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Analyzing Research Trends and Future Directions in Entrepreneurship Education with a Bibliometric approach

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ABSTRACT

This study provides a comprehensive bibliometric analysis of the literature on entrepreneurship education, examining research trends, thematic clusters, research opportunities, and author collaboration from 2014 to 2018. Utilizing VOSviewer, the study identifies key themes and shifts in academic focus over the years, with an emphasis on topics such as entrepreneurial mindset, innovation, social entrepreneurship education, gender dynamics, and self-efficacy. The analysis highlights the central role of entrepreneurship education within the broader educational discourse and its integration into higher education frameworks. Notable research clusters led by influential scholars such as Alain Fayolle and Harry Matlay are mapped, revealing strong internal collaborations and suggesting potential for increased cross-disciplinary research. The findings underscore the need for interdisciplinary approaches, the integration of technology in educational practices, and the development of inclusive programs tailored to diverse demographics. This study provides valuable insights for educators, policymakers, and researchers aiming to enhance the effectiveness and reach of entrepreneurship education.

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1. INTRODUCTION

Entrepreneurship education has increasingly been recognized as a crucial driver for economic growth, innovation, and employment generation across the globe [1], [2]. As countries and educational institutions invest heavily in nurturing the entrepreneurial capabilities of their populations, the academic interest in entrepreneurship education has also surged [3], [4]. This has resulted in a burgeoning body of literature that examines various aspects of entrepreneurship education, ranging from curriculum design and pedagogical strategies to the impact of such education on entrepreneurial intentions and success [5].

In light of this expanding scholarly landscape, it is imperative to periodically assess the evolution of research within this field to understand prevailing trends, identify gaps, and suggest future directions [5], [6]. A bibliometric analysis serves as an effective tool in this regard, providing a systematic method to quantitatively analyze academic literature and reveal the development

patterns, key themes, and influential works and authors in the domain of entrepreneurship education [6]. By mapping out the intellectual structure and dynamics of this academic field, stakeholders including educators, policymakers, and researchers can gain valuable insights that aid in the strategic development and implementation of entrepreneurship education programs [7], [8].

Furthermore, the global economic shifts and technological advancements continually reshape the entrepreneurial landscape, necessitating adaptive and forward-thinking educational practices [9]. Therefore, a comprehensive bibliometric analysis not only reflects the historical and current academic focus but also aids in predicting and shaping future educational frameworks that align with emerging entrepreneurial needs [10].

Despite the recognized importance of entrepreneurship education, there remain significant challenges in its implementation and effectiveness that warrant detailed academic scrutiny. One such challenge is the need for alignment between educational outcomes and the practical requirements of entrepreneurial ventures. Additionally, the variations in entrepreneurship education across different cultural and institutional contexts raise questions about the universality and adaptability of educational practices and outcomes. Moreover, the rapid pace of change in technology and business models also demands continuous updates to the curriculum and teaching methodologies, which may not yet be adequately addressed in the existing literature.

These complexities underline the necessity for a comprehensive analysis of the research trends in entrepreneurship education. Identifying the most focused areas of current research, the methodologies employed, and the geographical and contextual diversity covered by the literature can help in pinpointing the areas that require further exploration. Such an analysis is pivotal to ensuring that entrepreneurship education can effectively contribute to nurturing competent entrepreneurs who can thrive in a dynamic global economy.

The objective of this research is to conduct a comprehensive bibliometric analysis of the literature surrounding entrepreneurship education. This analysis aims to elucidate the prevailing research trends and pinpoint future directions within this vital academic domain. By assessing the volume and growth of literature, this study seeks to chart the development of academic publications on entrepreneurship education over time, thereby gaining insights into its evolving significance within the scholarly community. Additionally, the research will analyze major publication outlets, identifying key journals and conferences where entrepreneurship education research is predominantly featured. This facet of the study will enhance understanding of how research outputs are disseminated and received across academic and professional platforms.

2. LITERATURE REVIEW

2.1 Historical Context and Evolution of Entrepreneurship Education

Entrepreneurship education has evolved significantly since its inception, reflecting the changes in global economic landscapes and the increasing recognition of entrepreneurship as a key driver of economic development and innovation. Initially, entrepreneurship education focused primarily on business creation skills, but over time, it has incorporated a broader set of competencies such as opportunity recognition, innovation, and risk management [11]. Research by [12] highlighted this transition, emphasizing the shift towards developing an entrepreneurial mindset among students rather than merely equipping them with business operational skills. The role of entrepreneurship education in fostering economic resilience and growth has been extensively documented. According to a study by [13]v, entrepreneurship education not only enhances individual entrepreneurial capabilities but also contributes to the overall entrepreneurial ecosystem by fostering a culture of innovation and risk-taking. This body of

research has set the foundation for understanding the impact of entrepreneurship education on both individual and societal levels.

