COGNIÇÃO, INTENÇÃO E O PAPEL DA EDUCAÇÃO PARA O EMPREENDEDORISMO: UMA REVISÃO BIBLIOMÉTRICA

COGNITION, INTENTION AND THE ROLE OF ENTREPRENEURSHIP EDUCATION: A BIBLIOMETRIC REVIEW

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Objetivo do estudo
Apresentar uma revisão e prognóstico de pesquisas acadêmicas voltadas para os campos da cognição, intenção e o papel da educação empreendedora.

Relevância/originalidade
Identifica o desenvolvimento do campo, documenta os periódicos e artigos mais relevantes, conceitos e a estrutura intelectual de autores proeminentes.

Metodologia/abordagem
Análise bibliométrica dos 25 artigos mais relevantes publicados entre 2014 e 2023 em periódicos das bases de dados Web of Science e Scopus, estruturas intelectuais, tendências e caminhos para o campo de intersecção da cognição, intenção e educação empreendedora.

Principais resultados
Principais periódicos são International Entrepreneurship and Management Journal e Frontiers in Phycology. Liñán e Chen os autores mais influentes. Processos pedagógicos e os contextos de aprendizagem melhoram a intenção que leva a empreender. As palavras-chave mais relevantes são empreendedorismo, intenção, cognição, autoeficácia.

Contribuições teóricas/metodológicas
Apresentar o estado da arte, integrar conhecimentos e identificar lacunas para pesquisas futuras que mostrem novas tendências, como interfaces com metacognição e a elaboração de programas de educação formal para o empreendedorismo, considerando contextos diversos.

Contribuições sociais/para a gestão
Uma melhor compreensão dos aspectos subjacentes dos programas bem-sucedidos de educação empreendedora contribui significativamente para fomentar o desenvolvimento econômico com a criação de novos negócios.

Palavras-chave: Cognição Empreendedora, Intenção de Empreendedorismo, Educação para o Empreendedorismo, Análise de cocitação, Revisão bibliométrica

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Study purpose
To present a review and prognosis of academic research focused on the fields of cognition, intention and the role entrepreneurship education

Relevance / originality
Identifies the field development, documents the most relevant journals and articles, concepts, and the intellectual framework of prominent authors

Methodology / approach
Bibliometric analysis using co-word and co-citation techniques of 25 relevant articles published between 2014 and 2023 in journals from the Web of Science and Scopus databases, intellectual structures, trends, and paths for the field of intersection of cognition, intention and entrepreneurial education.

Main results
Main sources are International Entrepreneurship and Management Journal and Frontiers in Phycology. Liñán & Chen are the most influential authors. Pedagogical processes and learning contexts improve the intention that leads to starting up. Most relevant keywords are entrepreneurship, intention, cognition, self-efficacy.

Theoretical / methodological contributions
Present the state of the art, integrate knowledge and identify gaps for future research that show new trends, such as interfaces with metacognition and the development of formal education programs for entrepreneurship, considering different contexts.

Social / management contributions
Better understanding of underling aspects of successful entrepreneurial education programs leads to a major contribution for new business ventures, fostering economic development.

Keywords: Entrepreneurial Cognition, Entrepreneurship Intention, Entrepreneurship Education, Co-citation analysis, Bibliometric review

COGNITION, INTENTION AND THE ROLE OF ENTREPRENEURSHIP EDUCATION: A BIBLIOMETRIC REVIEW

1. Introduction

Since Shane and Venkataraman note in Academy of Management Review (AMR) Note, *The Promise of Entrepreneurship as a Field of Research* (2000), several studies have emphasized the significance of entrepreneurship as a productive area for theories applicable to broader research issues. Moreover, it is common sense that Entrepreneurship significantly contributes to economic development by incubating technological advancements, enhancing economic efficiency, and generating employment opportunities.

Essentially, the most researched inquiries in entrepreneurship studies revolve around two questions: how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited (Shane & Venkataraman, 2000).

The Theory of Planned Behavior (TPB) is one of the main frameworks when studying entrepreneurial intent or entrepreneurial career choice (Ajzen, 1991, 2002; Shapero & Sokol, 1982) as it assumes that human social behavior is reasoned, controlled or planned in the sense that it takes into account the likely consequences of the considered behavior, but Shane and Venkataraman (2000) (2000) focus on opportunities as core to entrepreneurship, and other aspects as they concluded "Although recognition of entrepreneurial opportunities is a subjective process, the opportunities themselves are objective phenomena that are not known to all parties at all times" (p. 220).

To improve the skills for opportunities recognition and the development of entrepreneurial intention through pedagogical processes and learning contexts, Entrepreneurship Education (EE) is an essential tool. Fayolle, Gailly, and Lassas-Clerc (2006) comment that Entrepreneurship Education Programs (EEP) is an answer to an increasing interest from students in entrepreneurial careers. On the other hand, EEP can exhibit significant variation among countries and educational institutions, encompassing differences in objectives, target audiences, format, and instructing/pedagogical approaches.

The first attempt to summarize previous empirical investigations in EE, was meta-analysis of Bae and colleagues (2014) including 73 studies with 37,285 participants on entrepreneurship education and intentions finding a significant but a small correlation between them and, showing also that there are varied outcomes.

The second meta-analytic approach including 89 primary studies with a total sample size of 51,919 indicate the existence of differences in the manner in which entrepreneurial knowledge influences cognitive antecedents in the individuals who participate in new ventures and personal attitude and self-efficacy play a vital role in predicting entrepreneurial intention. Besides, age, gender, and education background significantly moderate the relationship between cognitive antecedents and entrepreneurial intention(Liao et al., 2022).

As a result, this paper aims to provide a more comprehensive understanding of the research on the role of entrepreneurship education, cognition, and intention. The purpose of this study is to identify a variety of research themes within each of these areas of specialization, with the intention of introducing new methods and perspectives to these field of research that may be beneficial in addressing the current gaps can help individuals and institutions planning education

The paper is organized as follows. Section 2 provides a detailed description of the methodology that includes the Bibliometric approach, selection criteria, final data set and the techniques used for analysis. Section 3 presents the results based on 25 journal analyses. Section 4 concludes the paper, highlighting its limitation and future research areas.

