Chapter

Research Trends in the Measurement of Entrepreneurial Education: A Bibliographic Coupling Analysis

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Abstract

The literature recognizes the importance of entrepreneurship for the development of students' job skills and for the socio-economic development of the countries, however, there are mixed results regarding the impact of entrepreneurial education and few validated measures for its evaluation. According to the above, we conducted a bibliometric study related to trends in the measurement of entrepreneurial education. We performed a bibliographic coupling analysis to identify the most relevant publications in this field of study. We identified eleven research trends: (1) Entrepreneurial self-efficacy. (2) Entrepreneurial intention. (3) Entrepreneurship education in higher education institutions. (4) Entrepreneurial skills. (5) Individual and national level determinants of entrepreneurial activity. (6) Drivers of entrepreneurial intention. (7) Assessment instruments of entrepreneurial education impact. (8) University entrepreneurship education program. (9) Social impact of entrepreneurship education. (10) Pedagogies used in entrepreneurship education. (11) Effectiveness of entrepreneurial education. We suggest future lines of research based on the results of our study.

Keywords: entrepreneurial education, entrepreneurship, measurement of entrepreneurial education, entrepreneurship education, entrepreneurial intention

1. Introduction

Entrepreneurship is considered one of the main strategies for economic development and competitiveness of countries [1–7]. Thus, entrepreneurs have become drivers of business growth around the world [8]. Consequently, the relationship between entrepreneurial intention and entrepreneurship education has long been addressed in literature [9]. In this regard, a growing number of research confirms that education plays an important role in promoting entrepreneurship [7, 10]. Indeed, entrepreneurial education has been gaining greater interest in literature [8] because it strengthens the entrepreneurial intention [11–14], favours the acquisition of new skills to compete in the labour market [15], develop a culture of innovation [8, 16] and influence positively entrepreneurial self-efficacy in students [17]. Thus, to promote successful entrepreneurship it is necessary to strengthen business education and the entrepreneurial ecosystem [13].

In line with the above, entrepreneurial education has positive impacts for both students and teachers [18]. Furthermore, the literature states that entrepreneurial

skills can be acquired through training [18]. In this sense, there is a growing interest in the analysis of pedagogies that facilitate entrepreneurship education in different disciplines, for example, in engineering [19], the effectiveness of design thinking is validated to teach entrepreneurial skills [19]. Also, the entrepreneurial training programs based on active learning and learner-centred approaches favour entrepreneurial intention in university students [20].

In this context, entrepreneurial orientation is a concept derived from the organizational field, which acquires more and more importance in the educational context, in fact business education is a common objective of different educational systems worldwide [18, 21]. However, despite its relevance "there is a scarcity of valid and reliable measures for assessing entrepreneurial orientation in students" [21]. Additionally, contradictory results are reported on the effectiveness of business education in recent literature [4]. In this regard, a group of authors [4, 10, 22–27] report positive effects of business training programs in different disciplines, while Khalifa and Dhiaf [28] highlights business education has a very low incidence on the entrepreneurial intention of students. Indeed, according to Debarliev et al. [29] non-formal education has a more significant effect than formal education on the development of entrepreneurial intent. In accordance with the above, this article analyses trends in the measurement of entrepreneurial education using the bibliographic coupling analysis technique.

2. Methodology

2.1 Studies identification

To identify the scientific publications, we performed a search in the electronic database Scopus using the following terms combination:

"entrepreneurial education" AND "measure*".

The search was performed on the title, summary, and keywords of the papers. The initial search yielded a total of 69 results. We included articles published since 1995 until 2020 and in English. Regarding the type of document, we only include scientific articles; editorials, conference articles, notes, and other material were excluded. Thus, after excluding publications that did not meet the requirements of year of publication, language and document type, we retained 53 papers.

2.2 Analysis of the studies

Bibliographic coupling analysis is one of the most important bibliometric techniques [30, 31]. This type of analysis allows identifying the knowledge structure of the field and its emerging topics [32]. This analysis "identifies similarities between documents regardless of citation frequency" [30]. Thus, bibliographic coupling analysis "refers to the phenomenon that two authors cite the same article(s) in articles that these two authors have published" [33]. This type of analysis was conducted with VOSviewer, a free software for bibliographic mapping.

