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*Research Article*

# The Past, Present and Future of Research on Chinese Entrepreneurship Education: A Bibliometric Analysis Based on CSSCI Journal Articles\*

Ye Zheng<sup>1</sup>

*Northwestern Polytechnical University*

## Abstract

The study is carried out based on 1134 journal articles on entrepreneurship education research included in CSSCI database from 1999 to 2017 as samples by employing the bibliometric and visual analysis methods, longitudinally the past, present and future of the entrepreneurship education in China, stating the concerns, focuses of the research and author collaboration at different stages of development in the academic circles, and pointing out the direction of the future study. Results show that the study on Chinese entrepreneurial education in the past 20 years has gradually come from the initial “exploratory stage” to the “comprehensive advance stage”, when with the number of papers published is in a significant growth and the funded papers are also increasing significantly. Focuses of the entrepreneurship education research have gradually been centralized with the research perspective transformed from the preliminary theoretical research into the in-depth discussion on the real hot spot issues. The trend of partnerships between authors is also shifting from “divergence” to “convergence”. For the future, It is advised to promote and improve the study on Chinese entrepreneurship education from two angles including “active change” and “external intervention”.

## Keywords

Entrepreneurship Education • Higher Education • Entrepreneurship Education System • Bibliometric Analysis

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<sup>1</sup>Correspondence to: Ye Zheng (PhD), School of Humanities, Economics, and Law, Northwestern Polytechnical University, Xi'an 710072, China; Education Center of MPA, Northwestern Polytechnical University, Xi'an City 710072, China. Email: lbxjbzy@nwpu.edu.cn

Early in the 1940s, MylesMace from Harvard Business School offered a course of Management of New Enterprise to MBA students, which later was recognized by a great number of entrepreneurship research scholars as the start of entrepreneurship education in colleges and universities in the west. After 60 years of development, colleges and universities in the developed countries like the United States and the UK have become the main body of entrepreneurship education and have established a systemic education system integrating courses of enterprise education, entrepreneurship degree awarding, entrepreneurship academic journals and permanent entrepreneurship research centers, etc. Compared with foreign practice of entrepreneurship education, entrepreneurship education in China started relatively late and it was not until April 2002 the Ministry of Education started the entrepreneurship education pilot work by providing pilot courses of entrepreneurship education in nine colleges and universities including Tsinghua University, Beijing University of Aeronautics and Astronautics, Heilongjiang University, Shanghai Jiaotong University, Wuhan University, Xi'an Jiaotong University and Northwestern Polytechnical University. After ten years of exploration and development, entrepreneurship ranking of China has risen from the 11th place in 2002 to the second place in 2012 among more than 60 countries/regions participating in global entrepreneurship observation. The data has fully reflected the influence and rapid development of entrepreneurship education in China.

The term entrepreneurship education can also be directly put into "entrepreneurial spirit", which is more appropriate. It is referred to as "the third passport" of education by UNESCO and endowed with the position equally important to academic education and vocational education. To understand the concept of entrepreneurship education, essentially, "entrepreneurship education is not equal to education on constructing enterprises". The British have a unique understanding of this as they believe that entrepreneurship refers to the process of assuming responsibilities, actively seeking and grasping the opportunity, effectively integrating and utilizing resources, making wise decisions, creatively solving problems, making innovations and creating value in a chaotic, ever-changing and uncertain environment. "entrepreneurial education" is "an education form aiming at cultivating entrepreneurial sense, entrepreneurial mindsets, entrepreneurial skills and other comprehensive entrepreneurial qualities, so that the educated have certain entrepreneurial competence." Ministry of Education of the People's Republic of China published *Some Suggestions of the Ministry of Education on Improving the Overall Quality of Higher Education* in April 2012, clearly proposing to "make the innovation and entrepreneurship education run through the whole process of talent training", "make basic teaching requirements for the innovation and entrepreneurship education in universities and colleges, and develop the innovation and entrepreneurship courses", "vigorously carry out teacher training for innovation and entrepreneurship", "support students in innovation and entrepreneurship training" and other specific requirements with strengthening innovation entrepreneurship education as one of the important directions of the reform of higher education in China in the future, and putting forward to improve the quality of creative talents training with great importance attached to the innovation and entrepreneurship education in the higher education reform and development.

From the theoretical perspective, early in the 21st century, the Chinese mainland scholars paid sufficient attention to the study on entrepreneurship education, which has laid an important theoretical basis for further research on entrepreneurship education at present. According to the current domestic research results, most of the scholars have explored the entrepreneurship education related theories from the perspectives of arising

background, connotation, patterns and development trend of entrepreneurship education. Specifically, Zhang (2005) pointed out that the rise of entrepreneurship education in the United States and other western developed countries was mainly because entrepreneurship has a positive role in promoting national economic development and employment, and formal entrepreneurship education can stimulate students' entrepreneurial potential and cultivate the students' entrepreneurial skills. Li (2016) recalled the connotation of innovation and entrepreneurship education, which has experienced a development history from substitution theory (connotation illumination at the "latent concept" stage), holism (connotation illumination at the "preconception" stage), perspectivism (connotation illumination at the "concept establishment" stage), integration theory (connotation illumination at the "posterior concept" stage). Ma & Bai, (2015); Huang, Qu, Shi, & Zeng, (2014); Ni (2015); Hu & Shen (2013) and other scholars deeply explored the specific path to solve the problem of innovation and entrepreneurship education at present, from three typical angles including "university - government - enterprise" ecological network mode, position entrepreneurship oriented entrepreneurship education system of Wenzhou University and social entrepreneurship education in colleges and universities, as well as the perspective of the innovation and entrepreneurship education model cases of Babson College and Stanford University. Based on the current research status quo of China's entrepreneurship education, some scholars have carefully organized the developmental tendency of entrepreneurship education, for example, Huang & Huang (2016) pointed out that colleges and universities in China should develop social entrepreneurship education from three aspects including opening maker spaces to promote social maker education, innovating the teaching mode to strengthen the construction of courses and the teachers, and perfecting the governance structure to establish a good ecological system.

