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ORIGINAL PAPER

Positioning the research on skills for entrepreneurship through a bibliometric analysis

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Abstract

This paper seeks to pinpoint the position of so-far research of skills for entrepreneurship in a bigger scientific inquiry network by relating it to its semantically related concepts' studies, which include entrepreneurial capabilities, abilities, capacities, and competencies. The bibliometric analysis method using VOSviewer was applied to analyze a total of 1,250 journal articles, written in English and published between 1973 and 2021, from the Scopus database. The descriptive statistics analysis revealed the growth of literature, publication outlets, and influential authors. The co-occurrence analysis of keywords suggested that the research on skills for entrepreneurship is highly related to entrepreneurship education research and entrepreneurial intention research. The follow-up content analysis in detail elaborated these two groups of relationships: skills and intention, and skills and education. The results are expected to benefit entrepreneurship researchers by offering a better understanding toward skills for entrepreneurship as a concept and as a developing research topic.

Keywords Entrepreneurial skills · Entrepreneurial competencies · Entrepreneurship education · Bibliometric analysis · Skills for entrepreneurship · Content analysis

Introduction

There exist many names that are similar or semantically related to the concept of skills for entrepreneurship in the literature. The definition of skills for entrepreneurship is far from an unambiguous one and is often interchanged with competencies of entrepreneurs (Chell, 2013; Pyysiäinen et al., 2006). As the studies of competencies of entrepreneurs precede those of skills, it is common to see practices of using competencies frameworks, such as that developed by Chandler and Jansen (1992),

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to outline skills for entrepreneurship (Chell, 1985; Cooney, 2012; Kutzhanova et al., 2009; Liechtenstein & Lyons, 1996; Mamabolo, 2016; Schallenkamp & Smith, 2008; Stuetzer et al., 2013a, 2013b). However, this approach can sometimes cause confusion when similar terms such as "entrepreneurial skills" and "entrepreneurship skills" appear in both the parent category and the child category as found in the research of Liechtenstein and Lyons (1996) and Cooney (2012).

This study uses the term "skills for entrepreneurship" to refer to various skills in need to perform tasks relevant to successful entrepreneurship involving getting and assembling new resources to create and grow an organization. In alignment with Chell (2013)'s statement, this study considers skills as a concept different from competencies, abilities, capacities, and capabilities. The concept of competencies is much broader embracing both skills and abilities, as well as other attributes including values, beliefs, knowledge, personality, wisdom, expertise (social, technical, managerial) mindset, and behavioral tendencies needed for successful and sustaining entrepreneurship (Kiggundu, 2002). Abilities among the list are akin to more general traits that can influence a personal's skill acquisition (Chell, 2013). The entrepreneurial capacities focus on the resources and constraints facing the entrepreneur (Norton, 1988) and were defined as a manager's knowledge about the firm's constituent elements, which is exogenous and acquired ability (Otani, 1996). The entrepreneurial capabilities are defined as the ability to identify a new opportunity and develop the resource base needed to pursue the opportunity (Arthurs & Busenitz, 2006). Both capacities and capabilities seemed to be more mentioned as firm-level constructs in the literature in the forms such as absorptive capacity (Aljanabi, 2018; Angeles Rodriguez-Serrano & Martin-Armario, 2019; Chung et al., 2021; Deeds, 2001) and dynamic capability (Adam et al., 2018; Aramand & Valliere, 2012; Arend, 2014; Zahra et al., 2006).

Previous research recommended separating skills as a term from the umbrella term of competencies and treating it as separate entity when building theory around it (Chell, 2013; Drakeley & White, 1999; Moloney, 1997). In this study I would like to position the research on skills for entrepreneurship in relation to its semantically similar terms such as entrepreneurial competencies, capabilities, capacities, and abilities. The purpose is to better understand skills for entrepreneurship not only as a standalone construct but also, perhaps more importantly, as a contextual construct that lies in a bigger network of scientific inquiries.

Literature review

Entrepreneurial skills research

The concept of skills comes from the psychology field to explain human development in different domains (Kutzhanova et al., 2009). The importance of skills for entrepreneurship and the fact that they are learnable, shapeable, and observable, have driven both theorists and practitioners to the topic since 1980s. In the context of entrepreneurship, which is influenced by exogenous and endogenous factors (Morris et al., 2001), skills for entrepreneurship are perceptibly context-related meaning

that possessing these skills does not necessarily guarantee an absolute success of new ventures. However, to qualify people with diverse skills for entrepreneurship by proper trainings can significantly increase the number of micro-entrepreneurs and the average earning of the informal sector, which plays a significant role in the economy especially in developing countries (Nguimkeu, 2014). Skills for entrepreneurship are direct expression of innate ability (Stuetzer et al., 2013a, 2013b), which together with willingness and power forms the three factors of shaping the supply of entrepreneurship (Knight, 2013).

Several review studies on skills for entrepreneurship can be found in the literature. The first review (Loué & Baronet, 2012) adopted a narrative literature review approach to develop a dedicated framework of skills for entrepreneurship. Chell (2013) discussed nature of skills and identify how to introduce skills into the entrepreneurial process. Sousa and Almeida (2014) identified two clusters of skills for developing a culture of entrepreneurship, which included personal skills and business skills. Johnson et al. (2015) reviewed the literature to identify key components of entrepreneurship skills and how they can/cannot be developed for the purpose of informing policy making in the UK environment. Krieger et al. (2018) examined the skill variety in entrepreneurship research, its outcomes, determinants, measurement alternatives, and the role of gender. Dolhey et al. (2018) reviewed 205 papers published between 2000 and 2016 in search for the overall status quo of research on entrepreneurship, skill development, and training. Almahry et al. (2018) selectively reviewed the relationship between entrepreneurs' skills and entrepreneurship education. Mamabolo and Myres (2020) examined 72 articles in some leading entrepreneurship and management journals to investigate what skills are required in different phases of the entrepreneurial process.