3. Results

3.1 Descriptive analysis

Regarding the evolution of the scientific publications, **Figure 1** highlights that the first paper related to the measurement of entrepreneurial education was published in 1995. However, from the year 2017 to the year there is a significant

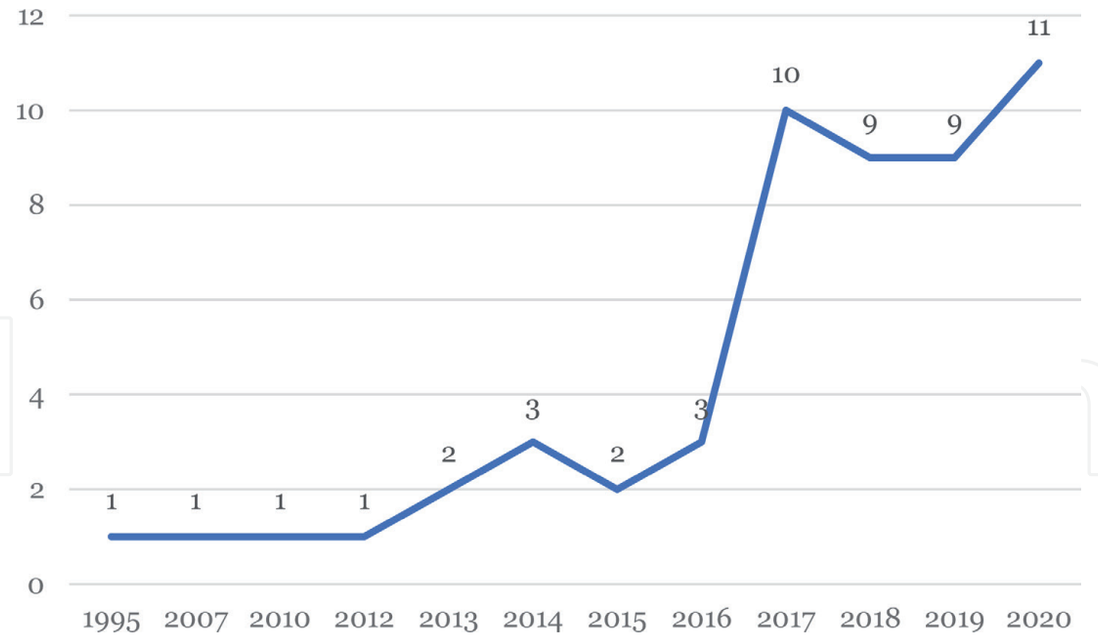

Figure 1.
Evolution of the scientific publications per year.

increase in the literature related to this topic, with a total of 39 articles, compared to 14 articles related to the search equation in the period between 1995 and 2016.

Additionally, the journals that concentrate the production related to the measurement of entrepreneurial education are: Education and Training, International Journal of Entrepreneurial Behaviour and Research, Journal of Entrepreneurship Education and International Journal of Management Education (**Table 1**).

On the other hand, **Table 2** presents the number of citations of the articles included in this analysis. Specifically, **Table 2** includes the papers with 10 or more citations in the Scopus database, corresponding to 19 of the 53 papers included in this bibliographic coupling analysis, according to the search equation presented in the methodology section.

3.2 Bibliographic coupling analysis

Figure 2 shows the thematic clusters identified from our bibliographic coupling analysis.