2. **Methodology**

Systematic Literature Review (SLR) played an essential role in systematizing scientific publications to use the existing body of knowledge effectively to give evidence-based insights for practical implications and improve professional judgment and competence (Paul & Criado, 2020). Using validated search techniques, objective research questions, data extractions, and data presentations (Ahmad, Menegaki, et al., 2020) SLR is carried out successfully in many areas.

SLR articles can be categorized as domain-based, theory-based, and method-based. Meta-analytical reviews are also increasingly popular in many subject areas (Hulland & Houston, 2020). Domain-based review articles can be classified into different groups; namely – Structured review focusing on widely used methods, theories, and constructs; Framework-based review, Bibliometric review, Hybrid-Narrative with a framework for setting future research agenda, and Review aiming for model/framework development (Paul & Criado, 2020).

Research question's formulation

Scoping involves the formulation of research questions that provide an underline plan, logical context, aim and base for operationalizing SLR. The key research questions for this research are:

RQ1. How has the field and intellectual structure of entrepreneurial cognition (EC), entrepreneurial intention (EI) and entrepreneurial education (EE) evolved?

RQ2. What are the most significant contributions, journals, keywords and who are the most influential authors, in the field?

This study uses the Bibliometric reviews method, employing statistical tools, the analysis in bibliometric review articles figures out trends, citations and co-citations of a particular theme, by year, country, author, journal, method, theory and research problem. Software like Bibliometrix (in R-Studio) are widely used to conduct such bibliometric reviews in diverse subject areas (Aria & Cuccurullo, 2017; Paul & Criado, 2020).

As stated by (Thomé et al., 2016) the literature offers a variety of approaches for searching and selecting an area of research, however, our analysis is based on six steps that include: Scoping and formulating the research question; Database selection and searches criteria; Search strings or Keywords; Relevancy and Quality assessment; and Data extraction, analysis and synthesis.

Database selection

The research articles for this study have been extracted from Web of Science (WoS) due to quality of and comprehensiveness of the data (Ahmad, Aghdam, et al., 2020; Ahmad, Menegaki, et al., 2020; Harzing & Alakangas, 2016; Harzing & van der Wal, 2009). A similar research was conducted at Scopus database and no other paper was identified. As pointed out by Paul and Criado (2020), one of the most popular and appropriate methods for selecting the relevant articles for any study is to search for articles using rigorously chosen keywords or strings present in the title, abstract or in the keywords list.

Following this approach, the keywords for this study are "Cognition" and "Intention" and "Education", document type= article, topic= management. The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) suggestion includes reporting guidance that reflects advances in methods to identify, select, appraise, and synthetize studies (Page et al., 2023).

XII SINGEP

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Journal articles published only in the English language, from 2014 to 2023 are included for the final analysis, covering ten years of research in both databases.

Articles were assessed for relevance by two researchers working in the field, primarily by reading the title and abstract but, where necessary, the full article was read. An initial search showed 114 articles. After trimming the database results in 26 articles for final analysis (Figure 1).
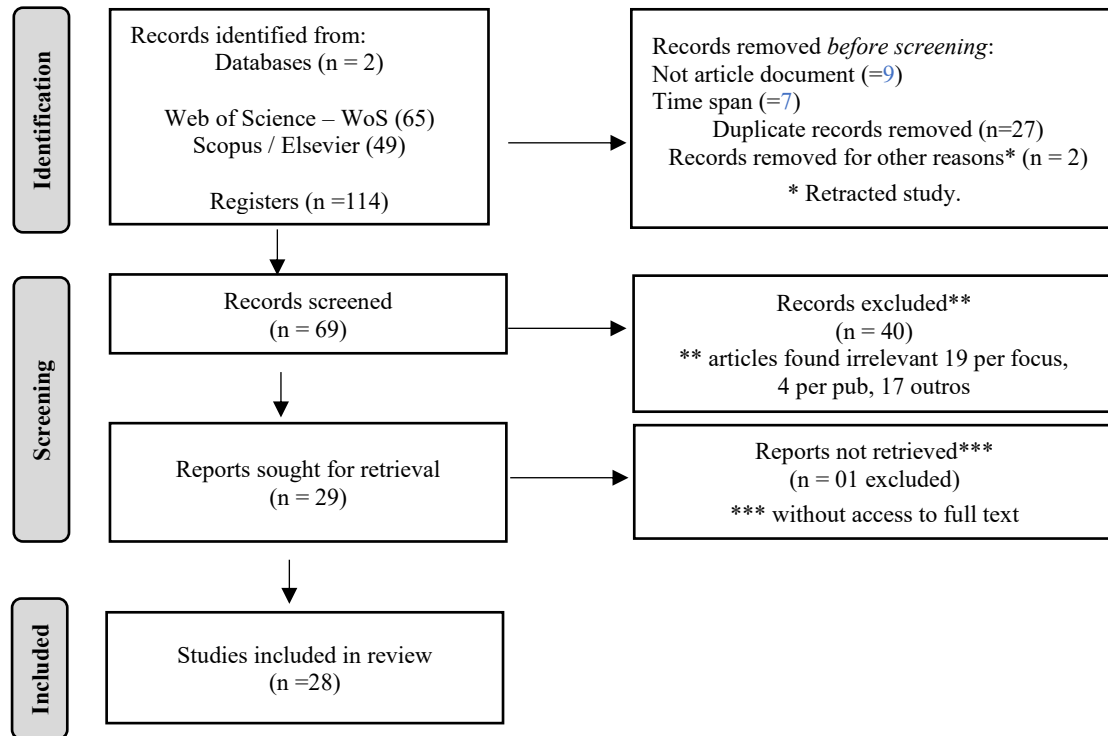
Figure 1 – PRISMA flow diagram

Figure 1 shows the refinement steps in our SLR procedure and the resulting number of articles. As the result of trimming the 114 studies with the following exclusion criteria, 40 were found irrelevant and 03 were not available. We identified 28 peer-reviewed articles relevant for our research hypotheses.