2.2 Key Theoretical Frameworks in Entrepreneurship Education

Several theoretical frameworks underpin the research in entrepreneurship education. The Theory of Planned Behavior [14] has been widely used to understand the relationship between educational interventions and entrepreneurial intentions. This theory posits that attitudes, subjective norms, and perceived behavioral control influence individuals' intentions to perform behaviors, such as starting a new business. [15] adapted this model to the context of entrepreneurship education, showing that educational programs significantly influence students' entrepreneurial attitudes and intentions. Another important framework is the experiential learning theory [16], which argues that learning is a process where knowledge is created through the transformation of experience [17] applied this theory to entrepreneurship education, suggesting that experiential learning methods, such as simulations and business plan competitions, are effective in enhancing entrepreneurial skills and intentions.

2.3 Empirical Studies on Entrepreneurship Education Outcomes

Empirical research in the field has extensively explored the outcomes of entrepreneurship education. A meta-analysis by [18] reviewed several studies and concluded that entrepreneurship education positively affects entrepreneurial intentions and competencies. However, the impact varies significantly depending on the pedagogical approach, duration of the program, and the students' background. This finding suggests a need for tailored educational programs that consider diverse student needs and contexts. Further, research has also delved into the contextual factors influencing the effectiveness of entrepreneurship education. [19] explored the role of cultural and institutional contexts in shaping the outcomes of entrepreneurship education. Their study revealed that in regions with supportive entrepreneurial ecosystems, education has a stronger impact on entrepreneurial outcomes.

2.4 Digitalization and Global Perspectives on Entrepreneurship Education

The recent trend towards digitalization in entrepreneurship education marks a significant transformation. Studies by [20] and [21] indicate that digital tools and online platforms are increasingly being integrated into entrepreneurship education to enhance accessibility and engagement. These tools not only facilitate the learning process but also mimic the digital practices common in today's entrepreneurial ventures. Additionally, the globalization of entrepreneurship education has attracted scholarly attention. Research by [22] examined how entrepreneurship education is adapted in different cultural contexts, finding significant variations in how entrepreneurial concepts are taught and understood globally. This line of inquiry is crucial for developing universally applicable but culturally sensitive educational practices.

3. METHODS

3.1 Research Design

This study employs a bibliometric analysis to systematically review and assess the body of literature on entrepreneurship education. Bibliometric methods are quantitative approaches used to map the development and dissemination of knowledge within a specific research field. These methods involve analyzing data related to publication patterns, citation analysis, and content analysis, providing insights into the trends, dynamics, and structural patterns within the academic discourse. For this research, the data will be sourced

from Google Scholar database, which are known for its comprehensive coverage of scholarly publications across various disciplines.

3.2 Data Collection

The data collection process involves extracting relevant publications from the identified databases using a predefined set of keywords related to entrepreneurship education, such as "entrepreneurship education," "entrepreneurial learning," "entrepreneurial pedagogy," and "innovation in education." The search will be limited to articles published in English from the year 1977 to the present, ensuring that the analysis covers the most recent developments in the field. Additionally, filters will be applied to exclude non-peer-reviewed articles and conference proceedings to maintain the quality and reliability of the data. The final dataset will include bibliographic elements like titles, abstracts, keywords, authors, publication years, and citation counts.

3.3 Data Analysis

Data analysis will be conducted using VOSviewer. This tool is instrumental in performing citation analysis, co-citation analysis, and keyword co-occurrence analysis. Citation analysis will help identify the most influential studies, authors, and journals in the field of entrepreneurship education. Co-citation analysis will reveal the relationships between various publications, providing insights into the foundational works that shape the field. Keyword co-occurrence analysis will be utilized to detect emerging themes and trends within the literature, illustrating the evolution of research topics over time and identifying areas that are gaining academic attention.