In summary, although a large number of Chinese scholars have conducted a study on the relevant issues of entrepreneurship education from different angles at present, the research perspectives are dispersed with a lack of systematical organization of entrepreneurship education related research literature, so it is difficult to comprehend correctly the overall context and the development frontier of the entrepreneurial education research. Specifically, what are the characteristics of the entrepreneurship education research at different stages? What are the research focuses, subjects and partnerships between authors at different stages of development? What are the future research trends and the areas needing a breakthrough? All these problems need to be solved as soon as possible, in order to better provide a scientific reference for entrepreneurship research theory and practice. In view of this, this study is carried out based on 1134 journal articles on entrepreneurship education research included in CSSCI database from 1999 to 2017 as samples by employing the bibliometric and visual analysis methods, longitudinally the past, present and future of the entrepreneurship education in China, stating the concerns, focuses of the research and author collaboration at different stages of development in the academic circles, thus having a complete grasp of the overall context and the future development trend of the entrepreneurship education research.

## **Data sources and Research Methods**

### **Data sources**

The data of the present study mainly comes from journal articles included in the Chinese Social Sciences Citation Index (CSSCI), retrieved with "entrepreneurship education" as the title, years of the literature retrieval:

1999-2017, retrieval condition "accurate", in the end, 1134 related articles were retrieved in April 2017. Specific retrieval results are shown in Figure 1. Journal articles included in CSSCI are used for this study mainly because CSSCI is accredited by the Chinese mainland academic circles as the most influential database with the highest quality papers in humanities and social science. By identifying the retrieved 1134 articles, 3263 key words and 16729 references were obtained in the end. This study intends to systematically analyze 1134 core journal articles extracted from CSSCI database.

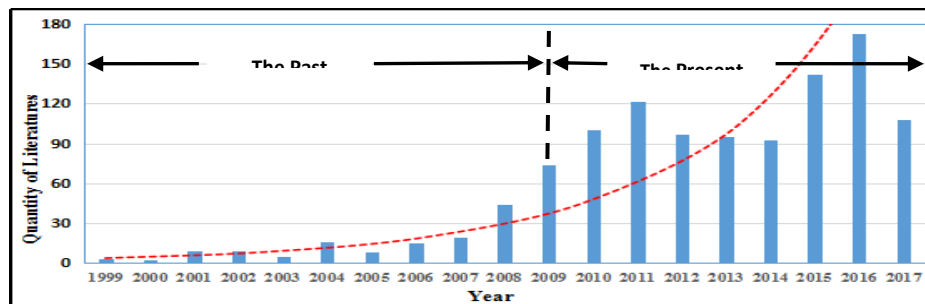


Figure 1. Overall change trend of quantity of the articles on the study of Chinese entrepreneurship education (1999-2017)

It can also be seen from Figure 1 that there is a growing trend of attention paid to the entrepreneurship education research by scholars in China in the 21st century, especially since the Ministry of Education of China issued the first global document on promoting the entrepreneurship education development -- Opinions on Energetically Promoting Innovation and Entrepreneurship Education in Colleges and Universities and Undergraduates' Self-Innovation, there has been an "explosive" growth in the study around entrepreneurship education in the academic circles with the number of articles published in 2010 about 5 times the total published in the past ten years before 2009, so it can be said entrepreneurship education in China gradually moves into a "incandescence" stage after 2010, which is an in-depth promotion and full implementation stage, different from the exploration and experiment stage of the entrepreneurship education research before 2009. Based on the characteristics of entrepreneurship education at different development stages in China, the years from 2000 to 2009 are defined as "past" in this study, and the years from 2010 to 2017 are defined as "present" of the entrepreneurship education research, which will be further discussed by stage in the following part.

### Basic characteristics of the acquired documents

Based on in-depth analysis of the acquired 1134 core periodical articles, we can find subject distribution, fund assistance, distribution of high-yield authors and organizations related to these articles, so as to learn about characteristics and manpower distribution of the current Chinese entrepreneurship education research more comprehensively. Specific results are as shown in Figure 2, Figure 3 and Table 1.

It can be seen from Figure 2 and Figure 3 that, on the one hand, China's National Social Sciences Fund, National Education Planning Fund, Jiangsu Department of Education Humanities And Social Sciences Research Base Project, Natural Science Foundation of China and other scientific funding agencies provided funding support for this study; on the other hand, the major disciplines of entrepreneurship education are mainly distributed in pedagogy of higher education, vocational pedagogy, enterprise economics, education theory and science of educational management, macroeconomic management and sustainable development and other fields, thus it can be seen that the entrepreneurship education research disciplines are featured by that the subjects of pedagogy hold a dominant position and contain contents of economics, management and other disciplines. Further, the results of figure 2 also reflect the support and scope of funding by national and provincial science funds at present for the entrepreneurship education research is far from enough, as the funded research papers account for only about 19% of the total. It is also worthy of improvement in the future.

