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Entrepreneurial competencies in higher education: a literature review

Competencias emprendedoras en educación superior: Una revisión de la literatura.

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Abstract

Introduction: Over the past two decades, entrepreneurial competencies have become a strategic pillar in higher education, responding to the challenges of employability, innovation, and sustainability. However, the conceptual and methodological diversity with which these competencies are addressed calls for an integrative review. **Objective:** This article aims to critically analyze the current state of scientific production on entrepreneurial competencies in higher education, considering theoretical approaches, applied methodologies, and emerging thematic trends. **Methodology:** A selective systematic review was conducted on 50 academic articles published between 2010 and 2025, retrieved from indexed academic databases. A chronological, thematic, and bibliometric analysis was applied, complemented by analytical summaries for each article. **Results:** The results reveal a significant increase in recent scientific production, a predominance of quantitative studies and reviews, and a growing interest in topics such as digital competencies, entrepreneurial mindset, and sustainability. **Conclusions:** Gaps were identified in longitudinal studies and instrument validation in non-Anglophone contexts. This review contributes to conceptual clarification and guides future research and educational policy development.

Keyword: Digital skills, Entrepreneurial competencies; Entrepreneurial mindset, Higher education; Systematic review.

Resumen

Introducción: *En las últimas dos décadas, las competencias emprendedoras se han consolidado como un eje estratégico en la formación universitaria, en respuesta a los desafíos de empleabilidad, innovación y sostenibilidad. Sin embargo, la diversidad conceptual y metodológica con la que se abordan estas competencias exige una revisión integradora.* ***Objetivo:*** *El presente artículo tiene como objetivo analizar críticamente el estado actual de la producción científica sobre competencias emprendedoras en educación superior, considerando enfoques teóricos, metodologías empleadas y tendencias temáticas.* ***Metodología:*** *Para ello, se realizó una revisión sistemática selectiva de 50 artículos académicos publicados entre 2010 y 2025, seleccionados en bases de datos académicas indexadas. Se aplicó un análisis cronológico, temático y bibliométrico, integrando resúmenes analíticos por artículo.* ***Resultados:*** *Los resultados evidencian un incremento significativo en la producción científica reciente, predominio de estudios cuantitativos y revisiones, así como un creciente interés en temas como competencias digitales, mentalidad emprendedora y sostenibilidad.* ***Conclusiones:*** *Se identifican vacíos en estudios longitudinales y en la validación de instrumentos en contextos no anglosajones. La revisión contribuye a clarificar el campo conceptual y a orientar futuras investigaciones y políticas educativas.*

Palabras clave: *Habilidades digitales, Competencias emprendedoras, Mentalidad emprendedora, Educación superior, Revisión sistemática.*

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Introduction

The development of entrepreneurial competencies has emerged as a strategic priority in higher education worldwide. In a global context shaped by digital transformation, youth unemployment, labor precariousness, and the urgent demand for sustainable innovation, universities are increasingly called upon not only to produce technically skilled graduates, but also to cultivate an entrepreneurial mindset capable of navigating complex social and economic challenges. As a result, the integration of entrepreneurship-focused courses, programs, and pedagogical models has expanded considerably over recent decades, giving rise to a growing body of research examining the nature, formation, evaluation, and practical application of entrepreneurial competencies.

However, this field remains characterized by considerable conceptual, methodological, and contextual diversity. Entrepreneurial competencies have been explored through psychological, educational, organizational, and technological lenses, drawing on frameworks such as EntreComp, the theory of planned behavior, self-efficacy theory, and experiential learning models. While this diversity enriches the field, it also hinders the consolidation of shared operational definitions, validated assessment tools, and coherent pedagogical strategies. Persistent questions remain regarding the cross-cultural transferability of competencies, the integration of digital and sustainability-oriented skills, and the actual impact of entrepreneurial education on employability and social development.