3.2.1 Cluster 1: entrepreneurial self-efficacy

Self-efficacy provides a measure of the impact of entrepreneurial education [41]. The first cluster groups studies related to the measurement of entrepreneurial self-efficacy, defined as motivation and capacity for the development of activities [41]. Specifically, the study by Barakat et al. [41] validates an instrument for measuring business self-efficacy, from a multidimensional perspective. For its part, the study of Cadenas et al. [22] measures entrepreneurial self-efficacy, entrepreneurial skills, civic participation, critical behaviour, technology optimism, and technology innovation in the context of the social entrepreneurship program. The paper by Gorostiaga et al. [21] analyses the relationship of self-efficacy with entrepreneurial orientation, gender, and personal initiative in vocational training students. In this context, the study by Gorostiaga et al. [21] examine the psychometric properties of the Entrepreneurial Orientation Scale (EOS). While, Mozahem and Adlouni [46] validate an instrument for measuring entrepreneurial self-efficacy, in order to determine the effectiveness of business education courses in four universities in

Journal	N° of articles	%
Education and Training	5	9,4%
International Journal of Entrepreneurial Behaviour and Research	3	5,7%
Journal of Entrepreneurship Education	3	5,7%
International Journal of Management Education	3	5,7%
Eurasia Journal of Mathematics, Science and Technology Education	2	3,8%
Journal of Small Business Management	2	3,8%

Table 1.
Leading journals in the measurement of entrepreneurial education research.

Authors	Year of publication	Citations
[26]	2010	99
[34]	2013	79
[35]	2014	59
[36]	2012	44
[37]	2007	34
[38]	2013	29
[39]	2016	27
[40]	2017	26
[41]	2014	21
[2]	2018	20
[42]	2018	18
[43]	2014	15
[24]	2017	12
[23]	2018	11
[44]	2015	11
[45]	1995	11
[25]	2018	10
[3]	2017	10
[28]	2016	10

Table 2.
Papers with the highest citations in Scopus.

Lebanon. In the case of France, the study by Laviolette et al. [36] analyse the impact of positive and negative same-gender fictional role models on students' self-efficacy and entrepreneurial intention.

On the other hand, from the context of higher education in China, the study by Jiang et al. [47] analyses the relationship between entrepreneurial self-efficacy and entrepreneurial intention with entrepreneurship education quality, highlighting that business education in this country is in a stage of exploration and growth [47]. In this regard, the study by Joensuu et al. [38] analyses the entrepreneurial intention of students from different areas of knowledge through a longitudinal study, validating that the development of entrepreneurial intention in the educational field is a complex process, which presents variations based on time and the gender of the

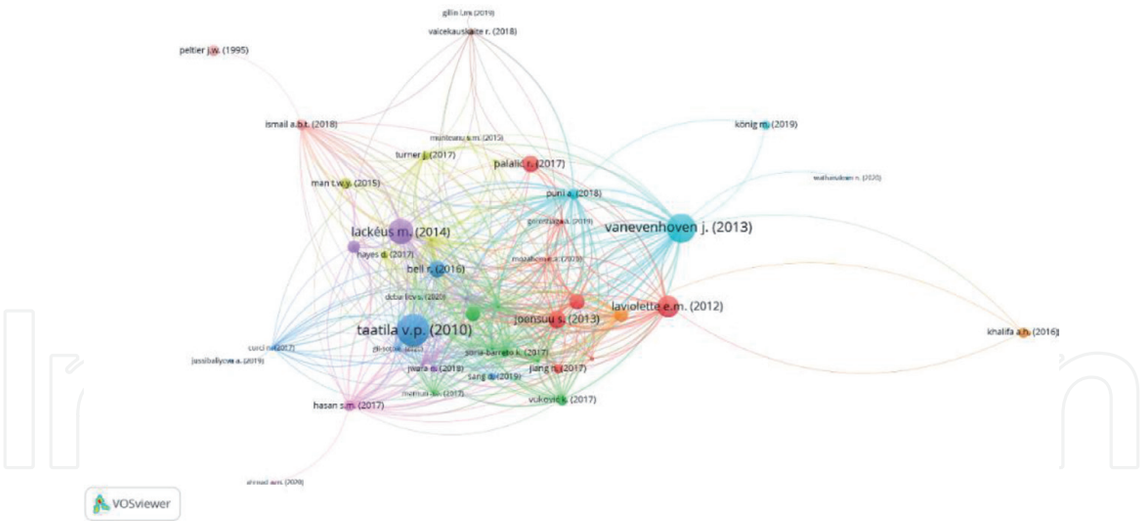

Figure 2.
Bibliographic coupling analysis.

students [38]. Thus, improving the environment and business education allows increasing the entrepreneurial intention of students [40].

