# Evolving Research Trends in Pedagogical Entrepreneurship Education Toward Achieving SDGs 4, 8, and 9: A Bibliometric Analysis

Ery Adam Primaskara[1], Ratih Hurriyati[2], Tika Annisa Lestari Koeswandi[3]

[1] Universitas Pendidikan Indonesia, Bandung, Indonesia
ery@upi.edu

**Abstract.** This study investigates research trends in pedagogical studies related to entrepreneurship training over the past 15 years (2010–2025). It aims to identify key themes, emerging topics, and gaps in the literature, providing insights into the evolution of research in this field. This research is grounded in the theory of entrepreneurship and pedagogical learning, offering a solid foundation for understanding the relationship between education and entrepreneurship training. A bibliometric analysis was conducted using a descriptive approach. Data were collected from Scopus, Web of Science, CrossRef, PubMed, Semantic Scholar, and Google Scholar, focusing on articles published between 2010 and 2025. Keywords such as Pedagogy, Entrepreneur, and Training were retrieved using Publish or Perish. The collected data were analyzed using VOSviewer to map keyword relationships and research trends. Findings reveal a strong interconnection between pedagogy, training, and entrepreneurship, forming nine keyword clusters. Popular topics include entrepreneurship courses, instructors, barriers, and nature, while information and sustainable development receive less attention. The study provides practical and theoretical insights relevant to education, entrepreneurship, and business development, influencing research direction and training practices. This study highlights shifting academic interests in entrepreneurship education, identifying key research gaps. Its findings contribute to shaping entrepreneurship training programs, supporting SDGs 4 (Quality Education), 8 (Decent Work & Economic Growth), and 9 (Industry, Innovation & Infrastructure).

**Keywords:** Pedagogical, Entrepreneurship, Training, Bibliometric Analysis

## 1 Introduction

In the Society 5.0 era, entrepreneurial competence has become essential for navigating rapid economic shifts [1, 2]. Entrepreneurship extends beyond business creation, encompassing innovation, resilience, leadership, creativity, and opportunity recognition—skills critical for economic progress [3]. Developing such competencies requires a structured progression involving motivation, mindset formation, and cultivating entrepreneurial attitudes and behaviors.

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Entrepreneurial skills are increasingly relevant across sectors and educational levels, from primary schools to universities [4]. The digital economy's expansion, particularly the growth of MSMEs, highlights the urgency of systematic entrepreneurial education [5]. In response, governments—such as through Indonesia's Presidential Regulation No. 2 of 2022 [6]—have integrated entrepreneurship into national education systems, spurring academic interest in effective pedagogies, models, and curriculum design.

However, despite increasing attention, key trends, emerging themes, and gaps in entrepreneurship education remain insufficiently mapped. A clearer understanding of these trends is essential for educators, researchers, and policymakers aiming to enhance entrepreneurship training. This study addresses the following question: What have been the dominant research trends in entrepreneurship pedagogy and training from 2010 to 2024? To answer this, the study applies bibliometric analysis to map research developments, identify core themes and underexplored areas, and visualize keyword relationships within the literature. This study aims to advance the discourse and support the design of more effective pedagogical frameworks for entrepreneurship education by uncovering research gaps and aligning scholarly inquiry with evolving educational and practical needs.

Entrepreneurship is closely linked to opportunity recognition, innovation, and resource-based theories, which explain how individuals identify and exploit opportunities in dynamic environments [1]. Constructivist and experiential learning theories complement these, which emphasize hands-on engagement, reflection, and real-world application in entrepreneurship education [7]. Experiential learning, in particular, enables students to internalize entrepreneurial concepts through simulations, case studies, and practical projects. Human capital theory further supports this approach by highlighting how education and skill development enhance entrepreneurial success [8].

Recent studies underscore the growing integration of entrepreneurship into formal education and the effectiveness of interactive, tech-driven methods such as virtual simulations and gamification [9]. Despite these advances, pedagogical gaps persist, especially regarding the balance between structured curricula and informal, experience-based learning. Some scholars advocate embedding entrepreneurship into standard education, while others emphasize extracurricular programs and mentorship [4]. This ongoing debate reflects the challenge of identifying the most effective educational strategies to foster entrepreneurial mindsets.

By grounding this study in established theoretical frameworks, the research identifies critical gaps and advances the discourse on optimizing entrepreneurship education in a rapidly changing global economy.