4. RESULT AND DISCUSSION

Table 1. Research Data Metrics

Metrics Data	Information
Publication years	1977-2024
Citation years	47
Papers	980
Citations	172747
Cites/year	3675.47
Cites/paper	176.27
Cites/author	94239.27
Papers/author	598.65
Authors/paper	2.46
h-index	202
g-index	375
hI,norm	141
hI,annual	3.00
hA, index	61
Paper with ACC > =	1,2,5,10,20:979,970,818,547,285

Source: Output Publish or Perish, 2024

Table 1 presents a comprehensive set of bibliometric indicators derived from the 'Publish or Perish' software, providing a quantitative overview of the scholarly impact and dissemination of research in the field of entrepreneurship education from 1977 to 2024. The table indicates a substantial volume of academic output with a total of 980 papers published over this period, accumulating a significant 172,747 citations. This reflects the field's evolution and its growing importance within the academic community. The average number of citations per paper stands at 176.27, illustrating the considerable influence and recognition these publications have garnered within related scholarly discourse. The average citations per year rate of 3675.47 further highlights the continuous relevance and impact of the research in this domain.

The h-index and g-index, which are 202 and 375 respectively, serve as robust indicators of the depth and breadth of the research impact. An h-index of 202 suggests that at least 202 papers have each received at least 202 citations, signifying both prolific output and substantial scholarly influence among the authors within this field. The g-index being higher at 375 indicates that the most cited papers have a disproportionately high impact, suggesting that some works in this field are foundational and frequently referenced in subsequent research. Additional metrics such as hI,norm and hI,annual, standing at 141 and 3.00 respectively, offer insights into the normalized citation impact

over time, adjusting for factors such as multiple authorships and varying citation practices across disciplines.

The data also details the distribution of papers exceeding certain citation counts (ACC), which provides insight into the visibility and influence of the published research. A significant majority of the papers (979 out of 980) have been cited at least once, and a notable 970 have been cited at least two times, indicating high levels of academic engagement and utility. As citation thresholds increase to 5, 10, and 20, the numbers decrease to 818, 547, and 285 respectively, which is typical in academic publishing where only a subset of works achieve higher citation counts.

Table 2. Most Cited Article

Citations	Author and Year	Title
4194	[12]	The emergence of entrepreneurship education: Development, trends, and challenges
3205	[23]	Gender, entrepreneurial self–efficacy, and entrepreneurial career intentions: Implications for entrepreneurship education
2489	[24]	The impact of entrepreneurship education on entrepreneurship skills and motivation
2439	[25]	Entrepreneurship education: A systematic review of the evidence
2374	[18]	The relationship between entrepreneurship education and entrepreneurial intentions: A meta–analytic review
2348	[26]	Assessing the impact of entrepreneurship education programmes: a new methodology
2309	[27]	The chronology and intellectual trajectory of American entrepreneurship education: 1876–1999
2089	[28]	Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes
2057	[29]	Entrepreneurship education: known worlds and new frontiers
1961	[30]	Some research perspectives on entrepreneurship education, enterprise education and education for small business management: a ten-year literature review

Source: Output Publish or Perish, 2024

Table 2 presents the most cited articles in the field of entrepreneurship education, highlighting the key scholarly contributions that have shaped the academic discourse over recent decades. The leading article by DF Kuratko, with 4194 citations, discusses the development, trends, and challenges in entrepreneurship education, underlining its critical role in shaping the entrepreneurial landscape. This paper's high citation count reflects its pivotal role in defining and expanding the understanding of entrepreneurship education's scope and significance. Following closely, the works of Wilson, Kickul, and Marlino, and Oosterbeek et al., with 3205 and 2489 citations respectively, delve into gender dynamics in entrepreneurial self-efficacy and the direct impacts of entrepreneurship education on skills and motivation. These articles underscore the importance of demographic factors and educational impacts in cultivating entrepreneurial intentions and capabilities.

The subsequent articles listed in the table explore various dimensions of entrepreneurship education. For example, Pittaway and Cope provide a systematic review of evidence on entrepreneurship education, garnering 2439 citations, which indicates substantial reliance on their synthesis in further scholarly research. Similarly, Bae et al.'s meta-analytic review, which examines the relationship between entrepreneurship education and entrepreneurial intentions, shows significant scholarly impact with 2374 citations, suggesting a strong academic interest in understanding how educational interventions influence entrepreneurial mindsets. Additionally, Fayolle, Gailly, and Lassas-

Clerc's methodological approach to assessing entrepreneurship programs, cited 2348 times, highlights the scholarly focus on evaluating the efficacy of educational frameworks and their outcomes.

These articles collectively provide a comprehensive overview of the themes that dominate the field of entrepreneurship education, including pedagogical effectiveness, the influence of personal and demographic factors on entrepreneurial outcomes, and the historical evolution of the discipline. The citation counts reveal not only the influence of these works but also the diversity of research interests within the field, ranging from theoretical frameworks to empirical evaluations and methodological innovations.