In response to these challenges, this article presents an integrative review of recent scholarly work on entrepreneurial competencies in higher education. Its primary objective is to critically analyze the chronological evolution, thematic diversity, and methodological trends in the academic literature. The review encompasses 50 peer-reviewed articles published between 2010 and 2025, selected from indexed scientific journals. These studies are analyzed through a combination of bibliometric, thematic, and methodological lenses.

This review is guided by the following question: What are the main trends, theoretical approaches, and findings in recent research on entrepreneurial competencies in higher education? Beyond offering a structured synthesis of the literature, the article seeks to contribute to the design of effective training programs, the development of robust evaluation instruments, and the formulation of educational policies that foster entrepreneurial capacity through a critical and forward-looking lens.

THEORETICAL FRAMEWORK

The concept of entrepreneurship has historically been approached from various disciplines, reflecting its multifaceted nature. From classical economics, the entrepreneur is identified as a key agent in productive dynamics. Cantillon, as cited by Hebert and Link [1], described the entrepreneur as someone who assumes risks by buying at a known price and selling under uncertain conditions. Knight [2] elaborated on this notion, emphasizing that the entrepreneur operates under a particular type of uncertainty—non-quantifiable and not amenable to statistical analysis—which sets this role apart from others in economic systems.

From a more innovation-oriented perspective, Schumpeter [3] conceptualized the entrepreneur as the engine of "creative destruction," introducing new combinations of products, processes, or markets that transform the economic system. This view highlights the transformative capacity of entrepreneurship, beyond the mere management of existing businesses.

In more contemporary contexts, authors such as Shane and Venkataraman [4] emphasized the study of entrepreneurship as a phenomenon that connects individuals with opportunities, focusing on the identification, evaluation, and exploitation of the latter. In this line, Sarasvathy [5] proposed the theory of *effectuation*, in which entrepreneurship is conceived as an emergent process based on the logic of available means, co-creation with key stakeholders, and constant adaptation to an uncertain environment.

These definitions converge on highlighting elements such as innovation, risk, proactivity, and value creation as core components of entrepreneurship, forming a conceptual framework that transcends economic logic to encompass cognitive, behavioral, and social dimensions.

Additionally, the concept of entrepreneurial competencies has gained prominence in recent decades, especially in the educational field, as a key tool for developing capabilities aimed at entrepreneurial action. These competencies are understood as an integrated set of knowledge, skills, attitudes, and values that enable individuals to identify opportunities, generate innovative ideas, and mobilize resources to create value [6].

Mitchelmore and Rowley [7] proposed a typological classification into four dimensions: personal, relational, strategic, and technical, which helps illustrate the breadth of attributes required in entrepreneurial contexts. Similarly, Man, Lau, and Snape [8] grouped competencies into specific domains such as conceptualization, relationships, strategy, and commitment, which not only reflect individual capacities but also interactions with dynamic environments.

Tittel and Terzidis [9], in a recent systematic review, identified a wide range of entrepreneurial competencies categorized into cognitive, behavioral, interpersonal, and managerial skills. Their study reinforces the notion that these competencies are not static; rather, they can be developed and strengthened through formative processes, particularly in higher education.

In this regard, entrepreneurial education seeks not only to transmit technical knowledge but also to foster creativity, initiative, resilience, and the capacity to take calculated risks [10]. This comprehensive view enables entrepreneurship to be approached as a transversal competence applicable across various academic disciplines and organizational types.

Finally, linking theoretical approaches to entrepreneurship with the competencies necessary for its development constitutes a fundamental basis for designing educational pro-

grams, crafting public policies, and constructing innovation ecosystems.

METHODOLOGY

This study is framed as a selective systematic review with a narrative approach, aimed at critically analyzing recent scientific literature on entrepreneurial competencies in higher education. The review was designed in accordance with general principles of methodological rigor applicable to literature syntheses, emphasizing comprehensive search strategies, transparency in source selection, and coherence in data analysis.