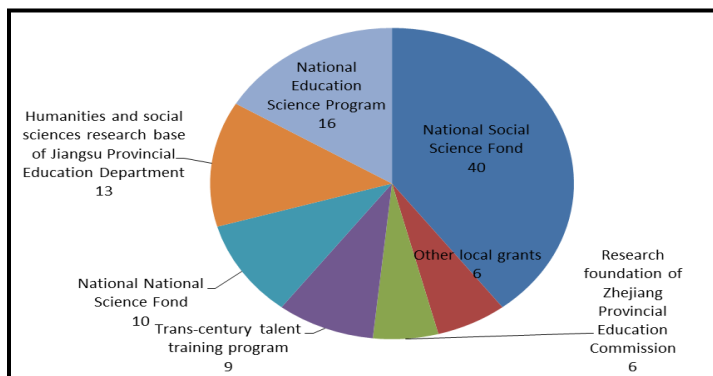


Figure 2. Fund assistance for the study on Chinese entrepreneurship education

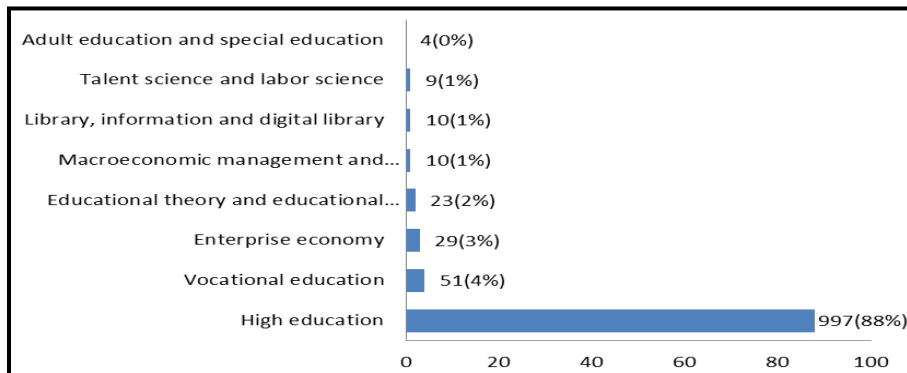


Figure 3. Subject distributions in the study on Chinese entrepreneurship education

Table 1  
*Distribution of Scholars and Universities having Published the Largest Number of Articles on Entrepreneurship Education Research in China (Top 10)*

Ranking	High-yield author	Number of articles	Ranking	High-yield university	Number of articles
1	Huang, ZX (2013)	22	1	Zhejiang University	69
2	Wang, ZR	21	2	Northeast Normal University	55
3	Xu, XZ	16	3	Wenzhou University	53
4	Shi, YC	11	4	Nantong University	17
5	Mei, WH (2009)	10	5	Jilin University	14
6	Yan, MX (2009)	9	6	Wenzhou Medical University	14
7	Zeng, EL	9	7	Beijing Normal University	13
8	Wang, ZQ	8	8	Tsinghua University	13
9	Zhang, ZQ	5	9	Jiangsu University	12
10	Ni, H	5	10	Southeast University	12

Table 1 shows the authors and universities having published the largest number of CSSCI journal articles. Due to space limitations, only top 10 high-yield authors and organizations are listed here. According to Table 1, Huang Z.X., Wang Z.R., Xu X.Z., Shi Y.C., Mei W.H. and other scholars published a large number of articles on entrepreneurship education research with a certain influence in this field; there is no big difference in quantity of published articles between Yan M.X. and Zeng E.L., but they are scholars currently publishing a large number of articles in the entrepreneurship education research field. In addition, from the ranking of post of the universities publishing the largest number of articles on entrepreneurship education research in China, Jilin University, Beijing Normal University, Zhejiang University, Tsinghua University, Southeast University and other domestic famous universities have published more research results in this field. And Northeast Normal University, Wenzhou University, Nantong University, Jiangsu University and other colleges and universities in the east China have focused on entrepreneurship education research for a long time and also have published a lot of research results.

### Research methods

This study is carried out based on the mainstream method for document research at present: bibliometric analysis. This method takes the literature system and the literature metrology characteristics as the study object, based on mathematics and statistical methods and other qualitative research methods, to study the literature information distribution structures, quantitative relations, change rules and so on, and then discuss knowledge structure, characteristics and rules of a certain discipline (Zheng, 2014). This paper employs the general bibliometric analysis method for analysis of high cited documents as well as the number of articles, fund/discipline distribution, research power distribution and other contents mentioned above. On the other hand, this paper also hires keyword co-word analysis and author co-citation analysis to identify hot spots and cooperation characteristics of the entrepreneurship education research topics.

Specifically, as the most important analytical method in the field of bibliometrics and scientific metrology, co-word analysis is realized mainly by building appearance frequency of two key words in the same article for

clustering and integration, and then analyzing closeness between these keywords presented conjointly to explore the hot topics, evolution routes and developing trends of the research field reflected by the key words (Chen, 2010). The author co-citation analysis (ACA) is another method for co-citation analysis, mainly derived from literature co-citation relationship. It is based on that the author is taken as a measuring unit for co-citation analysis to study articles published by N authors and cited by other authors, from which we can find out high-yield scholars and their cooperative relations in a certain research field (Qiu & Qin, 2010). On the basis of knowing well the main research methods, this study mainly employs two common visual knowledge atlas analysis tools - Citespace and Ucinet, used for visual description of co-word analysis of keywords and co-citation of authors, to clearly and soundly show the relational network between keywords and authors. What needs illustration is that, as a visual tool CiteSpace has been widely used both at home and abroad. The software, developed by Chaomei Chen, a professor of College of Information Sciences and Technology, Drexel University, can be used to draw clustering maps based on keyword co-word analysis, to help mine and explore the research status, hot spots and future trends in a certain field (Chen, 2006).