4.1 Keyword Co-Occurrence Analysis

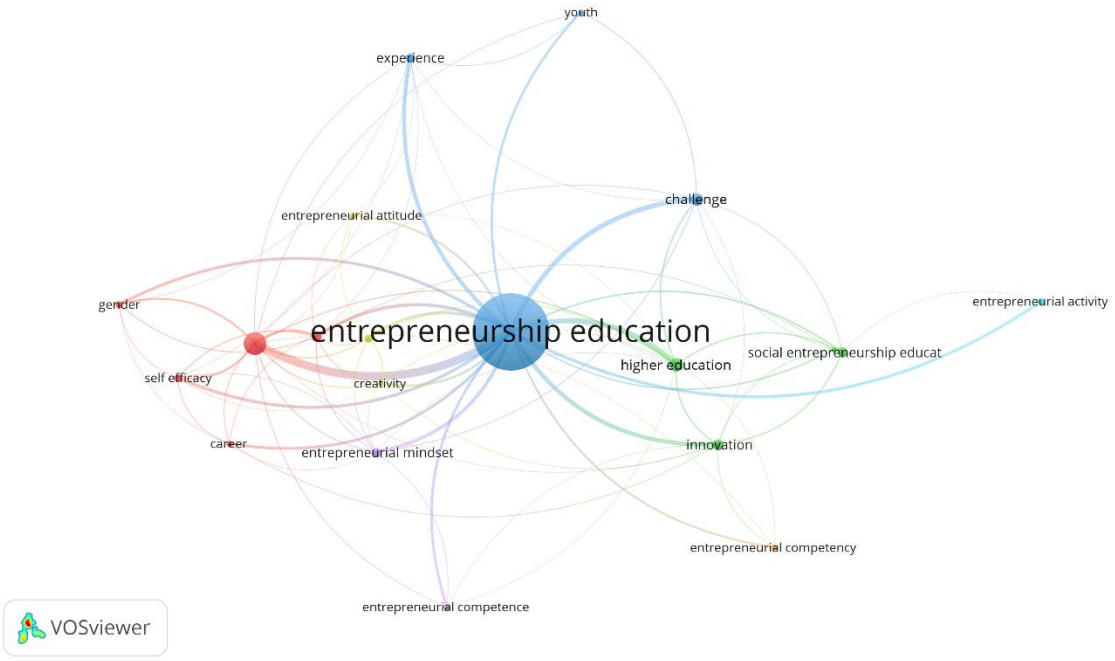

Figure 1. Network Visualization
Source: Data Analysis, 2024

The figure 1. illustrates the interconnected research themes surrounding entrepreneurship education. This map uses node and link diagrams to represent key terms or concepts in the field and their relationships based on co-occurrence in scholarly literature. Each node's size indicates the frequency of the term's occurrence, while the lines (or links) denote the strength of relationships between terms, highlighting how often terms appear together in the literature.

4.2 Central Theme

1. Entrepreneurship Education

   As the central and largest node, this indicates that 'entrepreneurship education' is the most frequently discussed topic and serves as the focal point of the surrounding research. Its direct connections to other nodes suggest it is a broad field influencing various dimensions of education, business, and personal development.

2. Higher Education

   Connected closely to 'entrepreneurship education', this node likely discusses the role of universities and colleges in fostering entrepreneurial skills. The connection suggests significant research focuses on integrating entrepreneurship into higher education curricula, exploring its impact on students' career prospects and entrepreneurial intent.

3. Social Entrepreneurship Education

This node, while smaller, is crucial and indicates a specialized area within entrepreneurship education focusing on social change and businesses that aim to address societal challenges. Its presence reflects growing academic interest in how entrepreneurship education can contribute to social innovation.

4.3 Interconnected Sub-Themes

1. Entrepreneurial Mindset and Competence

These nodes are central to understanding what educational programs aim to develop in individuals. The 'entrepreneurial mindset' node linked to 'creativity' and 'innovation' underscores the importance of these traits in fostering entrepreneurial thinking. Meanwhile, 'entrepreneurial competence' suggests a focus on the practical skills necessary for entrepreneurial success.

2. Gender and Self-Efficacy

The inclusion of 'gender' and its connection to 'self-efficacy' highlights a significant area of study within the field, examining how gender influences confidence in entrepreneurial capabilities. This research is crucial for developing tailored educational programs that encourage entrepreneurship across diverse demographic groups.

3. Career

The link between 'entrepreneurship education' and 'career' emphasizes the role of this education in career development. This connection likely explores how entrepreneurial skills prepare students for various career paths, not just those involving starting a business.