Data extraction, bibliometric and network analysis and synthesis

Bibliometric analysis helps in finding the most representative contributors, themes and collaborations (Anwar et al., 2021). The network approach is a quantitative method for analyzing scientific publications and is widely accepted within Bibliometric studies (Randhawa et al., 2016).

Co-word analysis is a methodology involving keywords of articles to seize scientific networks of the field under study (Ding et al., 2001). According to (Callon, 1986) this is a content analysis technique establishing relationships and building a conceptual structure of the domain based on pair of words in documents. The idea underlying the method is that, when words frequently co-occur in documents, it means that the concepts behind those words are closely related mapping conceptual structure of a field. This support researchers in highlighting the nexus in the main theme (Koseoglu & Parnell, 2020). Co-word analysis aims to map the conceptual structure of a field using the word co-occurrences in a bibliographic collection. This helps the researchers to highlight the nexus of the main theme with the emerging subfields of the study (Koseoglu & Parnell, 2020).

The Louvain method (Blondel et al., 2008) employs network modularity, which measures the meaningfulness of network division into communities. It starts with assigning each node to separate community and then iterates through all communities, checking whether adding a node from one community to another causes an increase in modularity and choosing the change with greatest score. These processes are repeated until there is no change in community structure. The method has been found to be very fast for large networks and to provide excellent accuracy (Liu et al., 2012).

Co-citation network analysis is a tool to identify the conceptual structure of an academic discipline. Co-citation analysis assert that the more two items are cited together, the more likely it is that their content is related, in this study the unit of analysis: document co-citation analysis, author co-citation analysis (Alonso et al., 2018; White & McCain, 1998). According to (Koseoglu & Parnell, 2020), conceptual connections, co-citation networks, invisible colleges, social contagions, knowledge networks, knowledge domains and source knowledge are the other terms that are used interchangeably for intellectual structure (Zupic & Čater, 2015).

As proposed by Anwar et al. (2022) we conduct a co-authorship network analysis to represent the publication work carried out by a given group of researchers, this network is a useful to understand collaboration patterns; for instance, the numbers of papers groups of authors write, how many co-authors are involved, the distance between authors within the network and how collaboration patterns vary between authors within the group as a whole.

For this study, 28 articles were converted into Text format which is readable in R-Studio software for Bibliometrix analysis, and into Excel (CSV) format for complementary analysis. R-Studio is an open-source R-tool for comprehensive quantitative research and scientific mapping, encompasses statistical algorithms, mathematical functionality and visualization capabilities for analysis through tables and graphs (Aria & Cuccurullo, 2017). VoSviewer, as a tool designed to generate and present networks that involve connections between sources, authors, or documents based on bibliographic couplings were used to construct co-occurrence networks of authors' keywords or index keywords by leveraging text mining techniques (Van Eck & Waltman, 2017).

Limitations

It is possible that some relevant and interesting articles were missed out because they were not present in selected databases or by exclusion/ inclusion criteria. Future work should compare the present findings including other sources of records.

3. Results and discussion

This section presents the descriptive statistics and results of the citation and network analysis. Citation analysis includes the time trend of publications and citations, identifies the most influential sources, the most prolific authors and the most influential articles. Network analysis is divided into subsections; Documents Co-citation analysis, Authors Co-citation Analysis; Co-word analysis and Collaboration network analysis.

Descriptive statistics

The selected 28 articles were published in 25 journals from 2004 to 2023. In total, 92 authors contributed showing an average of 3,17 authors per article and a collaborative index of 3,42. The articles with single authors are 3 (3,26%), while 89 (96,74%) articles were written by multiple authors, this indicator exhibits a different pattern from other major business management fields were more than 20% are single authored (Anwar et al., 2022; Bueno et al., 2024). The general high quality of articles is evidence by an average citation count of 20,21 citations per article and other related information are presented in Table 1.

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Table 1 - Baseline Statistics

Main information	Numbers
Documents	28
Sources (Journals)	25
Author's Keywords (DE)	111
Time period of publications	2004:2023
Average citations per articles	20,21
Authors	92
Single authors	3
Multi-authors	89
Articles per author	0,315
Average Nº of authors per article	3,17
Average Nº of co-authors per articles	3,31
Collaboration Index	3,42

*Note. * Total number of phrases used in titles of an article's references*

Annual publication and citation trend

There is an increasing trend with some variations of research on cognition, intention and education of entrepreneurs in the timespan of analysis 2014–2023 in figure 2. The period can be divided into three distinct stages: The latency stage (2014–2018); growth stage (2018–2020); and takeoff stage (2021–2023). During the first stage, only 3 articles (10,71%) were published, which is equal to one article per year. The steady growth period represents 7 articles (25%) with an improved average of 3,5 articles per year. After 2021, the publication trend showed a sharp increase representing 19 articles (67,85%) of the sample with an impressive average of 6 articles per year with an Annual Growth Rate: 34,59% in the hole period. The declining line for year 2020 may occurs due to pandemic effect. However, it is important to note that research on the field continues to growth.

Figure 2 – Publication trends on entrepreneurial cognition, intention and education
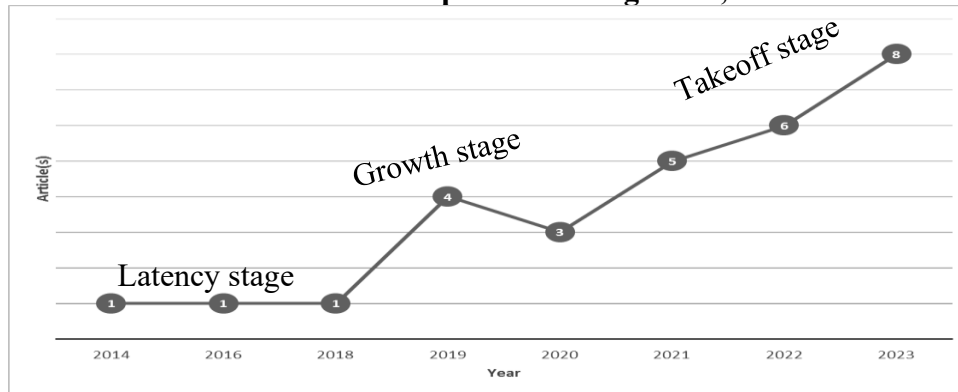
By far the most influential article is Zhang et al. (2014) that even after ten years is the most relevant in the field, followed by Lindh & Thorgren, (2016) with a fraction of their influence.

