occurrence research advances our knowledge of how entrepreneurial competencies develop in educational environments. This study advances the field by offering a thematic and longitudinal perspective that will influence future scholarly investigations, real-world curriculum development, and policy formulation.

Acknowledgement
We gratefully acknowledge Mr. Gusman Nawanir (Economics and Business Faculty, University of Islam Riau) and Mr Arianto Muditomo (Economics and Business Faculty, Perbanas University) for providing continuous academic support and valuable perspectives during the development of this work. Their active engagement and thoughtful comments contributed significantly to refining the results' analysis and presentation.

Conflict of Interest Statement
We confirm that we carried out this research without any financial support, sponsorship, or commercial involvement that might create a conflict of interest. We ensured that all stages of the study, from data collection to analysis, were conducted objectively and free from outside pressure.

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