4.4 Emerging and Niche Areas

These nodes are linked closely with 'entrepreneurship education', suggesting that current research heavily focuses on how creativity and innovation can be integrated into educational frameworks and how they impact entrepreneurial success.

1. Challenge

This node, though less prominent, is strategically important as it might discuss the challenges faced in implementing and measuring the effectiveness of entrepreneurship education programs. It could also refer to the challenges that educational programs prepare students to tackle in entrepreneurial settings.

2. Youth

The appearance of 'youth' connected to 'entrepreneurship education' indicates a focus on early education's impact on developing entrepreneurial qualities. This suggests a significant interest in how early exposure to entrepreneurship can influence career choices and entrepreneurial activities in later life.

Overall, the visualization highlights the multifaceted nature of entrepreneurship education research, encompassing educational methods, gender influences, career impacts, and the development of core competencies such as creativity and innovation. The map not only reflects the current state of research but also points to areas where further studies are needed, such as deeper explorations into the challenges of entrepreneurship education and its impacts on different demographic groups.

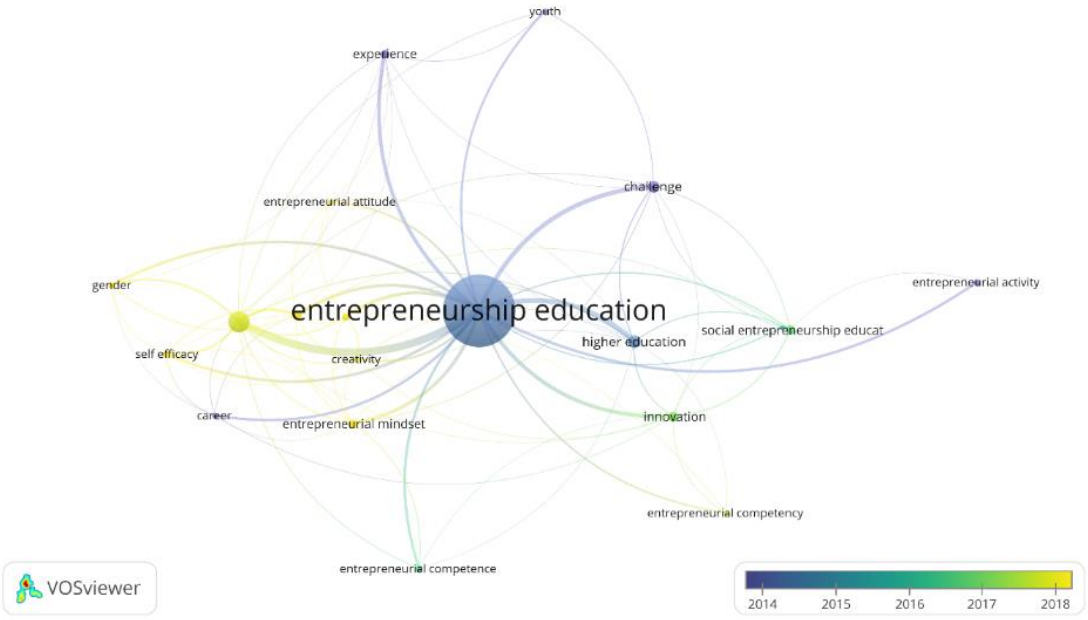

Figure 2. Overlay Visualization
Source: Data Analysis, 2024

The VOSviewer visualization map provides a detailed chronological progression of key themes in entrepreneurship education research from 2014 to 2018. The analysis of this color-coded timeline, ranging from purple in 2014 to yellow in 2018, reveals shifts in focus areas over the years, highlighting emerging themes and changing priorities. Each year brings a distinct set of focal points that collectively illustrate the evolving landscape of entrepreneurship education research.

The year 2014, indicated by purple nodes, focuses on "Experience," "Youth," "Challenges," and "Career." These foundational themes emphasize the initial conditions and contexts in which entrepreneurship education occurs. "Experience" and "Youth" likely explore how early life experiences and younger demographics engage with entrepreneurial concepts. The theme "Challenges" suggests a focus on the obstacles faced in fostering entrepreneurial skills at various life stages, while "Career" indicates an interest in how entrepreneurship education influences career paths and choices.

As the nodes turn blue in 2015, the emphasis shifts to "Entrepreneurship Education" and "Higher Education." This shift suggests a deeper investigation into the pedagogical aspects and the role of higher educational institutions in delivering entrepreneurship education. The focus is likely on curriculum design, teaching methodologies, and the integration of entrepreneurship within broader educational settings, marking a move from individual experiences to institutional strategies.