Most influential journals

The results for most influential journals based on the total citation are displayed in Figure 4. The most influential journals are derived from the ranking based on Bradford's law (Brookes, 1969), where a group of journals is divided into different zones. Zone 1 lists the 6 journals with the highest number of publications and citations, and these are likely to be of the highest interest to researchers in the discipline. Entrepreneurship Theory and Practice (ETP) Journal holds the top position with a total of 128 citations, which accounts for about 11% of the total number. ETP is followed by the Journal of Business *Venturing* (JBV) with 110 (~ 9,5%)

XII SINGEP

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and Journal of Small Business Management with 60 (5,15%) citations respectively. These citation counts reflect the numbers of citations for the articles selected for this study identified via our keyword's searches. These results show that intersection of cognition, education and entrepreneurial intention has been a leading area of attention for top-tier journals especially in the recent period.

Figure 4 provides insights into source dynamic overview in terms of annual production. Frontiers in Phycology are demonstrating an increasing interest on the field of intersection of cognition, education and entrepreneurial intention in the last three years. On the other hand, is in the International Entrepreneurship and Management Journal (IEMJ) that shows the strongest commitment and has been publishing on the field intersection, demonstrating a steady growth. It is followed two sources Journal of Enterprising Culture (JEC) and Management Learning (ML). Publication in European Management Journal (EMJ) started 6 years ago, but it has demonstrated a steady dynamic during the period.

Figure 4 – Source Growth
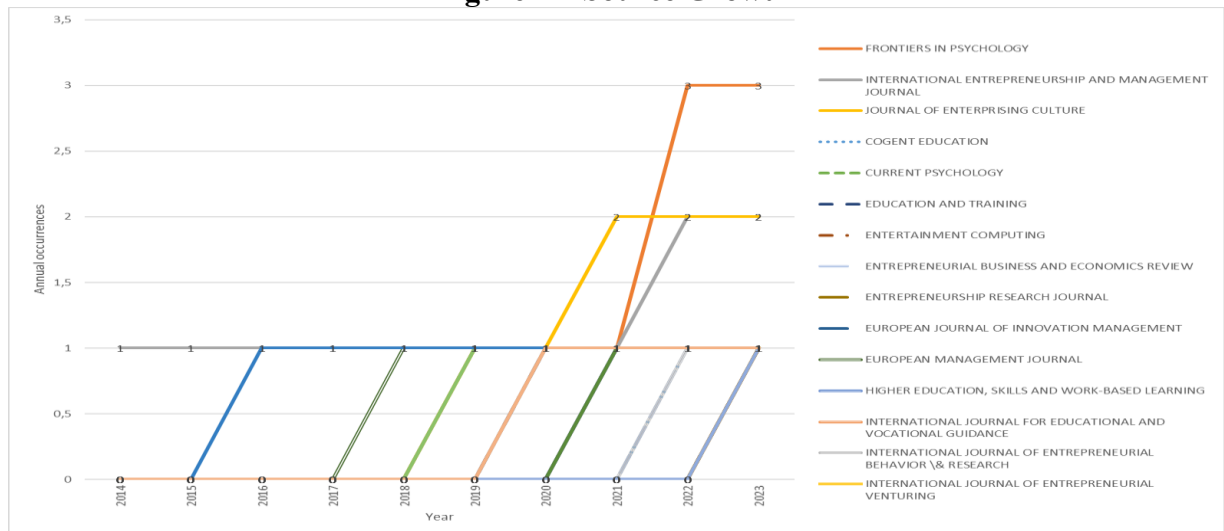
It is noted that although the Entrepreneurship Theory and Practice (ETP) haven´t been in the top five publishers still on the out of the top cited. There are, some surprising omissions (e.g. Journal of Business Venturing), and inclusions (e.g. Frontiers in Phycology and Higher Education Skills and Work-Based Learning), in the list. These intriguing results probably occurs due to a lack of publications encompassing the relevant terms together trinomial keywords over the review period. Despite this, the results show that intersection of cognition, education and entrepreneurial intention has been the prominent area of attention for top-tier journals especially during the recent period.

The most prolific and influential researcher(es)

Evaluating the scientific output of scholars based on *h*-index, g-index, citations (full citation, fractional citation, Citation per Year, etc.). The ranking of authors' based on full citation count shown Zhang et al. (2014), as the forefront authors with 415 citations followed by Badawi et al. (2019) and Lindh & Thorgren (2016) as second and third with 40 and 31 citations respectively.

At the author(s)-level metrics g-index and *h*-index measure both the productivity and citation impact of the publications of a researcher and thus show the impact of academics, representing the most cited papers based on the number of citations of their publications. Zhang

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(Rotterdam School of Management, Erasmus University) is at the highest rank in total citation, followed by Badawi (Ahlia University, from Bahrain) at second and Lindh (Luleå University of Technology, Sweden) is at third place. And even though Zhang's publication is a decade old, it remains the most cited and it is also worth noting that the effort to consolidate the field carried out by Liao et al. (2022) begins to increase in terms of citations.

Most influential articles are ranked based on the total citation. Normally in total citation parameter, the old articles get high ranking, but their influence may be less than the current articles if the ranking is based on citation per year (CPY). The results presented in Table 2 showed that the article published by Zhang and colleagues (2014) has on average more CPY than (Badawi et al., 2019; Estelami, 2020; Liao et al., 2022; Lindh & Thorgren, 2016; Reyad et al., 2019).