The overall scholarly interests in skills for entrepreneurship has spread vertically and horizontally. The vertical direction explores in depth certain skills such as social skills (Baron & Tang, 2009; Lamine et al., 2014), political skills (Fang et al., 2015; Tocher et al., 2012), entrepreneurial leadership (Jones & Crompton, 2009), and communicative skills (Ulvenblad et al., 2013). They were further broken down to subskills (Baron & Tang, 2009; Henley et al., 2017) and measured to explore their origins and impact on outcomes such as entrepreneurial intention (Liñán et al., 2013), occupational choice of entrepreneurship (Hsieh et al., 2017), and venture performance (Cong et al., 2017). The horizontal direction investigates the innate structure of skills system that consists of multiple skills of entrepreneurs (see Table 1). One research output from this direction is inventories of skills, which include but are not limited to: 12 skills (Hood & Young, 1993), 4 clusters of 17 entrepreneurial skills (Lichtenstein & Lyons, 2001; Lyons & Lyons, 2002; Schallenkamp & Smith, 2008), 7 categories of 45 clusters of entrepreneurial behaviors (Man & Lau, 2000), 6 items of new resource skill (Baum & Locke, 2004), 8 categories of 44 entrepreneurial skills (Loué & Baronet, 2012), 3 categories of 10 management skills of entrepreneurs (Sar, 2017), 4 categories of 8 skills (Mamabolo, 2016), and 4 categories of 30 entrepreneurial skills (Lyons et al., 2019). Despite different directions, skills for entrepreneurship are commonly perceived as observable, measurable, and trainable. However, many tend to neglect the differences between key constructs under measurement. For instance, competence/competencies/capacity and skills are constantly

Table 1 Various terminology and typology related to skills for entrepreneurship

Literature	Concept	Categories elaborating the concept
(Chandler & Jansen, 1992)	Self-perceived competencies	human/conceptual competence; ability to recognize opportunity; drive to see venture through to fruition; technical/functional competence; political competence
(Liechtenstein & Lyons, 1996)	Entrepreneurial skills	technical skills; management skills; entrepreneurship skills; personal maturity skills
(Baum & Locke, 2004)	New resource skill	cognitive capacity; organizational capacity; decision making; technical capacity; identifying opportunities
(Pyysiäinen et al., 2006)	Entrepreneurial skills by task-level	basic functional skills; critical meta-task-level skills
(W. L. Smith et al., 2007)	Entrepreneurial skills	categories from (Liechtenstein & Lyons, 1996)
(Schallenkamp & Smith, 2008)	Entrepreneurial skills	categories from (Liechtenstein & Lyons, 1996)
(Loué & Baronet, 2012)	Entrepreneurial skills	opportunity recognition and exploitation skills; financial management skills; human resources management skills; marketing-commercial activities skills; leadership skills; self-discipline skills; marketing-monitoring activities skills; intuition and vision skills
(Cooney, 2012)	Entrepreneurship skill set	entrepreneurial skills; technical skills; management skills
(Stuetzer et al., 2013a, 2013b)	Entrepreneurial skills	adopted measures from: (Baum & Locke, 2004) (Chandler & Jansen, 1992)
(Chell, 2013)	Skills required in the entrepreneurial phases	cognitive skills; behavioral skills; technical skills; managerial skills
(Sar, 2017)	Management skills of entrepreneurs	personal skills; interpersonal skills; group skills
(Mamabolo, 2016)	Entrepreneurship skills framework	startup skills; core business skills; personal and leadership skills; technical skills
(Lyons et al., 2019)	RISE management domains (Including 30 individual Entrepreneurial skills)	business management skills; relationship management skills; organizational process; management; transformational management skills

interchangeably used in the literature. The measurement of "entrepreneurial skills" by Stuetzer et al., (2013a, 2013b) adopted measurement of "self-perceived competencies" by Chandler and Jansen (1992) and the "new resource skill" by Baum and Locke (2004) was focusing on measuring capacities. Therefore, among all the confusion between mixed concepts, it is a necessity to clarify their positions, relationships, and evolvement in the literature.

Bibliometric analysis of skills for entrepreneurship

Bibliometric analysis is a method that statistically analyze academic publications to provide quantitative insight into a selected domain of literature (Benckendorff & Zehrer, 2013; De Bellis, 2009). It can often reveal details on literature growth and knowledge development of a topic over years, by visualizing bibliometric data such as citations, authors, keywords, sources of publications, countries, and organizations. The VOSviewer is one popular software to conduct bibliometric analysis, which offers five types of analysis methods namely co-authorship analysis (unit of analysis: authors, organizations, countries), co-occurrence analysis (unit of analysis: all keywords, author keywords, and index keywords), citation analysis (unit of analysis: documents, sources, authors, organizations, countries), bibliographic coupling analysis (unit of analysis: documents, sources, authors, organizations, countries), and co-citation analysis (unit of analysis: cited references, cited sources, cited authors). Compared with other bibliometric analysis tools such as CiteSpace, when fed with the same data, VOSviewer can reveal consistent and similar analysis outputs but meanwhile it is advantageous on avoiding overlapping between key nodes and labels in the visualization outputs (Zhang et al., 2011). VOSviewer was also reported to be more frequently used than CiteSpace and HistCite (Pan et al., 2018).