By 2016, the theme centers around "Entrepreneurial Competence," indicating a narrowed focus on the specific skills and abilities that entrepreneurship education seeks to develop. This theme reflects a maturing research interest in measuring and enhancing the direct outputs of entrepreneurship education programs, such as critical thinking, problem-solving, and other entrepreneurial competencies.

In 2017, the nodes become green, highlighting "Innovation" and "Social Entrepreneurship Education." This year marks a significant pivot towards the application of entrepreneurship education in addressing societal issues

and promoting innovation. The focus on social entrepreneurship education suggests an exploration of how entrepreneurial efforts can be harnessed to achieve social change, reflecting a broader societal trend towards sustainability and social responsibility.

The transition to yellow in 2018 brings a renewed focus on "Gender," "Self Efficacy," and "Entrepreneurial Mindset." These themes indicate a resurgence of interest in how demographic factors and personal traits influence the effectiveness of entrepreneurship education. Research in this year likely examines the barriers and enablers specific to different genders, the psychological impacts of entrepreneurship education, and how it shapes the entrepreneurial mindset.

The chronological progression from individual experiences to educational frameworks, competency development, and finally to innovation and demographic impacts suggests the need for interdisciplinary research that incorporates psychology, education, gender studies, and business. Understanding how these diverse factors interplay can help tailor more effective entrepreneurship education programs. The emphasis on innovation in 2017 and the continuous evolution of educational methods underscore the potential for integrating newer technologies and innovative teaching methods into entrepreneurship education. Research could further explore how digital tools and platforms can enhance learning outcomes and accessibility. The recurring themes related to demographic factors, such as gender and self-efficacy, highlight the importance of developing inclusive and tailored educational practices that accommodate diverse learner needs. Future research could focus on creating adaptive learning environments that consider these varied factors, ensuring that entrepreneurship education is equitable and effective across different demographic groups.

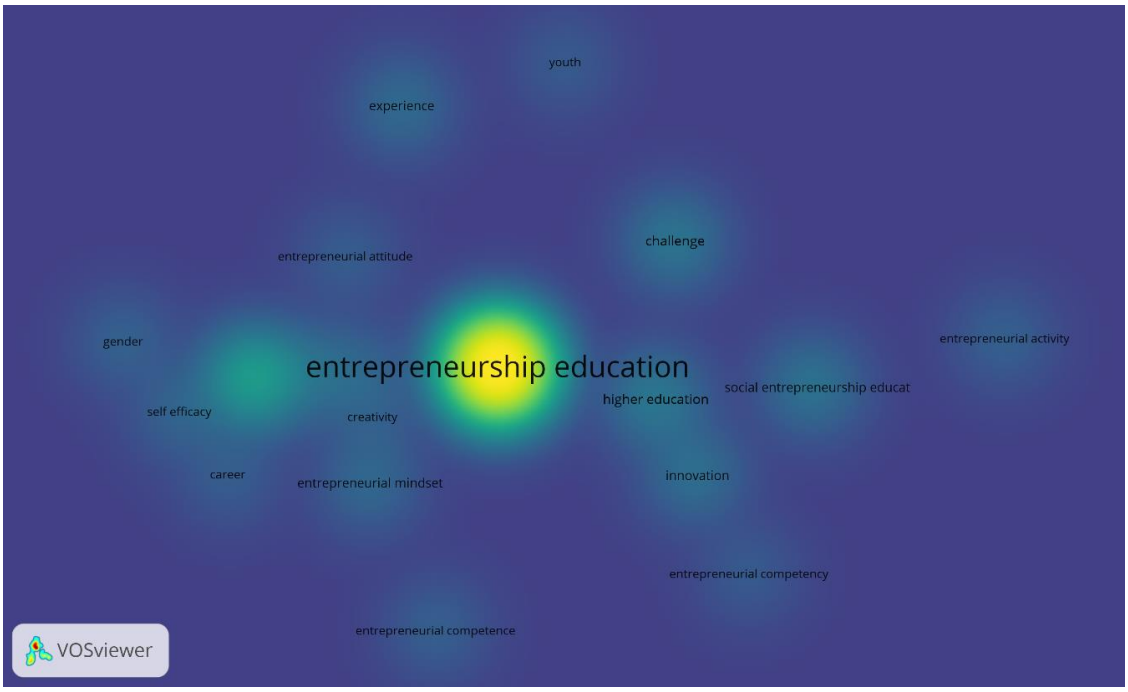

Figure 3. Density Visualization
Source: Data Analysis, 2024

The figure 3 is a visualization from VOSviewer that illustrates the landscape of research themes related to entrepreneurship education. The vivid array of colors represents the concentration and interconnectivity of

various key terms, highlighting the central role of "entrepreneurship education" in the discourse. This map allows us to see which areas have garnered more focus and how they relate to each other within the scholarly discussions from a bibliometric perspective.