### **The past of research on Chinese entrepreneurship education (1999-2009)**

During the period from 1999 when China's first article on entrepreneurship education research 'Brief Exploration of Entrepreneurship Education' was published to 2010 when the Ministry of Education of China issued Opinions on Energetically Promoting Innovation and Entrepreneurship Education in Colleges and Universities and Undergraduates' Self-Innovation, CSSCI database included 204 journal papers, including only over 10 papers receiving national and provincial funds. Obviously, the academic circles paid no enough attention to the study on entrepreneurship education research and both the central and local governments at all levels issued no specific policies and regulations for entrepreneurship education practice. In this period, entrepreneurship education research as at the "exploration stage". Specifically depending on the high cited documents on the entrepreneurship education research from 1999 to 2009 as well as keyword frequency and keyword co-word network, author co-citation network and other information, we can get the characteristics and problems existing in Chinese entrepreneurship education at this stage.

#### **Entrepreneurship education research focuses between 1999 and 2009: highly cited literature analysis**

Table 2 lists top 10 articles on Chinese entrepreneurial education research most highly cited during the 10 years from 1999 to 2009, which also reflects the focus of the academic circles on entrepreneurship education during this period.

As can be seen from Table 2, highly cited articles mainly focus on discussion of both entrepreneurship education development model (Mu, 2006; Yi, 2002; Xia, 2004), implementation of entrepreneurship education policies overseas (Fang & Liu, 2006; Guo, Liu, & Lu, 2008; Niu, 2007). As entrepreneurship education was at the exploratory stage and there were no clear implementation ideas or systems established during this period, more efforts were made to use overseas policies and experience for reference, and then try to put forward practical path of enterprise education in China.

Table 2  
*Highly cited articles on entrepreneurship education (1999-2009)*

No.	Author	Title	Citation frequency	Download frequency	Journal name	Year
1	Mu, ZR	Research on the Mode of Entrepreneurship Education for Undergraduates in China	370	7979	Journal of Higher Education	2006
2	Tang, HD (2001)	From Employment to Entrepreneurship Education	228	1757	Educational Research	2001
3	Fang, GZ	Educational Modes of Carving Out for Undergraduates and Its Inspiration in America	226	4896	Studies in Foreign Education	2006
4	Yi, JQ	The Rational Thinking about Launching Entrepreneurship Education for Institution of Higher Learning	213	1453	China Higher Education	2002
5	Mei, WH (2009)	Problems and Strategies of Entrepreneurship Education in Higher Institutions in China	199	4865	Educational Research	2009
6	Guo, LJ	Comparative Analysis of the Entrepreneurship Education Policy of Chinese and Foreign University students	198	3888	Higher Education Exploration	2008
7	Niu, CS	An Analysis of Education Policies for Graduate Entrepreneurship in UK	187	5041	Comparative Education Review	2007
8	Xia, CY	The Practice and Thinking of University Student Entrepreneurship Education	175	1787	Jiangsu Higher Education	2004
9	Cai, KY (2000)	Strengthen the Startup Education—An Important Subject in 21 Century	168	1331	Research on Education Tsinhua University	2000
10	Lu, LH (2007)	Characteristics of Enterprise Education in American Universities and Its Inspirations	154	2499	Studies in Foreign Education	2007

### Entrepreneurship education research hot topics between 1999 and 2009: word frequency analysis and co-word network

According to statistics analysis of high-frequency keywords and their appearance frequency in China's entrepreneurial education research field from 1999 to 2009 by using word frequency analysis software, 204 research papers on entrepreneurship education contain a total of 712 keywords and they appear 1679 times, 2.36 keywords for each paper on average. Table 3 shows a list of top 30 high frequency keywords summed up according to the results of analysis based on the software. These high frequency keywords are technical terms in the field of entrepreneurship education, which, to a certain extent, reflect the research hot topics during the period. The term "entrepreneurship education" appears 98 times, and keywords "undergraduate", "colleges and universities", "USA" appear respectively 23 times, 12 times and 8 times, in addition, other keywords appear in



a similar frequency, between 2-5 times. Thus, it can be seen that the research hot topics at this period were scattered when scholars tried preliminary discussion on entrepreneurship education from different perspectives and summarized related theories and practical experience.

Table 3  
*Top 30 High Frequency Keywords on Entrepreneurship Education Research (1999-2009)*

Ranking	Keyword	Frequency	Ranking	Keyword	Frequency	Ranking	Keyword	Frequency
1	Entrepreneurship education	98	11	Enlightenment	5	21	Corporate culture	3
2	Undergraduate	23	12	Curriculum system	5	22	Innovation and entrepreneurship education	3
3	Colleges and universities	12	13	University	5	23	Entrepreneurial university	3
4	US	8	14	Ideological and political education	4	24	Countermeasure	3
5	Entrepreneurship	7	15	Entrepreneurial spirit	4	25	Creative spirit	3
6	Higher education	6	16	Quality-oriented education	4	26	Challenge	2
7	Entrepreneurial quality	5	17	Colleges and universities	4	27	Innovative and entrepreneurial talent	2
8	Employment	5	18	Salt Lake City	4	28	Current status	2
9	Entrepreneurial ability	5	19	Entrepreneurship education system	4	29	Entrepreneurial practice	2
10	Undergraduate entrepreneurship education	5	20	Characteristics	3	30	Rise	2

Based on word frequency analysis of keywords, keyword co-word analysis is further employed to create the visual knowledge map of the keyword co-word network in Chinese entrepreneurship education research field during the period from 1999 to 2009 by using Ucinet, as shown in Figure 4. In Figure 4, the size of the node forwards depends on the appearance frequency of the keywords, thickness of the node connection line represents the correlation of this node and other nodes, the position of nodes in the graph and the font size are determined by the word frequency and its centrality value. In addition, a different color represents one research topic. The node with a white ring represents a core keyword in a certain theme. From the clustering color of keywords in Figure 4, research hot area of entrepreneurship education at this stage (1999-2009) mainly focused on four aspects.