Table 2 - List of works ranked by year and number of cites

Rank	Title	Reference	Total Citations (TC)	TC per Year	SJR	H	Quartile
1	The role of entrepreneurship education as a predictor of university students' entrepreneurial intention	(Zhang et al., 2014)	415	33.727	1.52	71	Q1
2	Critical event recognition: An extended view of reflective learning	(Lindh & Thorgren, 2016)	31	3.44	1.57	84	Q1
3	Do entrepreneurial skills affect entrepreneurship attitudes in accounting education?	(Reyad et al., 2019)	27	4.50	0.44	20	Q2
4	Unveiling the role of entrepreneurial knowledge and cognition as antecedents of entrepreneurial intention: a meta-analytic study	(Liao et al., 2022)	15	5.00	1.52	71	Q1
5	The effects of need for cognition, gender, risk preferences and marketing education on entrepreneurial intentions	(Estelami, 2020)	13	2.60	0.42	27	Q2

Accordingly, the most influential article is "The role of entrepreneurship education as a predictor of university students'" published almost 10 years ago. The article steams from Ajzens (1991) and Shapero & Sokol (1982) theoretical approaches to develop a better understanding how the interplay among endogenous (perceived desirability and feasibility) and exogenous (prior entrepreneurial exposure and entrepreneurship education) variables moderated by type of Higher Education Institutions, study major and gender can predict the EI of students (Zhang et al., 2014).

The second most cited article by Lindh & Thorgren (2016) introduce a concept of critical event recognition in entrepreneurial education, using a ground theory methodology to a summer course of entrepreneurship, aiming to answer the question of "how individuals identify and value an event as critical?" In their results it was implied that some learners develop task specific cognitions from critical events even when they lack previous experiences. The third most influential article is Reyad et al. (2019) which presents an analysis of the impact of EE in six entrepreneurial domains (risk taking, critical thinking, problem solving, innovation, autonomy and need for achievement) on cognitive skills and EI of accounting students.

The paper from Liao et al (2022), is a meta-analytic study including relevant articles, from major scientific databases (Scopus and Web of Science) ain top ranked journals. The authors achieve 89 sources with a sample size of 51,919 were analyzed. Their results portray a positive and significant influence of entrepreneurial knowledge (EK), personal attitudes (PA), social norms (SN) and self-efficacy (SE) and age on EI but not for gender. Estelami (2020)

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found that Need for Cognition (NFC), gender and risk preferences affect entrepreneurial intentions in a different direction of previous work (Badawi et al., 2019; Reyad et al., 2019; Zhang et al., 2014).

The ranking presented in Table 2 showed that more than two-third of the top articles are published in the journals with H-factor above 50 and surprisingly all top journals range from 20 to 84. Although numbers 5 and 6 have are in the same level of total citations, we considered CPY to rank them. Moreover, both belong to Q2 journals stratification.

The conceptual structure on the intersection of cognition, education and intention

In this paper co-word analysis centered in author supplied keywords were used to represents the conceptual network (Callon et al., 1983; Ding et al., 2001). Here, the size of the nodes depicts the occurrence frequency of the keywords. The higher the frequency, the larger the node size will be. The thickness of the line connecting nodes is proportional to the closeness of connections between two keywords.

The thicker the line between two key words, the closer their relationship will be. Three clusters distinguished by colors in Co-occurrence Network visualization are shown in Figure 5. Each cluster represents a theme based on co-occurrence keywords in our sampled papers.

Figure 5 – Co-word Analysis in cognition, intention and entrepreneurship education
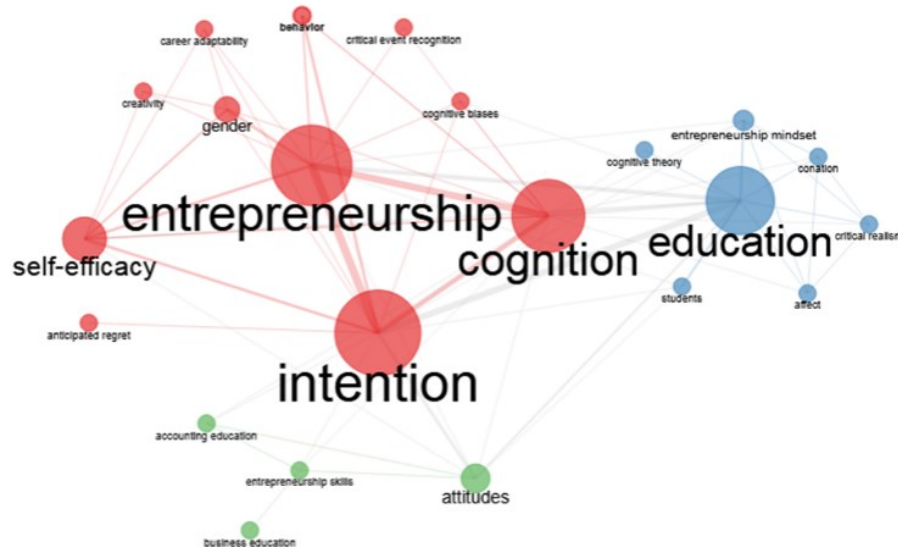
Notes:
1) Clustering by Louvain, normalized by association level with minimum edges of 1 and 35 nodes (0.2 Repulsion).
2) Authors Keywords were cleaned from synonyms and all non-concepts were removed.

The red cluster is the largest network of keywords with a major theme as "Entrepreneurship Intention" (i.e. intention) associated with other nodes such as cognition, self-efficacy, gender behavior and creativity. This cluster is also connected with other relatively smaller clusters such as "Entrepreneurship Education" and "Entrepreneurship attitudes".

The blue cluster is based on network of keywords relating to different aspects of formal education programs (i.e. students), vicarious experiences, role modeling and psychological theory (i.e. affection, conation, mindset and cognition).

Finally, the green cluster represents entrepreneurial attitudes directly linked with red clustered entrepreneurship intention pointing out practical aspects of entrepreneurship knowledge such as: skills sand professional education (i.e. business and accounting). The understanding of these themes, their underlying theories and network relationships provides the

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avenues for future research and development in the field of entrepreneurship intention, cognition and education.

Co-citation network analysis has high acceptance as a bibliometric method due to its reliability in connecting documents, authors or journals based on joint appearance in the reference lists reveals intellectual structures of fields (Alonso et al., 2018).