The selection of documents focused exclusively on peer-reviewed academic journal articles, published in English or Spanish. Non-academic sources such as websites, blogs, media content, and non-peer-reviewed repositories were explicitly excluded. The temporal scope of the search spanned from 2010 to April 2025, in order to include both foundational contributions and the most current developments in the field.

Searches were conducted using academic platforms such as Google Scholar, Scopus, SpringerLink, ScienceDirect, MDPI, Taylor & Francis, and Wiley. Keywords included *entrepreneurial competencies*, *higher education*, *entrepreneurial mindset*, *digital skills*, and *entrepreneurship education*, among others. Inclusion criteria were: a) studies explicitly focused on entrepreneurial competencies; b) research applied to the higher education context; and c) empirical, theoretical, or review articles with a defined methodology.

The final corpus consisted of 50 academic articles. These were analyzed through a mixed approach: a) inductive thematic analysis to identify conceptual trends; b) chronological analysis to track the evolution of the field; and c) bibliometric analysis to identify publication patterns by year, author, journal, and keywords. The entire process adhered to ethical standards of academic integrity, using only public sources and avoiding any direct involvement with human participants.

The academic trajectory surrounding entrepreneurial competencies in higher education begins with the work of Mitchelmore and Rowley, who conducted a comprehensive literature review and proposed a typology classifying such competencies into personal, relational, strategic, and technical categories [11]. Their study highlighted the need to operationalize these constructs through more robust empirical research, thus establishing a conceptual foundation for subsequent studies.

A decade later, Baena-Luna, Sales-Zaguirre, and Serradell-López conducted a systematic review focusing on the EntreComp framework. Their findings emphasized the model's adaptability to diverse educational contexts, while also pointing to the absence of standardized tools to ensure its coherent application and assessment within higher education [12].

In 2021, Revelo-Oña and Valencia-González conducted an empirical study in Ecuador, demonstrating how entrepreneurial competencies influence business model design and the development of institutionally driven sustainability strategies [13]. That same year, Lee and Herrmann, through a systematic literature review, explored the concept of entrepreneurial passion, analyzing its affective and cognitive dimensions and emphasizing its role in resilience and persistence throughout the entrepreneurial process [14].

In 2022, Ratković, Šlogar, and Šokčević carried out a comparative study involving university students in Serbia and Croatia, identifying significant differences in competency develop-

ment based on gender, academic discipline, and educational level. Their findings underscored the importance of academic and sociocultural environments [15]. In a similarly critical vein, Calanchez Urribarri, Calderón Calderón, and Cedeño Castillo advanced a feminist perspective on entrepreneurial competencies, highlighting the historical exclusion of women from traditional frameworks and advocating for a more inclusive and transformative approach [16]

The year 2023 marked a methodological diversification in academic output. Smith and Taylor conducted a systematic review with meta-analysis, integrating the study of competencies, skills, and capabilities as interrelated dimensions of entrepreneurship, with particular emphasis on digital, social, and strategic skills [17]. Complementarily, Mohamad presented a case study on a university linkage project, demonstrating how guided experiential learning fosters the development of leadership, problem-solving, and autonomy in students [18].

In the realm of technology, Ramírez Mata, Arechavala-Vargas, and Madrigal Torres explored the role of artificial intelligence in entrepreneurial competency development, identifying its potential to personalize learning and enhance strategic thinking [19]. Lastly, Coronel examined the institutional role of universities in fostering entrepreneurship, concluding that interdisciplinary curricular strategies and complementary formative activities are key factors in strengthening students' entrepreneurial profiles [20].

The year 2024 marks a turning point in the scientific production on entrepreneurial competencies, both in terms of publication volume and thematic and methodological diversification. During this period, emerging research lines such as digitalization, sustainability, and the validation of educational instruments became consolidated, reflecting the field's increasing maturity.

Satar, Alharthi, Omeish, Alshibani, and Saqib examined how digital learning orientation influences the development of entrepreneurial competencies in university graduates, with blended learning serving as a moderating variable. Their findings indicate that the combination of online and face-to-face modalities significantly enhances the acquisition of key competencies [21]. Similarly, Martínez and López investigated the role of digital competencies as predictors of entrepreneurial intention, concluding that skills such as technological literacy and digital communication strengthen self-perceived entrepreneurial capacity [22].