## 2 Methods

This study adopts a descriptive research design using a bibliometric approach to map research trends in entrepreneurship-related literature. The analysis is based on scholarly articles retrieved from Google Scholar, serving as the primary data source. The dataset comprises publications from 15 years (2010–2025), identified using the keywords

"Pedagogy," "Entrepreneur," and "Training." Data were collected via the Publish or Perish software and analyzed using VOSviewer on January 11, 2025.

The bibliometric procedure follows the structured methodology proposed by Garza-Reyes [10]. As illustrated in Figure 1, the process consists of five sequential stages: (1) defining research keywords to ensure conceptual relevance; (2) conducting the initial search; (3) refining results to exclude duplicates and irrelevant studies; (4) compiling initial descriptive statistics; and (5) conducting the bibliometric analysis. This framework ensures methodological rigor in visualizing and interpreting the structure of existing research in pedagogy, entrepreneurship, and training.




**Fig. 1.** Bibliometric Analysis Steps

## 3 Results and Discussions

Total citation count systematically ranked the refined dataset of 922 articles to identify the 15 most-cited publications. A template analysis was then conducted to examine key bibliographic attributes, including authorship, title, publication year, journal source, and publisher. This process highlights foundational contributions to pedagogical entrepreneurship training and reveals patterns in authorship, journal prominence, and scholarly impact.

As shown in Figure 2, citation counts for the top 15 articles ranged from 2,058 to 671, reflecting a citation gap of 1,387. The most-cited article, “Conceptions of Social Enterprise and Social Entrepreneurship in Europe and the United States: Convergences and Divergences” by Defourny and Nyssens [11], offers a comparative analysis of how regional socio-political contexts have shaped differing interpretations of social enterprise. Crucially, the study emphasizes the role of entrepreneurship education and training in institutionalizing these concepts, reinforcing the pedagogical importance of structured programs in advancing social enterprise frameworks across global contexts.

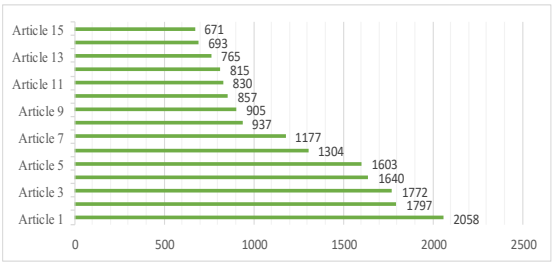


**Fig. 2.** Articles with the most citations
Source: Author's work.

As illustrated in Figure 3, a significant portion of pedagogy, training, and entrepreneurship research is published outside major academic publishers. This dispersion is mainly due to using Google Scholar, which indexes content from academic and non-academic platforms. Among Scopus-indexed journals, Emerald leads with 13% of publications, followed by Taylor & Francis (12%) and Elsevier (7%). While these figures reflect the dominance of established publishers in the field, they also highlight the diversity of publication outlets captured by Google Scholar's broader search scope.

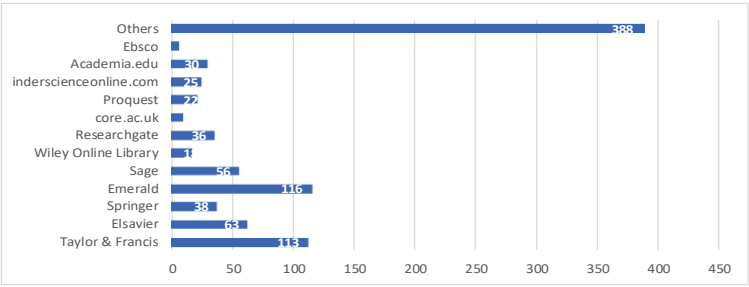


**Fig. 3.** Popular Publishers on Pedagogy, Training, Entrepreneurship Trends
Source: Author's work.

Figure 4 presents the longitudinal trend of publications on pedagogy, training, and entrepreneurship over 13 years, revealing significant fluctuations. Although the dataset spans 2010 to 2025, the most active publishing phase occurred between 2010 and 2013, peaking in 2013 with 292 articles. This surge reflects a period of intensified academic interest. However, publication volume dropped sharply to just two articles in 2014 and continued to decline through 2021. From 2022 to 2025, no relevant publications were detected in the dataset. This decline may be attributed to the COVID-19 pandemic, which disrupted academic priorities and prompted a thematic shift in research focus—potentially affecting output on pedagogical and entrepreneurial education during this time.