Many researchers have attempted using the bibliometric analysis in different entrepreneurship-related topics. For instance, Granados et al. (2011) analyzed a total of 286 papers on the social enterprises and social entrepreneurship published in journals between 1991 and 2010 for bibliometric indicators and epistemological orientation. López-Fernández et al. (2016) applied bibliometric indicators to review the literature on entrepreneurship in family firms. Pato and Teixeira (2016) performed a bibliometric analysis into the main trends of rural entrepreneurship research. Rey-Martí et al. (2016) used the Web of Science database that focused on social entrepreneurship research to conduct a bibliometric analysis to reveal the language of publication, areas of knowledge, changes in the number of research, countries, journals, and authors. Servantie et al. (2016) applied bibliometric analysis (including co-citation analysis) to a total of 567 articles on international entrepreneurship published between 1989 and 2015. There is none found on skills for entrepreneurship.

The goal of this study, therefore, is to utilize the method of bibliometric analysis, coupled by descriptive statistics and content analysis, to analyze the research of skills for entrepreneurship by exploring its position related to the research of its semantically related terms such as competencies, capabilities, abilities, and capacities. The rest of this article is structured as follows. The methodology part will explain details in data collection and data analysis. The findings and discussion

section will introduce the results from descriptive statistics analysis, bibliometric analysis (co-occurrence analysis of key terms), and content analysis. The conclusion part will summarize the whole research, introduce limitation, and suggest future direction of research.

Methodology

Data collection

The search of literature was conducted in the academic bibliographic database Scopus. The Scopus has been used in various review articles on the entrepreneurship field and is considered the largest abstract and citation database of peer-reviewed literature (Dias et al., 2019). Six groups of search strings (Table 2) were used to search within article titles, and the results were restricted to include only journal article written in English that were published in or before 2021. The search initially resulted in 1,499 bibliometric records. After removing duplicates (192 records), irrelevant literature (45), and records without references (12), a total of 1,250 records remained for further analysis. All results were integrated into one.csv file and imported into VOSviewer for bibliometric analysis.

Data analysis

The data analysis followed three steps. First, the descriptive statistics were presented to show the overall distribution of articles by year, source, and citation. Second, the co-occurrence analysis of all keywords was executed. This analysis examined what keywords that repeatedly appear in the literature were appearing together. The analysis was repeated twice, once for all records (1,250), and another time only for the

Table 2 Search strings

String	Result
(TITLE ("entrepreneur* skill*") OR TITLE ("enterprise skill*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	161
(TITLE ("entrepreneur*") AND TITLE ("skill*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	347
(TITLE ("entrepreneur*") AND TITLE ("abilit*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	92
(TITLE ("entrepreneur*") AND TITLE ("capacit*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	139
(TITLE ("entrepreneur*") AND TITLE ("competenc*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	432
(TITLE ("entrepreneur*") AND TITLE ("capabilit*")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j"))	328
Total	1499

508 records on skills for entrepreneurship. For the first run, the minimum number of occurrences of keyword was set to 5. Out of 3,593 keywords a total of 209 met the threshold. In the listed keywords, broad terms such as entrepreneurship, human, and article were all excluded. For the second run, the procedure was the same but adjusted the minimum number of occurrences from 5 to 2. A total of 210 out of 1,207 met the threshold. Third, the content analysis was applied to 508 records on skills for entrepreneurship to describe and summarize its relationship with its most related research themes.

Findings and discussion

Descriptive statistics

The research development toward understanding the five related concepts—competencies, capabilities, skills, abilities, and capacities—which are highly related to entrepreneurial activities, started in 1970s but only received increasing attention among scholars starting in 2010s (Fig. 1).

If breaking down by concept, the entrepreneurial competencies as a topic can be traced back to 1973, earliest study in the sample, and it has evolved to become the most studied concept among all 5 concepts in the list. The second most studied concept is entrepreneurial capabilities, with the first relevant article published in 1986 and the highest number of articles (56) found in 2020. The development of studies

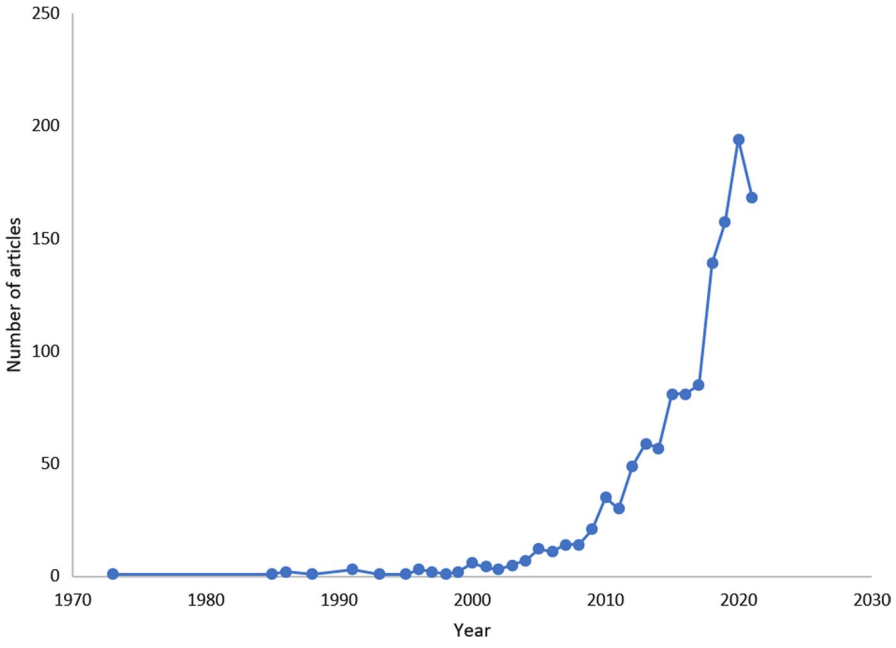

Fig. 1 Number of articles over years

on skills for entrepreneurship can be found in two lines (orange and gray). They both haven't received significant growth in the past three decades. Only in the past five years, the research on skills and entrepreneurial activities started having a stable publication number of at least 15 per year, which is far less compared to studies in concepts such as competencies and capabilities. The concept of capacity is in a similar slow development status, while the concept of abilities is not much studied in the literature over years (Fig. 2).