Between 1999 and 2009, the first kind of hot topic that the Chinese academic circles focused on in the entrepreneurship education research field was practice of undergraduate entrepreneurship education in Wenzhou (Cluster # 1). During this period when many parts as well as colleges and universities in China were preliminarily exploring entrepreneurship education, because Wenzhou had unique advantages for entrepreneurship and formed a long-term entrepreneurial essence of traditional culture, there were a group of scholars summing up and integrating a “Wenzhou mode” that could support undergraduate entrepreneurship based on the regional status quo of Wenzhou with reference to entrepreneurial experience of people in Wenzhou, and they hoped to spread the mode in other parts of China. The second hot spot of focus is the foreign experience and enlightenment of entrepreneurship education (Cluster # 2). Scholars referred to concrete practice and experience of entrepreneurship education in American colleges and universities and put forward relevant policy

suggestions on carrying out entrepreneurship education in China from many dimensions including syllabus, course setting, guidance for entrepreneurship, leading fund-raising for entrepreneurship and entrepreneurship research (Zhang, 2005). The third research hot topic is entrepreneurship education system construction and quality assurance in colleges and universities (Cluster # 3). According to some scholars, the entrepreneurship education system in colleges and universities refers to management elements constituting and promoting the entrepreneurship education related system in colleges and universities, mainly including the entrepreneurship education target system of colleges and universities, entrepreneurship education curriculum system, entrepreneurship education institution system, and entrepreneurship education security system, etc (Qu and Xu, 2009). However, improving the quality of entrepreneurship education requires returning to the origin of cultivating entrepreneurial spirit, which should be promoted from expanding depth and breadth of entrepreneurship education courses, strengthening the construction of teaching staff, creating the atmosphere of entrepreneurship education, improve the national and social guarantee mechanism and so on. The last research hot topic is ideological and political education in entrepreneurship education (Cluster # 4). On the analysis of relationships between entrepreneurship education and ideological and political education, Some scholars pointed out that entrepreneurship education is also a carrier of the ideological and political education, and discussed its values in ideal faith education, arduous struggle spirit education and the team spirit education and other ideological and political education (Zhai, 2006).

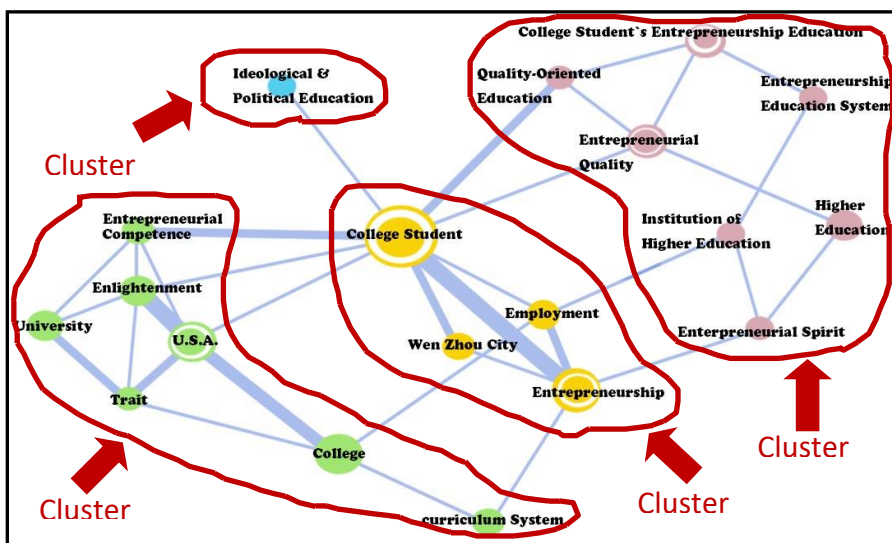


Figure 4. Co-word network map of entrepreneurship education research high frequency keywords (1999-2009)

**Analysis of author cooperation for entrepreneurship education research from 1999 to 2009**

By importing retrieved 204 research papers published during 1999 and 2009 into CiteSpace IV, setting Type to Author, Pruning to Pathfinder, and selecting the threshold value to be 30 words with the highest appearance frequency, finally we can get the co-citation network knowledge map of entrepreneurship education research authors, as shown in Figure 5. Results of the Figure 5 show that the co-citation network of authors reflects



Obviously, along with the release of relevant policy documents, the academic circles have attached great importance to the entrepreneurship education research attaches, which boosts the study on entrepreneurship education to come into the “advancing stage” from the “exploration stage”. Specifically depending on the high cited documents on the entrepreneurship education research from 2010 to 2017 as well as keyword frequency and keyword co-word network, author co-citation network and other information, we can get the characteristics and problems existing in Chinese entrepreneurship education at this stage.

#### **Entrepreneurship education research focuses between 2010 and 2017: highly cited literature analysis**

Table 4 lists top 10 articles on Chinese entrepreneurial education research most highly cited during the 10 years from 2010 to 2017, which also reflects the focus of the academic circles on entrepreneurship education during this period. It can be seen from Table 4 that highly cited articles were mainly published in 2010 and 2013, mainly because the Ministry of Education of China issued *Opinions on Energetically Promoting Innovation and Entrepreneurship Education in Colleges and Universities and Undergraduates' Self-Innovation* in May 2010 (as mentioned above), where the concept “innovation and entrepreneurship education” was used in official documents for the first time and the development direction of Chinese innovation entrepreneurship education was clearly defined. The release of the policy fueled a lot of Chinese scholars to focus on the undergraduate innovation and entrepreneurship education research from 2010 to 2013. Based on analysis of 10 highly cited articles published from 2010 to 2017, we can get two trends of the entrepreneurship education research, namely: (1) the research focusing on cultivation of innovative and entrepreneurial talents (Li & Lu, 2010; Liu, 2011; Chen, 2010; Yang, 2015); (2) summary of background of innovation and entrepreneurship education in colleges and universities as well as practice actualities both at home and abroad, and putting forward relevant countermeasures and suggestions. Compared with the previous period, during this period the entrepreneurship education in China has a clear goal and direction and enters the stage of comprehensive advance with focus on building innovation and entrepreneurship education system, as well as efforts to cultivate the innovative and entrepreneurial talents.