3.2.2 Cluster 2: entrepreneurial intention

The second cluster identified is oriented to the measurement of entrepreneurial intention. In this regard, in the case of Malaysia, the study by Mamun et al. [1] analyses the effectiveness of public policies and programs related to business education, which is considered one of the main strategies for the economic development of nations [1]. In the context of Thailand, the study by Saengchai and Jermsittiparsert [48] analyses the link between entrepreneurship education and the entrepreneurial intention of business school students. In the case of business administration students from Chile and Colombia, the study by Soria-Barreto et al. [11] highlights that entrepreneurial education, environmental conditions and previous experience significantly index entrepreneurial intention. The paper by Wąsowska [49], developed in business students in Poland, validates the factors that influence entrepreneurial intention, including: gender, entrepreneurial role models, educational profile, entrepreneurial self-efficacy and locus of control.

For its part, the one carried out in young people from Croatia and Macedonia [3] conclude that bridging and bonding social capital could be significant enhancers of entrepreneurial intention [3]. Similarly, the study by Saiz-Alvarez et al. [50] analyses the effect of parents' gender on entrepreneurial intention in university students. Likewise, Shahverdi et al. [2] analyse barriers to social entrepreneurship from the perspective of university students in Malaysia.

3.2.3 Cluster 3: entrepreneurship education in higher education institutions

Cluster 3 groups the studies related to entrepreneurial education in the context of higher education institutions, in this regard, the study by Bell [39] analyses the attitudes and specific traits that can be linked to employability in recent graduates from higher education institutions. In the case of Italy and the countries of the European Union, the paper by Curci & Micozzi [51] identifies the incidence of characteristics such as gender and training in the formation of new companies, based on data from the Global Entrepreneurship Monitor survey. In the case of China, Sang & Lin [9] validate the relationship between entrepreneurial education, entrepreneurial alertness and entrepreneurial intention.

In the context of Senegal, Gil-Soto et al. [27] confirm that business training programs have a positive impact on the development of business attitudes of students. Along the same lines, Jussibaliyeva et al. [15] highlight that business education enables students to acquire new skills and improve their competence in the labour market. Likewise, the paper by Taatila [26] presents successful cases of entrepreneurial education in the university context, validating the importance of learning through projects to train entrepreneurs [26].

3.2.4 Cluster 4: entrepreneurial skills

In reference to entrepreneurial skills, Hayes & Richmond [52] validate whether entrepreneurial students have differentiating personality traits compared to other students, highlighting that there are clear differences in the entrepreneurial student traits [52]. Furthermore, the study by Turner and Mulholland [53] identifies students' attitudes towards entrepreneurship education, highlighting the importance of skills such as project management, creative thinking, communication skills, and confidence.

In addition, the paper by Kim et al. [7] proposes a scale to measure entrepreneurship in young people in Korea, because most scales are adapted to the adult population. Also, Man and Farquharson [44] describe the importance of team-based projects as part of business education. On the other hand, the paper by Munteanu et al. [6] is aimed at measuring the entrepreneurial character of the European Union member, from the cultural, economic and administrative component, and entrepreneurial education, while the paper by Schmidt et al. [54] validates an entrepreneurial orientation measurement scale, from a multidimensional perspective, from a sample of students from Brazil and Finland.

3.2.5 Cluster 5: individual and national level determinants of entrepreneurial activity

According to the results of this cluster, a first group of studies analyses the individual determinants of business activity. In this regard, the study by Chang et al. [43] highlights as determinants skills in reflection and self-awareness, communication, empathy and the generation of new ideas. In the case of Vietnam, the paper by Nguyen [13] identifies the following determinants for entrepreneurship: entrepreneurial education, family background, entrepreneurial ecosystem, perceived behavioural control, social valuation, perceived opportunity, attitude, entrepreneurial self-efficacy, and entrepreneurial intention. On the other hand, Lackéus [35] analyses the impact of emotional events and critical learning events on enterprising students, through longitudinal study in engineering students.