A total of 536 journals were publishing on these 5 concepts, while the most publishing journals with at least 10 relevant articles found, are organized in Table 3. The top five journals under consideration were *Small Business Economics*, *Journal of Business Research*, *International Entrepreneurship and Management Journal*, *Journal of Small Business Management*, and *International Journal of Entrepreneurial Behaviour and Research*.

If only considering the concept of skills for entrepreneurship, among 216 journals the most publishing journals with at least 4 relevant articles are shown in Table 4. The top five journals under consideration were *Small Business Economics*, *International Entrepreneurship and Management Journal*, *Entrepreneurship*

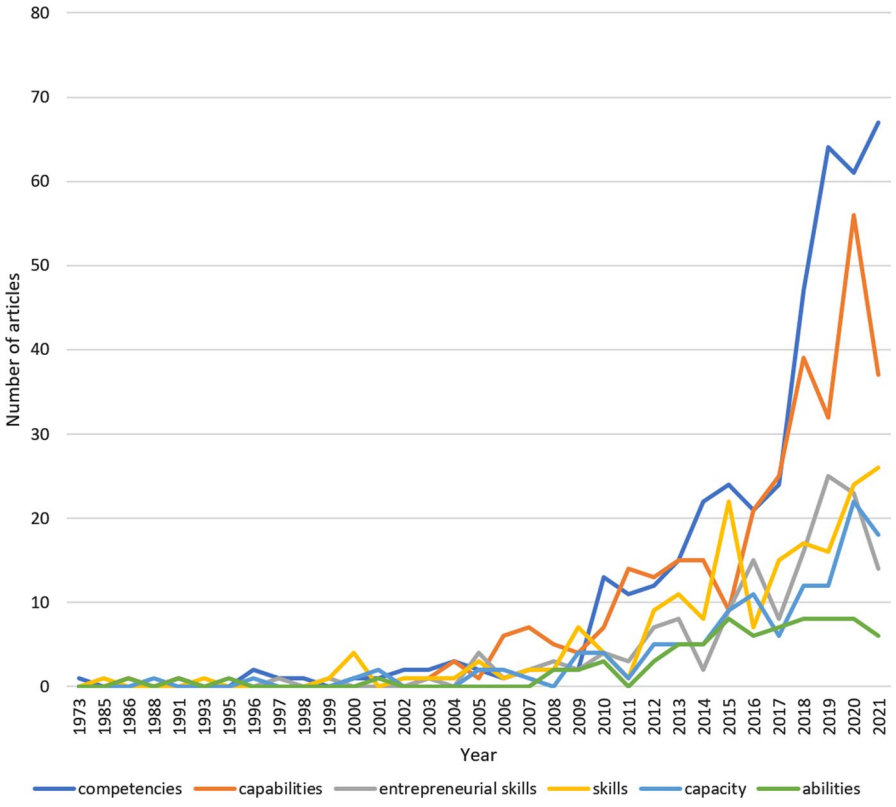

Fig. 2 Number of articles by concept over years

Table 3 Most publishing journals on the five related concepts–competencies, capabilities, skills, abilities, and capacities

Journal name	TP	TC	CPP	CiteScore[a]	SNIP[a]	SJR[b]	SJR-Q[b]
Journal Of Entrepreneurship Education	36	483	13	2.70	1.08	0.00	-
Sustainability	26	91	4	3.90	1.24	0.61	Q1
International Journal Of Entrepreneurship And Small Business	23	405	18	1.70	0.75	0.45	Q2
International Entrepreneurship And Management Journal	21	209	10	7.50	2.31	1.34	Q1
Academy Of Entrepreneurship Journal	20	337	17	1.10	0.38	0.21	Q3
International Journal Of Entrepreneurial Behaviour And Research	20	1160	58	6.20	1.82	1.24	Q1
Education And Training	19	587	31	3.80	1.37	0.74	Q1
Journal Of Business Research	18	439	24	9.20	2.85	2.05	Q1
Small Business Economics	18	623	35	8.80	2.70	2.20	Q1
Frontiers In Psychology	17	60	4	3.50	1.46	0.95	Q2
Industry And Higher Education	15	204	14	2.00	0.92	0.44	Q2
International Journal Of Entrepreneurship	15	69	5	1.30	0.57	0.20	Q3
Journal Of Small Business Management	15	330	22	6.40	1.94	1.68	Q1
Journal Of Small Business And Enterprise Development	11	140	13	4.50	1.36	0.73	Q1
Journal Of Asian Finance, Economics And Business	10	20	2	2.60	1.03	0.37	Q2
Journal Of Small Business And Entrepreneurship	10	152	15	2.70	1.23	0.42	Q2

TP = total publications; TC = total citations; CPP = citation per publication; SNIP = source normalized impact per paper; SJR = Scimago journal ranking score; SJR-Q = Scimago journal quartile