Instrument validation also gained prominence. Johnson and Thompson designed and validated the VEEKS scale to measure students' exposure to business-related skills in technical and vocational education. The tool proved to be highly reliable and useful for vocational training contexts [23]. In a complementary effort, García and Patel conducted a systematic review of the methods used to assess the entrepreneurial mindset, revealing considerable methodological dispersion and the need for more integrated, standardized instruments [24].

From an institutional perspective, González and Ramírez explored the role of dynamic capabilities in teaching and research as drivers of the university's third mission, especially in knowledge transfer and the promotion of technological entrepreneurship. Their study underscores the importance of organizational innovation in enhancing entrepreneurial competencies at the institutional level [25].

On the student side, Pereira and Silva analyzed learners' perceptions of entrepreneurial competency development in entrepreneurial universi-

ties. The results reflect positive views of active pedagogical strategies—such as mentoring and real-world projects—while also highlighting the need for stronger curricular integration [26]. From a more reflective stance, Fernández and López presented a critical review of the EntreComp framework, advocating for its update to include digital, sustainability-oriented, and systems-thinking competencies aligned with contemporary challenges [27].

In the educational context, Ferreras-Garcia, Sales-Zaguirre, and Serradell-López proposed a structural model to analyze the influence of generic and specific competencies on entrepreneurial development. Their results suggest that practical experience is a key factor in the consolidation of such competencies [28]. In a related study, Bardales-Cárdenas, Cervantes-Ramón, Gonzales-Figueroa, and Farro-Ruiz examined the link between entrepreneurial skills and local economic development, confirming that competencies acquired in higher education generate multiplier effects in graduates' communities [29].

Also, Othman and Jusoh conducted a descriptive study on students' self-assessment of entrepreneurial competencies. The findings revealed strengths in creativity and initiative but weaknesses in financial management and risk assessment. This type of research provides evidence of persistent training gaps, even within specialized programs [30].

The exponential growth of publications in 2024 not only confirmed the sustained interest in entrepreneurial competencies but also revealed greater thematic specificity and an expansion into new educational contexts.

In the rural development sphere, Müller and Schneider explored the use of automated tools to assess entrepreneurial competencies in universities located in rural areas. Their findings emphasized that digital assessments allow for more accurate profiling of students' learning needs, enabling more personalized pedagogical interventions [31]. Similarly, Davis and Miller examined entrepreneurial competencies in secondary agricultural education, finding that many teachers exhibited key competencies despite limited formal training. These results reinforce the need to integrate entrepreneurial content into curricula that are traditionally distant from entrepreneurship [32].

Systematic reviews continued to gain prominence as a preferred methodology. García and Patel conducted a systematic review of entrepreneurial mindset assessment methods, identifying a wide range of instruments and advocating for standardized evaluation criteria [33]. Complementarily, Hammoda investigated the impact of educational technologies—such as simulations and serious games—on competencies like initiative, resilience, and financial literacy, reporting positive effects particularly in technologically equipped higher education institutions [34].

Critical reflection on existing frameworks also featured prominently. Mai and Thai undertook a systematic review of over 170 articles on entrepreneurial competencies, revealing conceptual ambiguity and proposing guidelines for greater theoretical and operational clarity [35]. A similar need for definition was addressed by Hendayana and Pramudya, who examined the combined influence of digital literacy and entrepreneurship education on competency development. Their results suggested synergistic effects when both dimensions are integrated into curricula [36].

At the individual level, Alkaabi and Senghore explored the influence of gender, role models, and participation in entrepreneurship courses on students' entrepreneurial mindset. While they found strong associations between exposure to entrepreneurial figures and perceived

competency, gender differences were minimal in students' ability to generate innovative business ideas [37].