On the other hand, the study by Gimenez-Nadal et al. [14] examines the determinants of entrepreneurial activity, from the individual and national perspective, based on the results of the Global Entrepreneurship Monitor. While, Jwara and Hoque [5] describe the impact of higher education on entrepreneurial activity, highlighting that universities must integrate skills on entrepreneurship in academic activity. Similarly, the study by Khan et al. [12] analyses the role of education in business orientation in students of a business school.

3.2.6 Cluster 6: drivers of entrepreneurial intention

In the literature, different drives of business activity are identified, specifically the study by König et al. [55] analyses innovation as a determinant in the evolution patterns of business models. In the context of university students in Ghana,

the paper by Puni et al. [25] highlights that the acquisition of knowledge about entrepreneurship and the recognition of opportunities favour the entrepreneurial intention. Wathanakom et al. [8] analyse innovation as a critical factor in the entrepreneurial intention of university students. Also, the authors Vanevenhoven and Liguori [34] present the structure of a longitudinal study that measures the factors associated with entrepreneurial intention in students from 70 countries and 400 world universities.

3.2.7 Cluster 7: assessment instruments of entrepreneurial education impact

Cluster 7 groups the studies related to the challenges for measuring the impact of entrepreneurial intention on students. In this regard, the study by Huang-Saad et al. [42] highlights that there is little progress in how to measure the influence of entrepreneurial education in engineering students. In this regard, the literature highlights the need to develop assessment instruments focused on specific business results in the engineering area [42]. In the same way, it is established that currently, there is no uniform way to measure entrepreneurial intention [28].

In this sense, the study by Saptono et al. [56] highlights the need to measure entrepreneurial education from the affective domain of entrepreneurial learning, considering that most of the scales are concentrated in the cognitive and psychomotor domains. Thus, the study proposes a valid and reliable scale for this domain [56]. Additionally, in the UAE context, Khalifa and Dhiaf [28] conclude that entrepreneurial education does not have a significant impact on the development of entrepreneurial intention in students.

3.2.8 Cluster 8: university entrepreneurship education program

This cluster includes two case studies related to the impact of entrepreneurship training programs. The first of these highlights the importance of a business education program to promote the entrepreneurial mindset and innovation in the business context [16]. Through a longitudinal study, organizational factors and barriers for the development of entrepreneurship are identified [16]. The second case, through interviews, analyses the entrepreneurial intention of students and teachers, also proposes a conceptual reflection of the models used in the training of entrepreneurs [10].

3.2.9 Cluster 9: social impact of entrepreneurship education

In reference to this cluster, the study by Ahmad et al. [57] sets out the practical applications of entrepreneurship education in different countries and how it can strengthen economies and enhance community development, in the context of the Malaysian education system. Along the same lines, the study by Hasan et al. [24] validates a positive relationship between entrepreneurial education and business development. Likewise, it highlights that entrepreneurship education in the university context has a significant impact on students and society [24]. Thus, literature highlights the relationship between entrepreneurial education and economic development [24].

3.2.10 Cluster 10: pedagogical strategies used in entrepreneurship education

In reference to this cluster, the study by Ismail et al. [23] analyses the effectiveness of the different pedagogies in teaching entrepreneurship. Specifically, teacher- and student-centred learning is analysed through an experiment carried out on

university students in Malaysia [23]. Furthermore, the study by Peltier et al. [45] highlights the importance of practical experiences in developing students' skills.

3.2.11 Cluster 11: effectiveness of entrepreneurial education

The literature describes the need to study more deeply the effectiveness of entrepreneurship programs, due to the development of public and investment policies on this issue in different countries of the world [4]. In this regard, the study by Aboobake and Renjini [4] establishes that entrepreneurial education is effective in developing entrepreneurial intention in students. In the context of Macedonia, Slovenia, and Lithuania, Debarliev et al. [29] argue that non-formal business education has a more significant effect on human capital than formal education. For this purpose, two measurement tools are considered: Entrepreneurial Intention Questionnaire (EIQ) and Assessment Tools and Indicators for Entrepreneurship Education (ASTEE) [29].