[a]Figures for 2020 provided by SCOPUS

[b]Figures for 2020 provided by ScimagoJR

Table 4 Most publishing journals on the concept of skills for entrepreneurship

Journal name	TP	TC	CPP	CiteScore[a]	SNIP[a]	SJR[b]	SJR-Q[b]
Journal Of Entrepreneurship Education	18	246	14	2.70	1.08	0.00	-
Small Business Economics	12	238	20	8.80	2.70	2.20	Q1
Education And Training	8	155	19	3.80	1.37	0.74	Q1
International Journal Of Entrepreneurship And Small Business	7	51	7	1.70	0.75	0.45	Q2
Academy Of Entrepreneurship Journal	7	66	9	1.10	0.38	0.21	Q3
Journal Of Home Economics Research*	6	1	0	0.00	0.00	0.10	Q4
Mediterranean Journal Of Social Sciences*	6	15	3	–	0.68	0.00	-
International Entrepreneurship And Management Journal	6	311	52	7.50	2.31	1.34	Q1
International Journal Of Entrepreneurial Behaviour And Research	5	180	36	6.20	1.82	1.24	Q1
Industry And Higher Education	4	12	3	2.00	0.92	0.44	Q2
Sustainability	4	25	6	3.90	1.24	0.61	Q1
International Journal Of Entrepreneurship	4	13	3	1.30	0.57	0.20	Q3
Library Philosophy And Practice*	4	9	2	0.40	0.63	0.23	Q2
Entrepreneurship And Regional Development*	4	79	20	5.80	1.94	1.67	Q1

TP = total publications; TC = total citations; CPP = citation per publication; SNIP = source normalized impact per paper; SJR = Scimago journal ranking score; SJR-Q = Scimago journal quartile

[a]Figures for 2020 provided by SCOPUS

[b]Figures for 2020 provided by ScimagoJR

*Journals not listed in Table 2

and Regional Development, *International Journal of Entrepreneurial Behaviour and Research*, and *Education and Training*.

While comparing the above two tables, it was found that *Journal of Entrepreneurship Education* was the most popular journal to publish such topics. For researchers who studied skills for entrepreneurship, they were mostly disseminating works to the same journals that also published research on entrepreneurial competencies, capabilities, capacities, and abilities.

The most highly cited authors and documents on skills for entrepreneurship are listed in Table 5. Influential entrepreneurship-related authors on this topic include but are not limited to Hessel Oosterbeek from University of Amsterdam in Netherlands, Francisco Liñán from Universidad de Sevilla in Spain, Robert A. Baron from Oklahoma State University in the USA, Wendy Smith from University of Delaware in the USA, Markus Perkmann from Imperial College London in the UK, Elizabeth Chell from Kingston University in the UK, and Pablo D'Este from INGENIO in Spain. Overall, it seems that European scholars are leading the scientific debates in skills for entrepreneurship.

Table 5 Top cited authors and documents in the research of skills for entrepreneurship

Authors	Citation	Title	Journal
(Oosterbeek et al., 2010)	597	The impact of entrepreneurship education on entrepreneurship skills and motivation	European Economic Review
(Baron & Markman, 2000)	372	Beyond social capital: How social skills can enhance entrepreneur' success	Academy of Management Executive
(Liñán, 2008)	249	Skill and value perceptions: How do they affect entrepreneurial intentions?	International Entrepreneurship and Management Journal
(Baron & Tang, 2009)	180	Entrepreneurs' social skills and new venture performance: Mediating mechanisms and cultural generality	Journal of Management
(Smith et al., 2012)	129	A paradoxical leadership model for social entrepreneurs: Challenges, leadership skills, and pedagogical tools for managing social and commercial demands	Academy of Management Learning and Education
(Morgan et al., 2010)	115	Agricultural multifunctionality and farmers' entrepreneurial skills: A study of Tuscan and Welsh farmers	Journal of Rural Studies
(Clark, 2008)	111	The impact of entrepreneurs' oral pitch presentation skills on business angels' initial screening investment decisions	Venture Capital
(Perkmann & Spicer, 2007)	101	"Healing the scars of history": Projects, skills, and field strategies in institutional entrepreneurship	Organization Studies
(Michelacci, 2003)	94	Low returns in R&D due to the lack of entrepreneurial skills	Economic Journal
(Giunipero et al., 2005)	87	Purchasing/supply chain management flexibility: Moving to an entrepreneurial skill set	Industrial Marketing Management
(Pyysiäinen et al., 2006)	86	Developing the entrepreneurial skills of farmers: Some myths explored	International Journal of Entrepreneurial Behaviour and Research
(Sambasivan et al., 2009)	84	Impact of personal qualities and management skills of entrepreneurs on venture performance in Malaysia: Opportunity recognition skills as a mediating factor	Technovation
(Chell, 2013)	82	Review of skill and the entrepreneurial process	International Journal of Entrepreneurial Behaviour & Research
(D'Este et al., 2012)	78	Inventors and entrepreneurs in academia: What types of skills and experience matter?	Technovation
(Teal & Carroll, 1999)	75	Moral reasoning skills: Are entrepreneurs different?	Journal of Business Ethics

Table 5 (continued)

Authors	Citation	Title	Journal
(Boyles, 2012)	74	twenty-first century knowledge, skills, and abilities and entrepreneurial competencies: A model for undergraduate entrepreneurship education	Journal of Entrepreneurship Education
(Seuneke et al., 2013)	72	Moving beyond entrepreneurial skills: Key factors driving entrepreneurial learning in multifunctional agriculture	Journal of Rural Studies
(Galloway et al., 2005)	67	Enterprise skills for the economy	Education and Training
(Silva, 2007)	64	The Jack-of-All-Trades entrepreneur: Innate talent or acquired skill?	Economics Letters
(Logan, 2009)	62	Dyslexic entrepreneurs: The incidence; their coping strategies and their business skills	Dyslexia

Co-occurrence analysis

On the keyword co-occurrence network of all five concepts, the studies of skills for entrepreneurship were closely positioned to the studies on entrepreneurship education and entrepreneurial intention (Fig. 3). Its connections toward the concepts of entrepreneurial capabilities, capacities, and abilities were, however, not apparent.

The keyword co-occurrence analysis for the 508 studies on skills for entrepreneurship showed that this topic was closely studied near the topic of entrepreneurship education especially in the context of higher education with a strong interest toward students. Meanwhile, it was closely positioned around entrepreneurial intention, which is linked to key terms such as creativity, political skills, social skills, and communication skills.