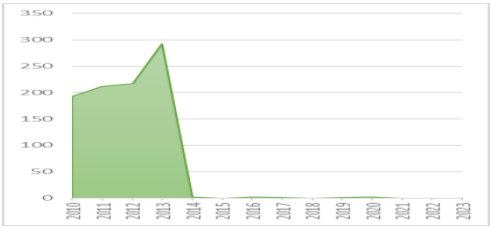


**Fig. 4.** Publication Growth in 15 Years
Source: Author's work.

The top 15 most-cited articles offer distinct insights into the intersecting fields of pedagogy, training, and entrepreneurship. Some, like Defourny and Nyssens [11], explore entrepreneurship's historical and ideological foundations across regions. Others focus on mechanisms that drive entrepreneurial development, emphasizing educational methods, learning objectives, and motivational factors that shape intention, mindset, and competencies. Notable contributions in this area include studies by Neck and Greene [12], Martin et al. [13], Liñán and Rodríguez-Cohard [14], Karlan and Valdivia [15], Mwasalwiba [16], Sarasvathy [17], Morris et al. [18], Brownell and Tanner [19], Sánchez [20], Haynie et al. [21], and Díaz-García and Jiménez-Moreno [22], all of which highlight the cognitive and behavioral impact of entrepreneurship education.

Moroz and Hindle [23] further contribute with a theoretical synthesis of entrepreneurial process models. Buabeng-Andoh [24] examines the integration of digital technologies in pedagogy, emphasizing their transformative role in educational contexts. These influential works collectively form a comprehensive foundation for advancing theoretical exploration and practical application in entrepreneurship education.

Fig. 4 summarizes the top 15 most-cited articles, each offering distinct insights into the intersecting fields of pedagogy, training, and entrepreneurship. Some, like Defourny and Nyssens [11], explore entrepreneurship's historical and ideological foundations across regions. Others focus on mechanisms that drive entrepreneurial development, emphasizing educational methods, learning objectives, and motivational factors that shape intention, mindset, and competencies. Notable contributions in this area include studies by Neck and Greene [12], Martin et al. [13], Liñán and Rodríguez-Cohard [14], Karlan and Valdivia [15], Mwasalwiba [16], Sarasvathy [17], Morris et al. [18], Brownell and Tanner [19], Sánchez [20], Haynie et al. [21], and Díaz-García and Jiménez-Moreno [22], all of which highlight the cognitive and behavioral impact of entrepreneurship education.

The keyword co-occurrence analysis highlights a strong interconnection among pedagogy, training, and entrepreneurship, reflecting their thematic convergence within the literature. Figure 5 visualizes these relationships through a co-occurrence network, where each color represents a distinct cluster of conceptually linked keywords. For example, Cluster Group 1 (red) groups terms that frequently appear together, indicating shared research focus. The spatial proximity of keywords within the network illustrates the strength of their association—closer terms have higher co-occurrence frequencies, signifying more intensive scholarly exploration of their intersection. This visualization

identifies dominant themes and reveals the structural patterns underpinning interdisciplinary research across the three domains.

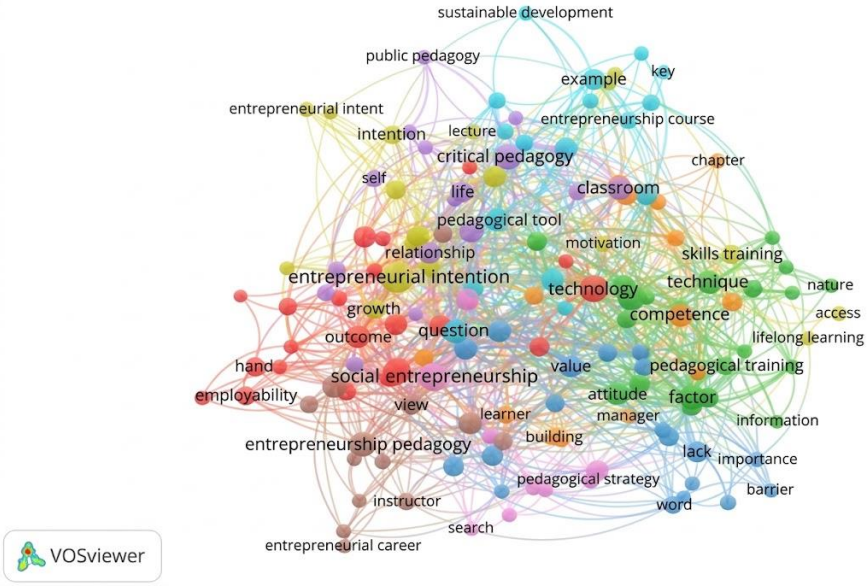


**Fig. 5.** Network Visualization: Keyword Distribution Map
Source: Author's work.

Figure 6 provides a temporal visualization of keyword trends in pedagogy, training, and entrepreneurship, using color gradients to convey research recency and intensity. Yellow-shaded keywords, such as *entrepreneurship course*, *instructor*, *barrier*, and *nature*, indicate themes that have gained prominence post-2012, reflecting a shift toward instructional and structural dimensions of entrepreneurship education. In contrast, keywords in black or dark purple—such as *entrepreneurial career*, *pedagogical tool*, *public pedagogy*, and *entrepreneurial intention*—represent foundational topics that dominated prior to 2011.