From the perspective of the arts, Thom conducted a qualitative study on integrating entrepreneurial competencies into arts education programs. The findings demonstrated that such competencies enable students to envision sustainable and autonomous careers, reaffirming the value of entrepreneurship beyond traditional business-oriented frameworks [38].

Added to that, Chen and Wang carried out a bibliometric analysis of publications in the field, identifying key research lines, leading authors, and countries, as well as emerging trends. This review provided a panoramic view of the field and useful directions for future development [39].

The year 2025 concludes the review period with the consolidation of emerging trends and methodological refinement in the study of entrepreneurial competencies. The research produced during this year places notable emphasis on long-term outcomes, theoretical framework validation, and the relationship between competencies and entrepreneurial well-being.

Zhou and Wang examined the mediating role of entrepreneurial competencies between entrepreneurship education and entrepreneurial intention. Their findings indicate that these competencies not only enhance the intention to start a business but also help translate academic training into concrete entrepreneurial action [40]. In a similar direction, Guillén, González, and López developed and validated a psychometric instrument to measure entrepreneurial competence in university students, incorporating attitudinal, behavioral, and cognitive dimensions. The tool demonstrated strong structural validity and diagnostic utility [41].

Farrokhnia, Kazemi, and Khosravi conducted a systematic review on entrepreneurial opportunity identification. Their analysis identified practical experience, environmental awareness, and cognitive curiosity as key factors, underscoring the value of active pedagogical approaches [42]. Complementarily, Nazir and Das carried out a review focused on factors influencing perceptions of entrepreneurial success. Their results show that beyond financial achievements, elements such as social recognition, autonomy, and personal growth are integral to how success is perceived [43].

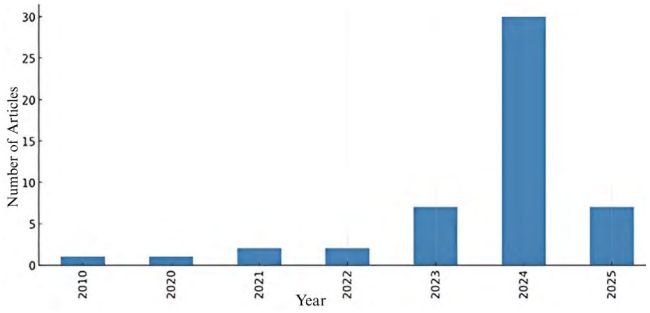
From a methodological standpoint, Martínez and López presented a systematic review of learning strategies in entrepreneurship education. Their study revealed that active methodologies—such as simulations, project-based learning, and personalized mentoring—have a direct impact on the development of core competencies like creativity, self-efficacy, and resilience [44].

Lastly, Smith and Lee conducted a longitudinal study assessing the long-term outcomes of educational initiatives focused on entrepreneurial excellence. Their findings show that programs integrating creativity, innovation, and resilience-based training produce lasting impacts on graduates' entrepreneurial mindset and professional achievements. This research provides valuable evidence that entrepreneurial competency development can yield long-term benefits beyond the academic environment [45].

The chronological analysis of the 50 reviewed articles reveals a clear trend of sustained growth in the scientific production on entrepreneurial competencies in higher education. Foundational studies begin to appear in 2010, but a significant increase in publication frequency is observed between 2020 and 2025. This pattern coincides with the growing implementation of

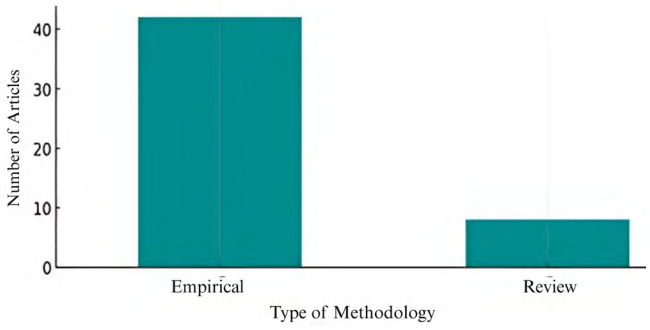
entrepreneurship promotion policies in educational settings and the digital transformation of learning environments (see Figure 1).