The competencies are an umbrella term for skills. However, in Fig. 3, the distances between entrepreneurial competencies as a cluster and other two clusters that are related to skills (entrepreneurial skills or skills) were not the closest. Their

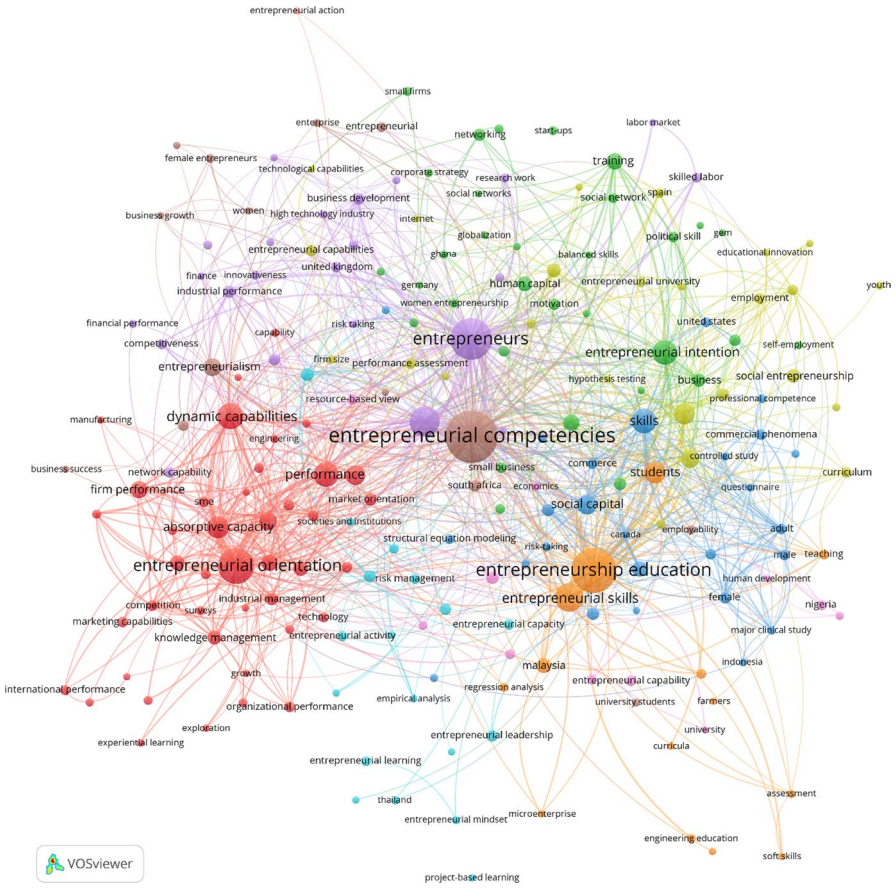

Fig. 3 Co-occurrence analysis of all keywords on all selected concepts

co-occurrences were even more distant in Fig. 4, and the intensity of entrepreneurial competencies as a term got significantly reduced as well, when the sample only involved studies on skills for entrepreneurship.

Content analysis

Due to the close relationship between skills for entrepreneurship and entrepreneurial intention and entrepreneurship education, the content analysis focused on literature that heavily studied these two groups of linkages.

From skills to intention: three theories

With the entrepreneurial intention as a re-occurring topic in the literature, three theories were constantly mentioned and applied by different studies: the balanced skills theory by Lazear (2005), the theory of planned behavior (TPB) (Ajzen, 1991), and the entrepreneurial event model (EEM) by Shapero and Sokol (1982). The paths from different skills to entrepreneurial intention and to venture performance are demonstrated in Fig. 5 as an exemplary network.

The balanced skills theory by Lazear (2005) was found to be one critical theoretical foundation to predict new venture creation and performance. It argues that being generalist rather than specialist makes a person more possible to becoming entrepreneur. Two premises are that people can utilize education and at-job training to broaden their skill set and the planned human capital investment will pay off. The income is positively affected by skills, with entrepreneurs having higher income compared to employees. Scholars are gradually gaining consensus

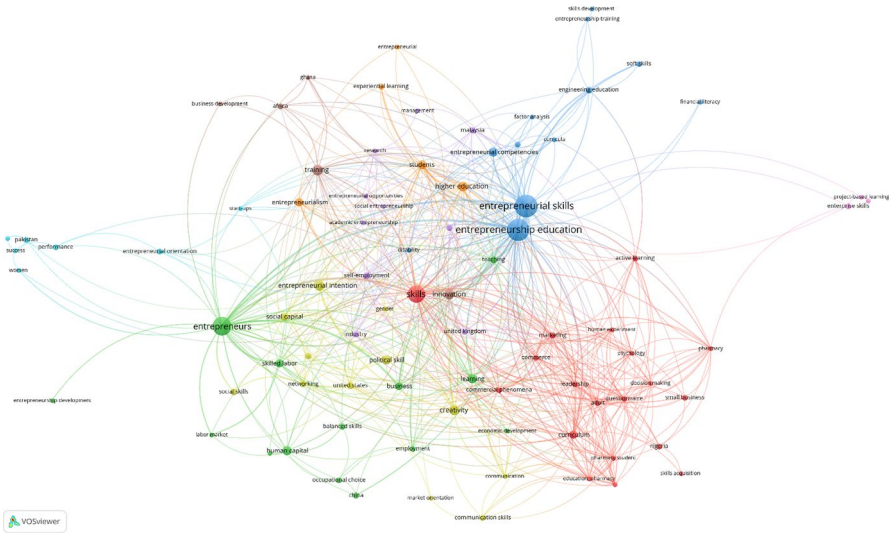

Fig. 4 Co-occurrence analysis of all keywords on the topic of skills and entrepreneurship