In the current study, the co-occurrence network of the intersection fields target in this research are shown in Figure 6. The size of boxes indicates the strength of paper co-citation and distinct colors of the boxes correspond to the different clusters of papers. Within the network, each node represents publications and the lines between them are citations. The nodes with thick links/ lines reflecting stronger association and are considered as the most cited authors or documents. The nodes with the highest links are considered the most cited ones.

Figure 6 – Co-citation network of Attention Based View Field
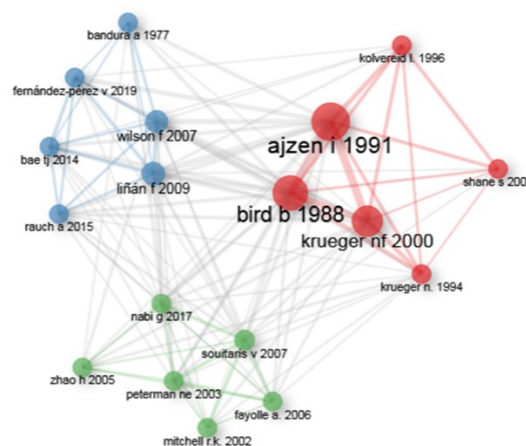
Each cluster is indicated with a distinct color and labeled with an author name, based on the contents of the research articles. The highest the co-citation of two papers in a paper citation network, the more possible is that these papers deal with similar topics. Given that strong co-citation relationship, a reflection of each cluster in the network demonstrates that publications bridging different domains can be considered as a common research stream based on research background and topics.

The red color represents cluster 1, showing more nodes with Ajzen (1991) as the largest node. This cluster representing the overall conceptualization of cognitive theory underlying entrepreneurship based on theory of planed behavior (TPB), entrepreneurial event model developed by Shapero & Sokol (1982) and cognitive framework proposed by Bird (1988). Articles in this cluster mainly involved studies that underpins aspects related with endogenous, exogenous predictors of entrepreneurs' intentions. Blue is cluster 2 discussing topics of documents like measurement of intrapreneurial intention (Liñán & Chen, 2009), self-efficacy (Bandura, 1977), gender (Wilson et al., 2007), cultural values (Bae et al., 2014; Liñán & Chen, 2009), emotional competencies (Fernández-Pérez et al., 2019). The cluster is dominated by attempts to measure and identify linkages, direction, and magnitude of effects, either direct or indirect in intentions of its predictors.

Cluster 3 is in the green colored concentrating on "Entrepreneurial education programs" (Fayolle et al., 2006), "student journey from higher education to graduate entrepreneur" (Nabi et al., 2010) "training evaluation" (Zhao et al., 2005), "teaching methods" (Mitchell et al., 2002) and "impact in distinct levels" (i.e. secondary, undergraduate and graduated) (Fayolle et al., 2006; Peterman & Kennedy, 2003; Souitaris et al., 2007; Zhao et al., 2005).

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Table 3 - *Intellectual structure and key articles*

Cluster		Title of top articles in each cluster	Reference	Between centrality
Cluster 1 – Core roots of cognitive entrepreneurship models				
1	1	The theory of planned behavior	(Ajzen, 1991)	11,83
1	2	Implementing entrepreneurial ideas: The case for intention	(Bird, 1988)	14,50
1	3	Competing models of entrepreneurial intentions	(Krueger et al., 2000)	10,31
1	4	Prediction of Employment Status Choice Intentions	(Kolvereid, 1996)	0,34
1	5	Entrepreneurial Potential and Potential Entrepreneurs	(Krueger Jr & Brazeal, 1994)	2,37
Cluster 2 – Entrepreneurship and Intentions				
2	1	Development and Cross–Cultural Application of a Specific Instrument to Measure Entrepreneurial Intentions	(Liñán & Chen, 2009)	18,77
2	2	Gender, Entrepreneurial Self–Efficacy, and Entrepreneurial Career Intentions: Implications for Entrepreneurship Education	(Wilson et al., 2007)	10,64
2	3	The Relationship between Entrepreneurship Education and Entrepreneurial Intentions: A Meta–Analytic Review	(Bae et al., 2014)	3,09
2	4	Self-efficacy: Toward a unifying theory of behavioral change	(Bandura, 1977)	1,53
2	5	Emotional competencies and cognitive antecedents in shaping student's entrepreneurial intention: the moderating role of entrepreneurship education	(Fernández-Pérez et al., 2019)	2,68
Cluster 3 – Enhancing entrepreneurship skills: insights from education				
3	1	Do entrepreneurship programmes raise entrepreneurial intention of science and engineering students? The effect of learning, inspiration and resources	(Souitaris et al., 2007)	9,54
3	2	Toward a Theory of Entrepreneurial Cognition: Rethinking the People Side of Entrepreneurship Research	(Mitchell et al., 2002)	0,69
3	3	Entrepreneurial intentions among students: towards a re-focused research agenda	(Nabi et al., 2010)	6,12
3	4	Assessing the impact of entrepreneurship education programmes: a new methodology	(Fayolle et al., 2006)	1,20
3	5	Enterprise Education: Influencing Students' Perceptions of Entrepreneurship	(Peterman & Kennedy, 2003)	1,53

The top articles per cluster are shown in Table 3 based on betweenness centrality measures which give insight into how productive communication can occurs in a network and who are the leading authors in controlling the network communication. Betweenness centrality measures the number of times a node lies on the shortest path between other nodes, it means that an individual influence the flow around a system or concept.

The Cluster 1 contains the core roots of theory driven entrepreneurship models, this set of papers encompasses major models of entrepreneurial intention, its relationship with employment attitude, sex or family background and a delineation of Entrepreneurship as research. The main models of entrepreneurial intentions with discussion regarding some overlapping on them mainly Shapero´s EEM (Shapero & Sokol, 1982) model and Theory of Planned behavior (Ajzen, 1991, 2002), Bird entrepreneurial cognitive model of new venture creation (Bird, 1988; Boyd & Vozikis, 1994) and Krueger the Entrepreneurial Potential model (Krueger Jr & Brazeal, 1994; Krueger et al., 2000).