#### **Entrepreneurship education research hot topics between 2010 and 2017: word frequency analysis and co-word network**

According to statistics analysis of high-frequency keywords and their appearance frequency in China's entrepreneurial education research field from 2010 to 2017 by using word frequency analysis software, 730 research papers on entrepreneurship education contain a total of 2710 keywords and they appear 6212 times, 2.29 keywords for each paper on average. Table 5 shows a list of top 30 high frequency keywords summed up according to the results of analysis based on the software. These high frequency keywords are technical terms in the field of entrepreneurship education, which, to a certain extent, reflect the research hot topics during the period. The term “entrepreneurship education” appears 507 times, “innovation and entrepreneurship education” appears 121 times, keywords “undergraduate”, “colleges and universities”, “entrepreneurship” appear respectively 101 times, 89 times and 41 times. On the whole, there are 17 high-frequency keywords appearing more than 15 times during this period, indicating scholar's passion and attention to entrepreneurship education are improved significantly and, compared with 1999-2009, the innovation and entrepreneurship education research in colleges and universities is becoming “popular” with research hot topics relatively concentrated.

Scholars are mainly dedicated to exploring the innovation and entrepreneurship education systems and talent cultivation modes suitable for China for colleges and universities, based on the national innovation and entrepreneurship policies proposed currently.

Table 4  
*Highly Cited Articles on Entrepreneurship Education (2010-2017)*

No.	Author	Title	Citation frequency	Download frequency	Journal name	Year
1	Li, JH	Integrate Innovation and Entrepreneurship Education into the College Talent Training System	250	5731	China Higher Education	2010
2	Huang, ZX	On the Integration Between Entrepreneur Education and Professional Education	211	15732	Educational Research	2013
3	Li, WM	Research on Ten-year Entrepreneurship Education in Chinese University: Evolution, Problems and System Construction	181	10975	Educational Research	2013
4	Liu, W	Thoughts of Construction on Personnel Cultivating System of Innovation-entrepreneurship Education in Colleges and University	161	5527	Education Science	2011
5	Chen, X	Innovation and Entrepreneurship Education Runs Through the Whole Process of College Personnel Training	154	3176	China Higher Education	2010
6	Liu, BC (2010)	Establishing the Education Concept of Innovation and Entrepreneurship, Cultivating Innovative Spirit and Practical Ability	136	3727	China Higher Education	2010
7	Hu, T	Foreign Innovation Education Model for Chinese University's enlightenment	134	9008	China University Teaching	2013
8	Li, SJ (2011)	The Construction of Education System for College Students Innovation and entrepreneurship	118	5094	Heilongjiang Researches on Higher Education	2011
9	Huang, ZX (2010)	Collaboration of Entrepreneurship Education in America: Concept, Model and Lessons	116	4283	Journal of Higher Education	2010
10	Yang, XH	The Strategies, Difficulties and Logical Stating Point of University Think Tank Serving Government Decisions	113	6775	China Higher Education Research	2015

Based on word frequency analysis of keywords, keyword co-word analysis is further employed to create the visual knowledge map of the keyword co-word network in Chinese entrepreneurship education research field during the period from 2010 to 2017 by using Ucinet, as shown in Figure 6. Similar to the results of Figure 4, the size of the node forwards in Figure 6 depends on the appearance frequency of the keywords, thickness of the node connection line represents the correlation of this node and other nodes, the position of nodes in the graph and the font size are determined by the word frequency and its centrality value. In addition, a different color represents one research topic. The node with a white ring represents a core keyword in a certain theme. From the clustering color of keywords in Figure 6, research hot area of entrepreneurship education at this stage (2010-2017) still focuses on four aspects.

Table 5  
 Top 30 High Frequency Keywords on Entrepreneurship Education Research (2010-2017)

Ranking	Keyword	Frequency	Ranking	Keyword	Frequency	Ranking	Keyword	Frequency
1	Entrepreneurship education	507	11	Higher schools vocational	20	21	Entrepreneurial university	12
2	Innovation and entrepreneurship education	121	12	Higher education	20	22	Local colleges and universities	12
3	Undergraduate	101	13	US	19	23	Innovation education	11
4	Colleges and universities	89	14	Entrepreneurial ability mode	18	24	Path	11
5	Entrepreneurship	41	15		17	25	Employment	11
6	Entrepreneurship education in colleges and universities	37	16	Undergraduate entrepreneurship	16	26	Entrepreneurial spirit	10
7	Innovation and entrepreneurship	36	17	Curriculum system	15	27	Ideological and political education	10
8	Professional education	22	18	Countermeasure	14	28	University	10
9	Innovation	21	19	Ecosystem	12	29	Strategy	9
10	Talent cultivation	20	20	Undergraduate entrepreneurship education	12	30	Entrepreneurship	9