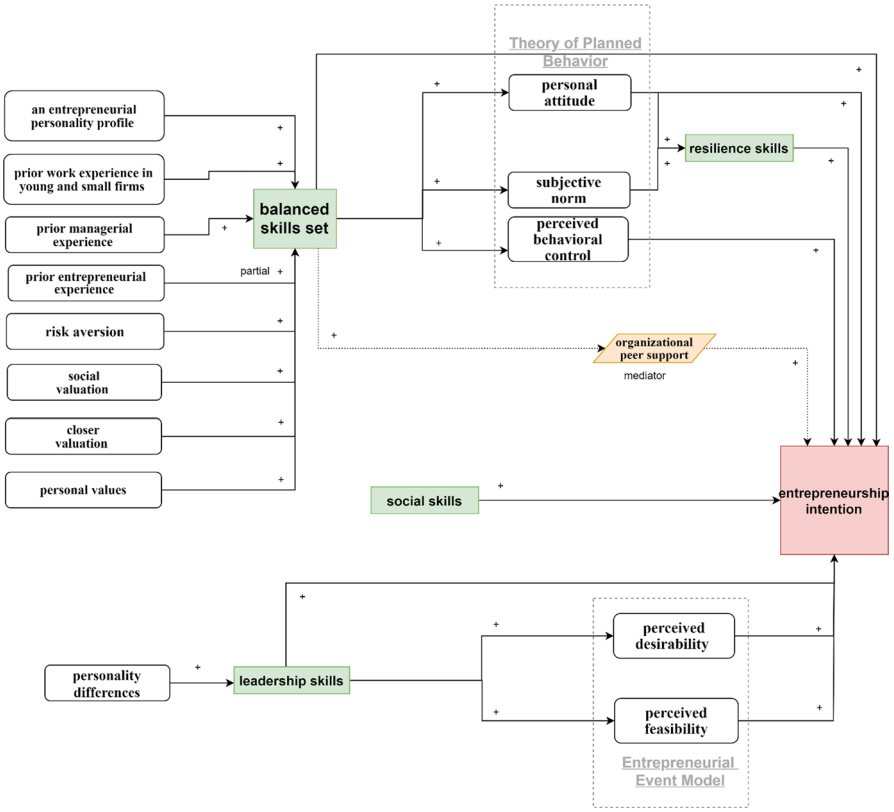

Fig. 5 Relationship between skills for entrepreneurship and entrepreneurial intention

toward the validity of balanced skills theory (Bublitz & Noseleit, 2014; Stuetzer et al., 2013a, 2013b) regarding a balanced skill set as important determinant of market entry and performance among entrepreneurs (Stuetzer et al., 2012). A balanced skills set was proved to be influenced by personality profile (Obschonka et al., 2017), previous experience (Stuetzer et al., 2013a, 2013b), risk aversion (Hsieh et al., 2017), and social and closer valuation (Liñán et al., 2013) and can be compensated by the market thickness such as locating in big cities (Bublitz et al., 2015).

The two most popular intention models are the TPB and the EEM. They emphasize different constructs. TPB argues that "intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control; and these intentions, together with perceptions of behavioral control, account for considerable variance in actual behavior" (Ajzen, 1991). Over years scholarly evidence repeatedly confirmed the validity of using the reconceptualization of TPB as an approach for understanding entrepreneurial intentions (Henley et al., 2017; Urban, 2012; Watchravesringkan et al., 2013). And skills for entrepreneurship

could influence the three key constructs of the theory of planned behavior, namely personal attitude, subjective norm, and perceived behavioral control (Liñán et al., 2013).

EEM highlights the roles of perceived desirability and desired feasibility as two significant antecedents of entrepreneurial intention (Krueger, 1993). These two constructs were found to be influenced by a person's perceived leadership skills (Henley et al., 2017). Leadership skills here acted as a measure of bridging cognitive social capital and were measured using student perceptions of leadership instrument by Zula et al. (2010), which include interpersonal/intrapersonal skills, task-specific skills, cognitive skills, and communication skills (Henley et al., 2017).

Training skills via education: teachability, approaches, and population

The acquisition of a new entrepreneurship behavior or skill is in essence a learning experience, which is agreeable to many behavior theorists and researchers (Gibb, 1997; McClelland, 1961; Minniti & Bygrave, 2001; Politis, 2005; Smilor, 1997). Considering that any learning with a purpose can fall into one of three categories—knowledge, skills, and attitudes (Galloway et al., 2005; Kraiger et al., 1993), the importance of researching the acquisition of skills for entrepreneurship as a learning experience is inevitable. Reasoning from this perspective it is hardly surprising to discover that a significant volume of research in skills for entrepreneurship is closely connected to the scientific inquiries into entrepreneurship education and trainings (Hills, 1988; Oosterbeek et al., 2010).

Entrepreneurship education can be viewed broadly in terms of skills that can be taught and characteristics that can be engendered in individuals that will enable them to develop new and innovative plans (Jones & English, 2004). The approaches to teach entrepreneurship education also constantly interest scholars. A conceptual paper by Haase and Lautenschläger (2011) offered a review of scientific discussions on the teachability of entrepreneurship and constructed an integrative conceptual model of entrepreneurship education. The model integrates two modes of entrepreneurship education: *education about entrepreneurship* focusing on theory building and *education for entrepreneurship* focusing on molding entrepreneurial individuals or training real entrepreneurs. The latter mode has different objectives including conviction (*know-why*), hard facts (*know-what*), and soft skills (*know-how*) and can be delivered in various methodologies. Some components of entrepreneurship are comparatively easier to teach (*know-what*) while some others are more difficult (*know-how and how-why*). It stated that empirical research on the pedagogical effectiveness of entrepreneurship education was mostly directed toward measuring *know-why* and very rare to measure *know-how*.