The visualization also encodes research frequency through brightness: lighter nodes denote higher occurrence and thematic saturation, while darker tones indicate underexplored areas. High-density keywords include *social entrepreneurship*, *classroom*, *relations*, *entrepreneurial intent*, *technology*, and *factors*, highlighting core themes in recent scholarship, particularly about technological integration and classroom-based entrepreneurship. Meanwhile, *information* and *sustainable development* appear less frequently, pointing to emerging but underrepresented areas. This color-coded map offers a nuanced understanding of evolving research trajectories within entrepreneurship and pedagogical studies.

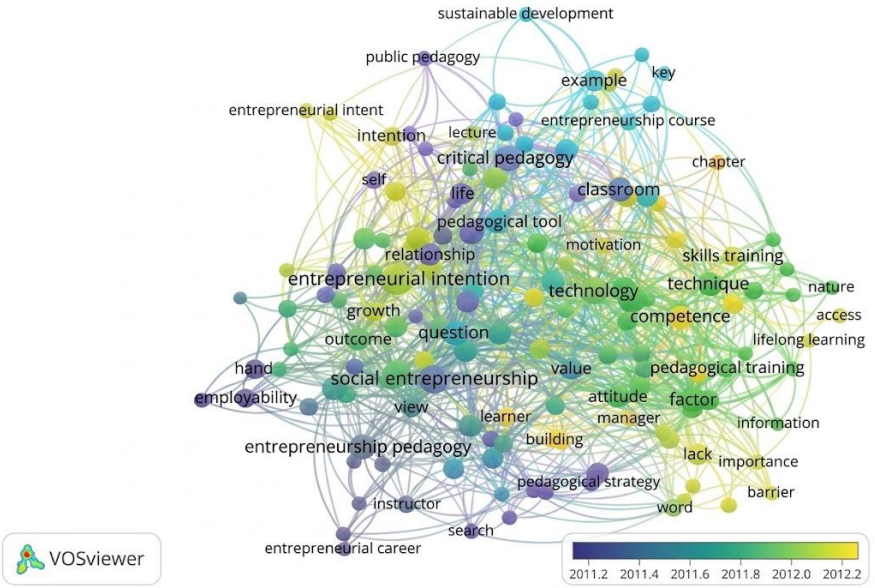


**Fig. 6.** Visualization Overlay: Keyword Recency Map
Source: Author's work.

## 4 Conclusion

This study reveals a closely interconnected evolution of research trends in pedagogy, training, and entrepreneurship, as evidenced by identifying nine distinct keyword clusters. These clusters offer a systematic view of thematic concentrations and demonstrate how scholarly attention has shifted and expanded. In recent years, keywords such as entrepreneurship course, instructor, barrier, and nature have risen, highlighting growing interest in pedagogical processes, instructional roles, and structural challenges within entrepreneurship education. Dominant topics currently include social entrepreneurship, classroom relations, entrepreneurial intention, technology, and factor analysis, which represent the most intensively researched areas in the field.

Despite this focus, several important themes remain underexplored. Keywords like information and sustainable development appear less frequently, signaling critical gaps in the literature. Given the increasing importance of sustainability and digital literacy in global education agendas, these underrepresented areas present valuable opportunities for future research. The co-occurrence and temporal analyses of keywords illuminate both historical patterns and the dynamic responsiveness of the field to evolving societal and educational demands. As entrepreneurship education increasingly intersects with digitalization, inclusivity, and sustainability issues, understanding these shifts is vital to framing relevant and impactful scholarly contributions.

Building on these insights, future research should strategically engage with well-established and emerging themes. Scholars are encouraged to deepen investigations into prominent topics such as social entrepreneurship and entrepreneurial intention through refined theoretical frameworks, robust methodologies, and pedagogical evaluation. Simultaneously, exploring neglected themes like sustainable development and information literacy offers significant potential for interdisciplinary integration and innovation. Leveraging the findings of this study as a conceptual guide will help researchers align their work with evolving academic priorities, close critical knowledge gaps, and advance entrepreneurship education to address better the complex challenges of a rapidly changing global landscape.

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