At the core of the visualization, "entrepreneurship education" shines brightly, signifying its position as the epicenter of research interest. This central placement indicates that most discussions and research paths in the field either emanate from or converge on this topic. The brightness and size of this node suggest that it is one of the most frequently mentioned and focused-upon topics within the literature, serving as a foundational aspect of studies in the field. The themes of "innovation" and "creativity" also brightly illuminated and located near the central node, highlighting their importance as both outcomes and components of effective entrepreneurship education. This reflects the growing acknowledgment in the literature that entrepreneurship education is not just about teaching business skills but also about fostering innovative thinking and creative problem-solving abilities in students.

Adjacent to "entrepreneurship education," the nodes for "higher education" and "social entrepreneurship education" are also prominent, though less intense, indicating significant but slightly lesser focus areas. The close proximity of these nodes to the central theme underscores the critical relationship between institutional educational settings and entrepreneurship education. It suggests a robust discourse on how higher education frameworks can incorporate or enhance entrepreneurship education, particularly with a social entrepreneurship angle, which has been gaining traction as a means to address societal challenges through entrepreneurial action. "Entrepreneurial mindset" and "entrepreneurial competence" also closely linked to the central theme, indicating that these are key attributes that entrepreneurship education aims to develop. These connections are crucial as they relate directly to the objectives of such educational programs, which are designed to cultivate an entrepreneurial spirit and the skills necessary to navigate and succeed in entrepreneurial endeavors.

On the periphery, we find "gender" and "self efficacy," suggesting these topics are relevant but less frequently connected directly to the core discussions on entrepreneurship education. The placement of "gender" indicates ongoing interest in how entrepreneurship education impacts or is influenced by gender dynamics, possibly exploring issues of access, participation rates, and outcomes across different genders. "Youth" and "career" are also somewhat peripheral, which could indicate specific niche areas of research that focus on the impacts of entrepreneurship education on younger individuals and how it influences career trajectories. This might involve studies on when entrepreneurship education should begin and its long-term effects on career development. Lastly, the nodes for "challenges" and "entrepreneurial activity" near the edge suggest these are emerging or less emphasized areas within the broader field. "Challenges" could encompass barriers to effective entrepreneurship education, including institutional, cultural, or resource-based obstacles. "Entrepreneurial activity" might focus on the practical outcomes and real-world applications of entrepreneurial education, assessing how well educational programs translate into actual entrepreneurial initiatives.

The visualization underscores the complex, interconnected nature of entrepreneurship education research, highlighting areas that have received significant attention and those that may require more focus. The insights gleaned

from such a bibliometric analysis are invaluable for educators, policymakers, and researchers as they seek to understand the current landscape, assess gaps, and identify future directions for research and practice. By understanding these dynamics, stakeholders can better tailor educational programs to meet the evolving needs of students and societies, ultimately fostering more effective and impactful entrepreneurship education systems.