Pedagogical methods of teaching entrepreneurship can be divided into two categories: (a) observational approaches, such as lecture, workshop, guest speaker, field trips to companies, and role model interaction; (b) experiential approaches, such as mentoring, simulations, business plan writing, business competition, and business creation (Fumero et al., 2015; Gartner & Vesper, 1994; Hills, 1988; Kuratko, 2005; Solomon et al., 2002). In general, the experiential approaches were more effective in

changing skills for entrepreneurship among learners. For instance, Chang and Rieple (2013) reported that their students' self-evaluated entrepreneurial skills were significantly changed by following the experiential learning approach, which put them alongside real-life entrepreneurs and financiers in live projects.

The emphasis of entrepreneurship education is on skills and competency development rather knowledge acquisition (Hynes & Richardson, 2007). It therefore should not be confined to only business schools and business students but needs to equip all students for a changing workplace (Hynes & Richardson, 2007). However, fewer studies focused on whether entrepreneurship education can equip individuals with the essential skills for the entry of self-employment (Haase & Lautenschläger, 2011; Premand et al., 2016). This study supported previous studies' observations because it also found that the dominant research context for studying entrepreneurship education and skills for entrepreneurship was in higher education with students being the major research pupulation. Meanwhile, very limited effort was paid to evaluate university-level entrepreneurship education programs' effectiveness by tracking graduates' activities and performance.

Comparatively fewer articles investigated the development of skills for entrepreneurship in childhood and adolescents (Cheung & Au, 2010; Huber et al., 2014; Moberg, 2014; Obschonka et al., 2017). Mixed results were found among academicians concerning the impact of early entrepreneurial competencies. Obschonka et al. (2012) reported the positive predicting power of early social competencies toward taking on entrepreneurship occupation and income level using the data collected from longitudinal research that included 16,000 individuals in the British context. They surveyed and interviewed 243 potential founders, 47 nascent founders, and 178 founders in Germany and concluded that early social competencies positively predicted entrepreneurial intension during adulthood. Another study used the data collected from 90 entrepreneurs in Germany and found that early entrepreneurial early entrepreneurial competence was not a robust predictor of a balanced skill set (Stuetzer et al., 2013a, 2013b). Considering that entrepreneurship education is today taught already in primary and lower secondary school to many pupils (Moberg, 2014), the research of this population is rather left behind.

Overall, the widely accepted assumptions were that skills for entrepreneurship can be taught, and entrepreneurship education programs have a positive effect on developing these skills. However, contradicting results in the literature were also found. For instance, the most cited study was by Oosterbeek et al. (2010) and it used an instrumental-variables approach in a different-in-differences framework to investigate the impact of an entrepreneurship education program—Junior Achievement Young Enterprise student mini-company (SMC) program—on college students' entrepreneurial skills and motivation in the Netherlands. The SMC program's effect on students' self-assessed entrepreneurial skills turned out to be insignificant. On the contrary Vij and Ball (2010) surveyed 75 final-year undergraduate students before and after an entrepreneurship and small business enterprise module to measure the impact of the module on their entrepreneurial skills, thinking, and intention. The survey instrument was based on 22 items from Entrepreneurial Skills Test and 3 items from Business and Management Skills Test. Results were positive among students, and they frequently mentioned four skills enhanced by the module: self-confidence,

determination, hard work and perseverance. "Conflicting results may be explained by unidentified mechanisms or depiction of unidentified mechanisms that have not been discovered because they may cancel each other out in empirical results" (Post et al., 2020, p. 357). Dedicated research is needed to carefully examine the methodology of relevant studies and rigorously evaluate the strength of the evidence to decide which direction of evidence is more convincing.

Conclusions

Skills for entrepreneurship have been under investigation by nearly four decades among scholars. However, the concept per se is far from being clearly defined and has never been examined connecting to its semantically related terms such as competencies, capabilities, capacities, and abilities. This study contributes to the literature by attempting for the first time using bibliometric analysis method to position the concept of skills for entrepreneurship among its semantically similar/related terms in a bigger context of inquiries. Results showed that compared to more studied concepts such as competencies and capabilities, skills for entrepreneurship as a research topic was less studied. The skills for entrepreneurship were found to be frequently studied in relation to the research of entrepreneurship education and entrepreneurial intention. The content analysis revealed further details of two groups of linkages: skills and intention, and skills and education. Three theories were constantly supporting the analysis of skills' contribution to entrepreneurial intention. Entrepreneurship education helps to train skills for entrepreneurship, but the research population has been mainly from the education system especially at the higher education level and few studies offered longitudinal data to evaluate such educational intervention's long-term effectiveness.

This study is not without limitation. The search strategy was only to include studies with preset keywords in the publication's titles. This criterion had excluded those studies without such keywords explicitly written in their articles' titles. While there were many empirical studies in the sample introducing different relationship between skills and their determinant, mediator, moderator, and outcome variables, it is beyond this study's purpose to illustrate all of them. Therefore, Fig. 5 is an example that only outlines part of the evidence.

Future researchers can attempt to expand the search to include preset keywords into titles, abstracts, keywords when searching in academic databases. The keywords per se can still be extended to cover other similar terms such as "technique*". More bibliometric analysis methods such as co-authorship analysis, citation analysis, bibliographic coupling analysis, and co-citation analysis can be further applied to this domain of literature to reveal more insights. For instance, regarding the two visualization maps follow-up research can be conducted to in detail analyze thematic clusters and their relationships. Moreover, it is recommended to investigate the less studied areas, as identified and discussed in the findings and discussion part of this article.

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Declarations

Conflict of interest This research claims no conflict of interest.

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