Fig. 1. Chronological distribution of articles (2010-2025)



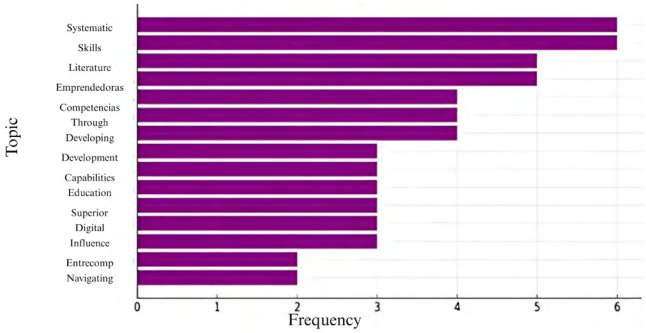
Regarding research methodologies, a predominance of empirical studies—particularly those with a quantitative approach—was identified, followed by systematic and integrative reviews. Qualitative studies were less common, though they provided valuable insights into formative experiences and specific educational contexts. An emerging interest in mixed-methods research and validation of measurement instruments was also observed (see Figure 2).

Fig. 2. Distribution by methodology



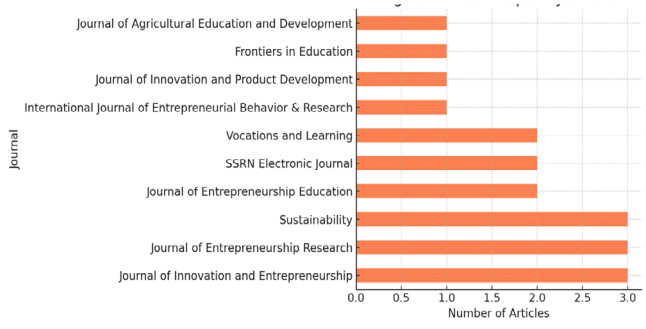
The inductive thematic analysis revealed five predominant conceptual clusters: (a) development of entrepreneurial competencies through formal education; (b) the influence of digital and technological literacy; (c) formation of the entrepreneurial mindset; (d) education for sustainability; and (e) validation of instruments and frameworks such as EntreComp. Keywords such as *digital*, *skills*, *mindset*, and *innovation* appeared frequently in the analyzed titles (see Figure 3).

Fig. 3. Most frequent topics in article titles



In terms of publication sources, the literature is distributed across journals focused on education, entrepreneurship, and organizational development. Among the most prominent are the *Journal of Innovation and Entrepreneurship*, *Sustainability*, and the *Journal of Entrepreneurship Education* (see Figure 4).

Fig. 4. Most frequent journals



The findings of this review reveal an increasingly complex and multidimensional landscape in the study of entrepreneurial competencies

within higher education. The consistent growth in scholarly publications—particularly between 2020 and 2025—aligns with a global shift toward entrepreneurship education, digitalization, and the demand for more resilient and adaptable graduates. This expansion reflects not only institutional commitment but also an increasing diversity of theoretical and methodological approaches.

A clear predominance of quantitative studies and systematic reviews was observed. While this trend highlights a desire for generalizable and replicable evidence, it also points to the relative underrepresentation of qualitative and mixed-method approaches, which could provide deeper, context-specific insights into how entrepreneurial competencies are developed. Research such as that by Mohamad [18] and Thom [38] demonstrates the value of narrative and experiential methods in capturing the complexity of learning processes in entrepreneurship education.

Conceptually, the reviewed literature reveals a persistent ambiguity in the definition and operationalization of entrepreneurial competencies. Although the EntreComp framework [12][27] has become a widely used reference, various critiques point to its limitations in incorporating digital, cultural, and sustainability-related dimensions. Scholars such as Mai and Thai [35] and García and Patel [24] emphasize the need for greater conceptual clarity and more robust standardization in evaluation methods, which remains a central challenge for the field.