4. Discussion

The literature has delved into the practical implications of business education in the university setting [24] and in the dynamics of different countries for the strengthening of the economy and the improvement of the living conditions of the communities [57]. In this way, previous studies [4, 13] highlight the importance of analysing the effectiveness of entrepreneurship programs and public policies to support entrepreneurship education.

However, despite the importance of business intention in the creation of companies, there is still no clear definition and a uniform way to measure this construct [28]. Similarly, in the field of entrepreneurial education, recent measurements have focused mainly on motivation to start new businesses [10]. In addition, the measurement of entrepreneurial intent has traditionally been carried out since the cognitive and psychomotor domains, dismissing the affective domains [56]. Also, most studies on entrepreneurial education have focused on its impact on entrepreneurial intention, using scales for potential adult entrepreneurs, which is why they are not adapted to the characteristics of youth entrepreneurship [7]. In fact, entrepreneurial behaviour assessment has evolved in terms of construct complexity and scope of empirical observation [54]. Particularly, Huang-Saad et al. [42] highlight the few advances in measuring the impact of entrepreneurial education in the field of engineering.

According to the above, Taatila [26] describe the need for higher education institutions to modify business education programs in order to improve the skills for entrepreneurship in students, taking into account the importance of business education to successfully develop innovative ideas [10]. Thus, the literature highlights the need to transform educational systems to promote creativity and innovation in students, in order to promote entrepreneurship in students [5].

Additionally, the literature highlights that the development of entrepreneurial intention is a complex process in the context of higher education [38]. This, coupled with pressure from higher education institutions to demonstrate the effectiveness of entrepreneurial education [26, 46]. Previous studies have looked at the challenges of business education and its effects on student development [22], as well as the relationship between the quality of business education and entrepreneurial intent [47]. Additionally Jiang et al. [47] suggest that the stronger the business orientation, the more significant is the relationship between the quality of business education and self-efficacy. In this sense, self-efficacy has been considered as a measure to evaluate the impact of business education [41].

5. Conclusion

The bibliographic coupling analysis describes the main trends related to the measurement of entrepreneurial education. In this regard, the literature shows different approaches related to the characteristics of entrepreneurs (Cluster 1, 2, 4 and 6), the conditions and support systems for entrepreneurship (Cluster 3, 5 and 10) and the analysis of the impact of entrepreneurial education (Cluster 7, 8, 9 and 11). These results obtained in this article have implications for teachers and educational institutions, because it presents the advances and challenges of entrepreneurial education in different educational systems around the world. In addition, for policy-makers, this article systematizes the evidence related to the results and instruments of measurement of entrepreneurial education, recognized as a strategy to favour the intention to create new enterprises and generate economic development in the countries.

We are aware that our study has important limitations. Deeper content analysis could be conducted in future studies addressing the different measurement instruments of entrepreneurial education. However, we consider that this bibliometric study provides important ideas to broaden the spectrum of knowledge regarding trends in the measurement of entrepreneurial education.

According to the analysis carried out, entrepreneurial education is approached from different perspectives in the literature, from self-efficacy and the development of entrepreneurial skills, to pedagogical strategies and the social impact generated by entrepreneurship in different contexts. Most of the literature focuses on the measurement of entrepreneurship skills in students, however, there is very little literature related to the competencies of the teacher who trains entrepreneurs. We suggest that this aspect be developed in future research.

Similarly, in line with the results of Ismail et al. [23], we propose the development of future works from a quasi-experimental design, because it allows to better address the impact of entrepreneurial education [23]. Furthermore, we suggest developing measurement instruments or methodologies to allow evaluating the impact of entrepreneurial education from different perspectives. Finally, it is important to delve into the effectiveness of business education, due to the contradictory results offered by the current literature [4].

Conflict of interest

The authors declare no conflict of interest.

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