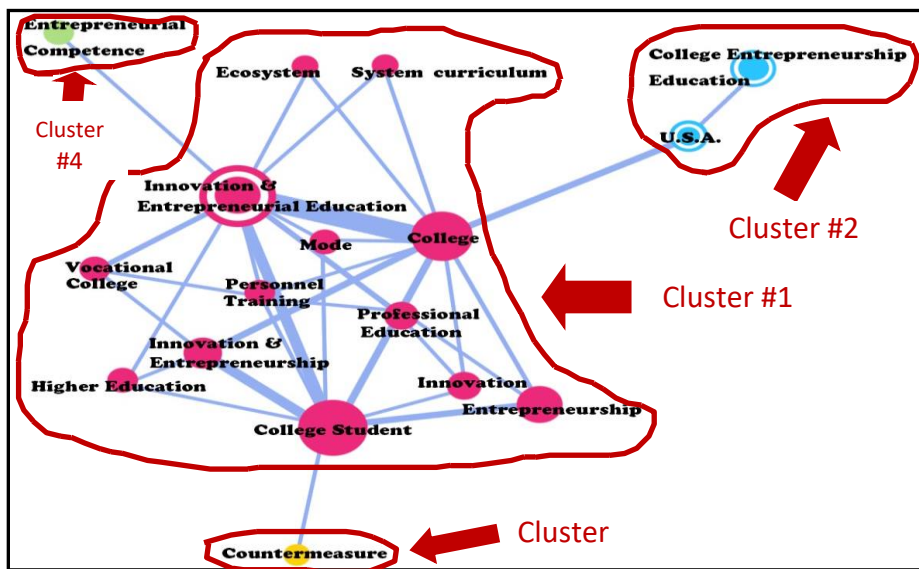


Figure 6. Co-word network map of entrepreneurship education research high frequency keywords (2010-2017)

Between 2010 and 2017, the first kind of hot topic that the Chinese academic circles focused on in the entrepreneurship education research field is innovation and entrepreneurship education system construction research (Cluster # 1). During this period, the release of the national innovation entrepreneurship related policies in 2010 and 2015 comprehensively has promoted the deepening of Chinese scholars on innovation and entrepreneurship education research. Scholars have focused on discussing how to construct the university

innovation and entrepreneurship education system suitable for social development, from many angles such as innovation and entrepreneurship education curriculum system construction, innovative and entrepreneurial talent cultivation system construction, undergraduate innovation and entrepreneurship education system construction (Li, 2011), construction of ecological environment for innovation and entrepreneurship education. Representative views include “university-wide” put forward by Wang, the innovation and entrepreneurship education architecture, based on the core idea of “all-round attention to students”, “based on specialized education”, “integrated into the whole process of talent training”, with the basic goal of “fully covering”, “layering” and “differentiating”, trying to achieve integration of face all students with layered teaching, close connection of school education and continuing education, balance of quality education and vocational education. The second hot spot of focus is the development and enlightenment of entrepreneurship education in the USA (Cluster # 2). Meng & Huang, (2012) pointed out that the setting of entrepreneurship courses, establishment of university entrepreneurship center, various business plan competition, security and support from entrepreneurial foundations in the USA provide a good development environment for entrepreneurship activities and education in America. These characteristics are of great significance for creating a good entrepreneurial environment, conducting entrepreneurship competition, establishing a diversified entrepreneurship education course system, constructing an entrepreneurship education expert system, and establishing a linkage system of entrepreneurial practice activities suitable for entrepreneurship education in colleges and universities in China. The second hot spot of focus is the research on the countermeasures of entrepreneurship education (Cluster # 3), specifically including development countermeasures of university entrepreneurship education (Fang, 2013), the countermeasures of entrepreneurship education for college students, and graduate student entrepreneurship education counter measures and other aspects. There are a large number of research results related to present situation, problems and countermeasures concerning undergraduate entrepreneurship education. The fourth hot spot of focus is the improvement of entrepreneurial competence and the research on its “cause and effect” (Cluster # 3), Dong Y.F., concluded that innovative and entrepreneurial competence of college students can be promoted and improved only by optimizing the innovation and entrepreneurship course system, establishing a multi-disciplinary integrated mentor team and building a practical platform for college students. The factors affecting improving the entrepreneurial competence include 5 areas such as skills, motivation, environment and family. Entrepreneurial competence will have a significant impact on entrepreneurial performance, choice of entrepreneurial model and sense of gain.

### **Analysis of author cooperation for entrepreneurship education research from 2010 to 2017**

By importing retrieved 730 research papers published during 2010 and 2017 into CiteSpace IV, setting Type to Author, Pruning to Pathfinder, and selecting the threshold value to be 30 words with the highest appearance frequency, finally we can get the co-citation network knowledge map of entrepreneurship education research authors, as shown in Figure 7. Results of the Figure 7 show that the co-citation network of authors reflects cooperation between authors at this stage. The network node number of 52 suggests that there are only 52 authors in the network; the network connection number of 20 suggests there are only 20 pairs of authors carrying cooperation in the field of the study.