Theoretical models explore a link between the predictors of intention and the entrepreneurial intention itself. In general, the predictors of EI are related to extrinsic and extrinsic elements of the entrepreneur. In the extrinsic pole model of the entrepreneurial event (EEM), the construct disability perceived social norms and attitudes socially perceived as adequate (Krueger et al., 2000; Shapero & Sokol, 1982; Zhang et al., 2014), which corresponds in a certain way to aspects of subjective norms and attitudes towards an attitude is two key components of the model of the theory of planned behavior (TPB) (Ajzen, 1991, 2002; Krueger et al., 2000; Zhang et al., 2014). Similarly, the model of entrepreneurial cognition proposed by

Bird (Bird, 1988; Boyd & Vozikis, 1994; Krueger et al., 2000) and considers contextual elements (social, political, economic, displacement, economic change, or deregulation) to inform the set of beliefs, the cognitive analytical elements (goal orientation) of Boyd's entrepreneurial intention (Boyd & Vozikis, 1994), factors that also contribute to the entrepreneurial potential (Krueger Jr & Brazeal, 1994; Krueger et al., 2000) preceding entrepreneurial intention.

On the other hand, the elements that make up the intrinsic aspect of the degree of perceived behavioral control model and the entrepreneurial event model connected to self-efficacy as proposed by Bandura (Bandura, 1977). In Bird's model (Bird, 1988) modified by Boyd's (Boyd & Vozikis, 1994) there is an interaction of personal repertoire, personality, and skills in the construction of an intuitive and holistic thought supporting a perspective of the entrepreneur as a visionary. In the proposal of the entrepreneurial potential there is an understanding and understanding that self-efficacy comprises the recognition of opportunities and threats to execute the entrepreneurial behavior which, in turn, is preceded by the intention, which is preceded by the entrepreneurial potential (Krueger Jr & Brazeal, 1994).

The cluster ends with conceptual a discussion of the promise as a research field beyond a bandwagon name to be used as a parking lot of studies (e.g. small business, new firms) Shane & Venkataraman (2000) propose the following definition: the field of entrepreneurship as the scholarly examination of how, by whom, and with what effects opportunities to create future goods and services are discovered, evaluated, and exploited. Thus, the field encompass sources, discovery, evaluation and exploitation of opportunities and the individuals who discover, exploit them. By defining this way linkages with organization scholars research questions could expand to cover related aspects of behavior (Bird, 1988; Boyd & Vozikis, 1994), opportunity recognition (Belchior & Castro-Silva, 2023; Chen et al., 1998; Costa et al., 2018; Gaglio & Katz, 2001; Kuratko et al., 2021; Lindh & Thorgren, 2016; McGrath & MacMillan, 2000; Pidduck et al., 2021; Shane, 2000), venture creation (Baron & Henry, 2010; Belchior & Lyons, 2021; Gartner, 1985; Lanivich et al., 2021; Lüthje & Franke, 2003; Meoli et al., 2020), sociological and economic aspects (Dai & Liao, 2019; Dai et al.; Dai et al., 2018; Kang et al., 2021; Liñán & Chen, 2009; Nelson & Winter, 1982; Pidduck & Zhang, 2022; Sarasvathy, 2001). In this paper they also discuss such important themes for entrepreneurship as existence of entrepreneurial opportunities, the discovery process and decision and models to exploit entrepreneurial opportunities as the main reasons to study entrepreneurship (Shane & Venkataraman, 2000).

The second cluster "Entrepreneurship and Intentions" include studies that define this relation as an essential aspect to be considered and conclude that intention precedes entrepreneurial activities related to creating a new business venture. Liñán & Chen (2009) conducted cross-cultural validation research using an instrument to measure entrepreneurial intentions in Spain and Taiwan, showing that intention antecedents are relevant (SN) which is higher in Spain. Using the Hofstede scale as an additional frame, they concluded that a supportive culture would lead to higher entrepreneurial intentions therefore, more new ventures in a country. In this sense, they found social and demographic background would influence on the TPB model, with cultural aspects moderating EI

The exponent in this cluster is the classic paper of Bandura (1977), highlighting the role of training in overcoming efficacy expectations, implying that performance-based procedures are the most powerful for effecting psychological changes. Nevertheless, Wilson, Kickul, and Marlino (2007) demonstrated that females showed significantly lower entrepreneurial self-efficacy than males in both middle/high school and in MBA programs in top-ranked Business schools, which is in line with other articles where gender precedent act as a moderator of Self-efficacy that influences EI. The latter research recommends that access to education is not

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sufficient for women to start a business, a realistic sense of feasibility skills development and attitude reinforcement could help to mastered competences to nurturing their entrepreneurial potential (Krueger Jr & Brazeal, 1994).

On the other hand, in a Meta-Analytic Review given Entrepreneurship Education and Entrepreneurial Intentions, Bae and colleagues (2014) found inconclusive data about gender due to the higher standard deviation of uncorrected mean correlations of females. So, in some publications, gender could be an antecedent/precursor or moderator variable; moreover, in some research, culture was the moderator, not gender. Besides, their findings indicate that EE can significantly increase EI, but the non-homogeneity in the methodology for describing the evaluated stages reduces the confidence in these results.

Some authors, such as Fernández-Pérez and colleagues (2019), have shown that external factors, such as education and SN, influence EI differently. In addition, entrepreneurial education programs have a role in moderating relationships because students with higher emotional competencies who receive entrepreneurship education will have a more positive attitude towards entrepreneurship and will perceive themselves as more capable of becoming entrepreneurs (impacting attitude toward a behavior). As contributions, the authors include aspects related to emotional competence as antecedents of Attitude and SE extending Ajzen model (Ajzen, 1991, 2002).

The last cluster named enhancing entrepreneurship skills encompass the discussion in formal entrepreneurial education program (EEP) highlighting some aspects with positive impact of considering social cognition in the development on entrepreneurial intention (EI). Mitchell and colleagues (2002), highlight that a cognitive perspective could offer insights on entrepreneur phenomena and address crucial likewise misperceptions in decision context; opportunities and risk evaluations; self-efficacy; regretful thinking; intention; task effort and performance that have been generally overlooked before (economic theories, personality traits and strategic management approaches).