Recent studies also highlight the growing importance of technological and digital competencies. Investigations by Martínez and López [22], Hammoda [34], and Satar et al. [21] underscore the value of integrating digital literacy and blended learning strategies to enhance entrepreneurial profiles. This line of research aligns with broader educational trends and anticipates a continued shift toward hybrid learning environments.

The findings further indicate a progressive expansion of entrepreneurial competencies beyond business schools into traditionally non-entrepreneurial fields such as agriculture [32], the arts [38], and secondary education. This diversification broadens the relevance of entrepreneurial learning but also demands curricular adjustments and pedagogical strategies tailored to each context.

Finally, the review underscores a significant gap in longitudinal studies capable of tracing the long-term effects of entrepreneurship education. Research such as that by Smith and Lee [45] illustrates the potential of such approaches to document sustained impacts on graduates' mindsets, behaviors, and career trajectories. However, these studies remain rare. Future research should therefore prioritize longitudinal designs, cross-cultural comparisons, and the validation of context-sensitive assessment tools.

CONCLUSIONS

This review confirms that the study of entrepreneurial competencies in higher education has experienced sustained growth over the past fifteen years, both in terms of scientific output and in its theoretical and methodological development. The field has become a central pillar in contemporary educational agendas, reflecting a growing concern for cultivating citizens capable of navigating change through innovation, initiative, and resilience.

One of the key contributions of this review was the identification of five predominant thematic areas: competency development through formal education, digital literacy, entrepreneurial mindset, sustainability as a transversal

competency, and the validation of frameworks and instruments. These areas not only reflect the field's dynamism but also demonstrate its expansion into non-traditional domains such as the arts, agriculture, and secondary education.

The review also highlights persistent gaps that future research must address. These include the need for greater conceptual clarity, the lack of standardized assessment instruments, and the limited presence of longitudinal studies capable of capturing the long-term effects of entrepreneurship education. These challenges are not merely methodological—they have direct implications for the design of effective educational policies and practices.

Practically speaking, it is recommended that higher education institutions adopt active, integrative, and context-sensitive pedagogical approaches that incorporate digital tools, collaborative learning, and experiential strategies. Similarly, efforts should be made to validate frameworks adapted to local realities and to develop rigorous indicators to assess the progress of entrepreneurial competencies across different academic levels and disciplines.

In summary, this review not only provides a panoramic and systematic view of the current state of knowledge but also offers concrete guidelines for strengthening entrepreneurship education from a critical, inclusive, and forward-looking perspective.

Beyond the central findings of this review, additional contributions identified in the literature provide further depth and breadth to the current understanding of entrepreneurial competencies. Studies such as those by Branca et al. [46] and Silva & Pereira [47] highlight the impact of structured entrepreneurship programs on the development of self-efficacy and opportunity recognition among students. Research from Latin American contexts, including Moreno-Pérez et al. [48] and D'Armas Regnault et al. [49], emphasizes the role of entrepreneurship in personal development and social integration. Chávez Vera et al. [50] and Kumar & Singh [51] provide empirical evidence on how the development of entrepreneurial competencies enhances students' confidence and entrepreneurial behavior. Complementarily, Luna Tobar & Infante Sánchez [52], Morita et al. [53], and Pennetta et al. [54] contribute with systematic reviews focused on the categorization of competencies and the effectiveness of teaching methodologies. Other works, such as those by Lee & Kim [55] and Smith & Lee [56], explore the influence of extracurricular and experiential learning in shaping the entrepreneurial mindset. Theoretical models, including those synthesized by Frontiers in Psychology [57], Bolton & Thompson [58], and Kiggundu [59], provide foundational frameworks that inform current competency constructs. In addition, earlier studies by Man et al. [60], Shane [61], Gibb [62], and Rae [63-64] offer essential conceptual bases that continue to underpin contemporary discussions on entrepreneurial education and its transformative potential across educational systems.

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