4.5 Co-Authorship Analysis

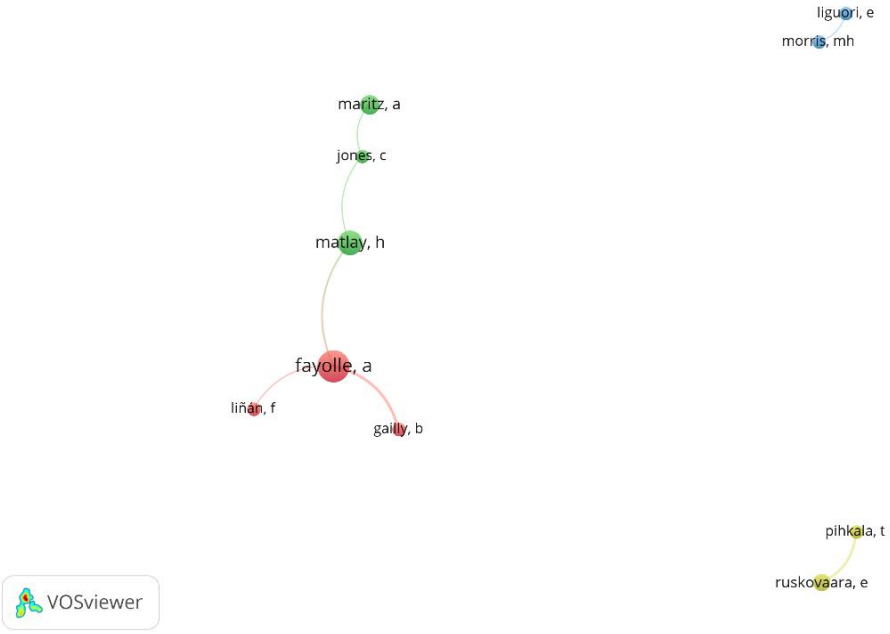

Figure 4. Author Collaboration
Source: Data Analysis, 2024

The VOSviewer visualization map above depicts the network of co-authorship among researchers in the field of entrepreneurship education. This type of map helps us understand the collaborative relationships between different authors and the structure of research networks within this academic domain. Each node represents an author, with the size of the node indicating the volume of publications, and the lines connecting nodes representing co-authorship relationships. The color clusters indicate different research groups or collaborative clusters within the broader research community.

The red cluster features Alain Fayolle prominently, indicating his significant influence and central role within this research community. Fayolle is known for his extensive work in entrepreneurship education, particularly focusing on the theoretical and practical aspects of entrepreneurial learning and pedagogy. His co-authorship with Benoît Gailly and Francisco Liñán suggests a strong collaborative network that has likely produced influential research in the field. This cluster's central positioning and interconnected nodes imply a highly productive and closely-knit research group that has contributed substantially to the academic discourse on entrepreneurship education. The green cluster is centered around Harry Matlay, another prominent figure in entrepreneurship education research. Matlay's connections with Charles Jones and Alex Maritz indicate a collaborative focus on various aspects of entrepreneurship education, possibly including curriculum development, educational outcomes, and the impact of entrepreneurship education on student

intentions and behaviors. This cluster is characterized by robust interconnections, suggesting a collaborative and influential research network that spans multiple projects and publications. The blue cluster, featuring Eric Liguori and Michael H. Morris, indicates another significant collaborative group within the field. Liguori and Morris are well-known for their contributions to entrepreneurship education, particularly in the areas of experiential learning, educational innovation, and the development of entrepreneurial ecosystems within academic institutions. The distinct separation of this cluster from others suggests a specialized focus area or a unique approach within the broader field of entrepreneurship education. The yellow cluster, with Timo Pihkala and Elena Ruskovaara, represents a collaborative network focusing on entrepreneurship education, likely within the context of educational policy, program evaluation, and cross-national studies. This cluster's distinct positioning and specific pairings suggest targeted research initiatives, possibly involving comparative studies or the implementation of entrepreneurship education programs across different educational systems or countries.

The map shows varying degrees of interconnectedness among the clusters. The red and green clusters, with Fayolle and Matlay at their centers, show significant internal connections, indicating frequent collaborations and possibly a shared research agenda. These clusters' strong internal linkages suggest that they form the core of the research community in entrepreneurship education, driving much of the innovation and academic discourse in the field. The blue and yellow clusters, although connected to the larger network, appear more isolated and specialized. This separation suggests a focus on niche areas within entrepreneurship education or distinct research methodologies. For instance, Liguori and Morris (blue cluster) might focus on experiential and practical aspects of entrepreneurship education, while Pihkala and Ruskovaara (yellow cluster) could be concentrating on policy and program implementation.

5. CONCLUSION

The comprehensive analysis of thematic clusters, research trends, research opportunities, and author collaboration within entrepreneurship education provides a holistic view of the field's evolution and future directions. The thematic clusters identified in the VOSviewer visualizations reveal key focus areas such as entrepreneurial mindset, innovation, and social entrepreneurship education, with a chronological progression highlighting shifts in research priorities over the years. These trends underscore a growing emphasis on integrating entrepreneurial skills within higher education and addressing societal challenges through innovative and socially responsible entrepreneurship. Research opportunities abound in exploring interdisciplinary approaches, enhancing technological integration in educational practices, and tailoring programs to diverse demographic needs, particularly focusing on gender dynamics and youth engagement. The author collaboration network maps highlight significant research groups led by influential scholars such as Alain Fayolle and Harry Matlay, indicating strong internal connections within these groups and opportunities for increased cross-cluster collaborations. By fostering global partnerships and interdisciplinary research, the field can further expand its impact, ensuring entrepreneurship education remains responsive to contemporary economic and societal needs.

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