The main discussion is related to stablish theoretical linkage between EEP and EI the studies, Nabi, Holden, and Walmsley (2010) conduct a large-scale cohort study aiming to identify the impact of formal entrepreneurial program in relation to entrepreneurial intentions in UK higher education (over 8,000 students, studies from 2007 to 2008) they found in these cohort group about 50% of business and engineering students group definitely or probably shall start-up after the program. Their proposal is to use of TBP as a guidance to evaluate (and develop) the impact of entrepreneurship education programs (EEPs) on antecedents of entrepreneurial behavior (e.g. attitudes about entrepreneurship, perceived self-efficacy, entrepreneurial intention) by a refocused agenda of EE to shorten the journey from student to start-up for a broader academic audience.

This proposition are further researched by Souitaris, Zerbinati and Al-Laham (2007) and Fayolle et al (2006) using different methodologies they test the impact of the EEP program on EI by positioning EEP as an antecedent to TPB modified model, and EI as an antecedent to entrepreneurial behavior moderated by a trigger event. In these studies the instrument validated by Kolvereid (1996) were applied. The after-course data collection included items related to some characteristics of the EEP, the audience (previous experience and role model influence) and measures the skills acquired, derived from Johannisson's (1991) five content research scale and Souitaris, Zerbinati and Al-Laham (2007) added a scale to measuring nascency.

The main finding of Souitaris, Zerbinati and Al-Laham (2007) is that after EEP, students' subjective norm and intention to self-employment increased due to inspiration, so programs must be designed purposefully as proposed by Tkachev and Kolvereid (1999). Their results confirm that the EEP, have strong measurable impact on the entrepreneurial intention of the students in line with Herron (1991) findings on entrepreneurial skill and skill propensity

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which are related to new venture performance, but the set of behavioral triggers that leads people to come to start-up probably occurs along their lifespan. In this sense what matters is the cumulative influence of repeated exposure to entrepreneurship, role models, EEP and experiences (Gorman et al., 1997; Herron & Robinson Jr, 1993; Rajecki, 1990).

The cluster ends with a survey grounded with 265 MBA students from 5 Universities, addressing the mediation role of self-efficacy as antecedent of intention to be an entrepreneur and to explore the influence of two stable factors and two relatively malleable factors. Their results confirm the positive impact of formal education in strengthening students' confidence, based on cognitive mechanisms (Autio et al., 1997; Bandura, 1977; Fayolle et al., 2006; Fiet, 2000; Herron, 1991; Herron & Robinson Jr, 1993; Johannisson, 1991; Kolvereid, 1996; Krueger & Carsrud, 1993; Souitaris et al., 2007; Tkachev & Kolvereid, 1999). The authors reinforce the importance of technical knowledge and informational content of the program, mainly in the nascency stage when it gives the confidence avoiding the low positiveness phenomena (Boyd & Vozikis, 1994; Donckels, 1991; Gasse, 1985; Krueger & Carsrud, 1993; McMullan et al., 2002; Scherer et al., 1989).

4. Conclusion

The aim of this study was the identification of the most influential sources, researchers, documents, keywords and themes contributing to the development on the field of the intersection among cognition, education and entrepreneurial intention. The number of annual publications reflects the overall increasing trends. The fewest publications were found up to 2018. This period can be labeled as the latency stage. From 2019 to 2021, the annual publication trend started to increase and hence it can be called the development stage. And beyond 2021, a sharp growth has been seen in the field and this may be called the take off stage. During this period no renowned journal published a special number with this topic.

Top ranking journals such as International Entrepreneurship and Management Journal (IEMJ), Frontiers in Phycology and Journal of Enterprising Culture (JEC) are the major contributors to the development of the field. The top three most influential articles are (Zhang et al., 2014), (Lindh & Thorgren, 2016) and (Reyad et al., 2019) with 33.72, 3.44 and 4.50 citations per year respectively. All these influential articles were published in top ranked journals of management. The important and most relevant keywords that have been identified are: entrepreneurship, intention, cognition, self-efficacy, gender behavior and creativity, education, students, vicarious experiences, role modeling affection, conation, mindset, skills and professional education. These keywords and the themes identified through this research will help researchers on the field or that are interested on to design and establish their research scope or even update their lecture orientation for students.

The field of the intersection among cognition, education and entrepreneurial intention is an emerging research interest within Entrepreneurship, our scope in this study has been the identification of the most relevant sources and intellectual structure. Using bibliometric methods, we found a three-dimension cluster composed by: a) core roots of cognitive entrepreneurship models; b) Entrepreneurship and Intentions; and c) Enhancing entrepreneurship skills: insights from education.

The intersection among cognition, education and entrepreneurial intention contribution fundamental is the reality that different EEP can foster entrepreneurial action, when the individual is equipped with business skills that increase their self-efficacy perception through the lens of opportunities recognition. Formal education programs have a long history of contribution to the field although their results are not fully perceived in the short term. We see advances on the cause-and-effect mechanisms to establish a better linkage between risk

perceptions, age, gender and intentions. Still a challenge to investigate the factors that hinder EEP and business environment dynamics under this intersectional lens.

Although intention is the central topic for our intersectional study it has allowed deep insights into the antecedents and consequences of it for entrepreneurship, something seems to be missing either in cognition aspects, in formal education frontier. Current efforts of field consolidation were not totally success due to shortfalls in methodological choices and headed to myopic or fragmented results.

Future directions

Until the following studies arrives, our study consolidates based on bibliometric analysis and exhibited robust evidence to conclude that the intersection among cognition, education and entrepreneurial intention has evolved from their roots to a vibrant subfield of Entrepreneurship research, with a proximal orientation to understand dynamic nature of the attentional phenomena. Although a lot of work has been done much more has yet to be done regarding understand of mindset or metacognitive level and in the impact of artificial intelligence in formal programs both are embedded in the roots and up-to-date research projects, and our expectation is that the findings reported in this paper will support and foster researchers to connect and discuss the effects of this research in the field of Entrepreneurship.

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