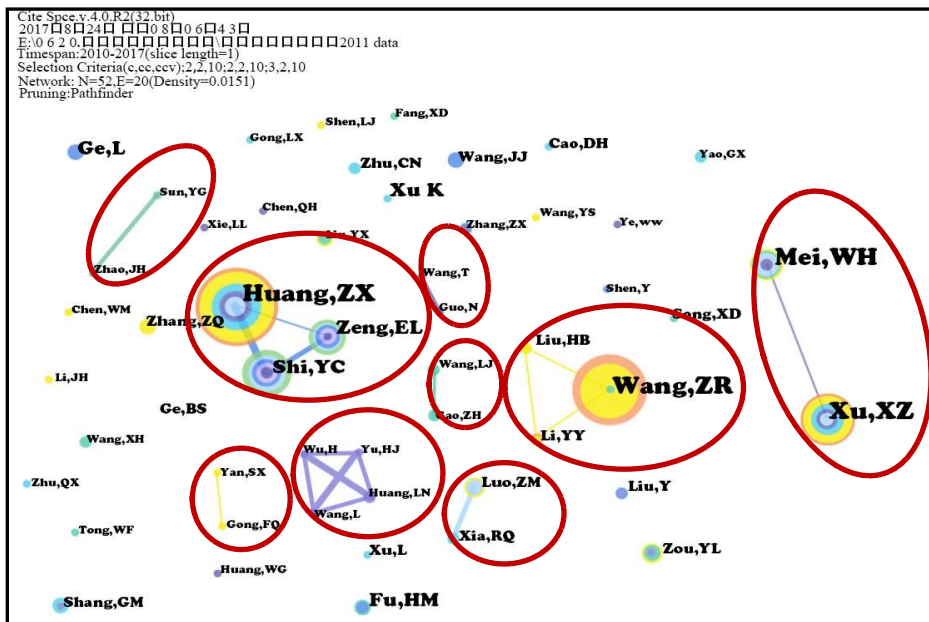


Figure 7. Co-word network map of the authors' cooperative relations for entrepreneurship education research (2010-2017)

Compared with 1999-2009, author cooperation around entrepreneurship education research in China during this period has improved significantly. According to Figure 7, on the one hand, more scholars have been engaged in entrepreneurship education research and the number of published articles has increased significantly; on the other hand, there are some obvious cooperation teams having fierce discussions about entrepreneurship education research. Specifically, Huang Z.X. has formed tightly fixed relationship with Zeng E.L. and Shi Y.C. and they each have published a number of papers. Wang Z.R. is also in an obvious cooperation team with Liu H.B. and Li Y.Y. Besides, four scholars like Mei W.H., Xu X.Z., and Wu G. have related cooperation between each other, so do Luo Z.M. and Xia R.Q. as well as other scholars. In summary, Chinese scholars have gradually carried out relevant cooperative research around entrepreneurial education during 2010-2017, but the cooperation is insufficient and more authors still carry out reach and publish papers individually, so it needs to further strengthen team awareness.

### The future of research on Chinese entrepreneurship education: summary and reflection

To accurately understand and get the developmental tendency of entrepreneurship education in China in the future, it is required to analyze and compare the “past” (1999-2009) and “present” (2010-2017) of the research on entrepreneurship education, so as to clearly find out possible inadequacies and problems in entrepreneurship education research. On this basis, the relevant data should be predicted to reveal the future research trend of



Chinese entrepreneurship education, and then further summarize and induce China's entrepreneurship research direction in the future based on the above findings.

### **Comparison between "past" and "present"**

During 1999-2017, Chinese scholars have had fierce discussions around entrepreneurship education research. On the whole, there are significant differences between the "past ten years" (1999-2009) and the "present ten years" (2010-2017) of Chinese entrepreneurship education research in the number of published articles, hot research areas and author cooperation:

(1) the change in the number of published articles in the field of entrepreneurship education research shows that Chinese entrepreneurship education research has shifted gradually from the "exploration stage" to the "advance stage", both in terms of the overall number of articles and the project funding, as a result of the current release of policies by the central and local governments promoting innovation and entrepreneurship education, the enthusiasm and attention paid by the academic circles to the study on innovation and entrepreneurship education continues to heat up, and with development and deepening of entrepreneurship education practice, the relevant theoretical research also continues to mature and advance. According to actualities of China's innovation and entrepreneurship education, the academic circles in China will continue to put innovation and entrepreneurship education to a new stage of development at present and in the future.

(2) Compared with 1999-2009, focuses of the entrepreneurship education research in the recent ten years (2010-2017) have gradually been centralized with the research perspective transformed from the preliminary theoretical research into of view by the preliminary theoretical research into the discussion on the real hot spot issues. Because entrepreneurship education started late in China, the academic circles in China mainly focused on discussion of related theories in the study of entrepreneurship education at the beginning of the 21st century, and in most cases they just referred to and learned the experience of entrepreneurship education in the west. But in recent years, the central documents on entrepreneurship education released in 2010 and 2015 have pointed out the direction for the research among the academic circles and the scholars have become more accordant with the actual situation of China in research, as they start to conduct intensive studies around hot spots, difficulties and key issues in the current entrepreneurship education by means of related theories based on foreign experience.

(3) The trend of partnerships between authors is also shifting from "divergence" to "convergence" obviously at the two stages of entrepreneurship education. Between 1999 and 2009, there were a small number of scholars engaged in entrepreneurship education research and most of them carried out research individually. But with the advance of entrepreneurship education practice, there are more authors coming to "win-win cooperation" and many researches "groups" have been formed around entrepreneurship education research, which undoubtedly plays an important role in developing and innovating research directions of current and future entrepreneurship education in China. And a wide range of academic cooperation helps achieve complementary advantages between authors and realize communications between different disciplines, so it also has important practical significance for deepening the study on entrepreneurship education.

### **Future trend prediction**

By deep analysis and organization of the “past” and “present” of entrepreneurship education research in China, it can be seen that the future Chinese entrepreneurship education research results will still be in a growing trend, and the various national and provincial funds for entrepreneurship education research assistance will also continue to expand. Specifically, the time series analysis method is employed in this paper to predict the number of published articles, funding and author cooperation concerning entrepreneurial education research in China in the following five years. Results show that, by 2022, the number of papers published by the academic circle around entrepreneurship education research will grow to 673 in China, about 3.6 times that in 2017. The number of articles funded by 2022 will also be more than 3 times the current. Besides, according to the statistical data of the quantity of author collaboration network nodes and connections in annual research literature generated based on CiteSpace, further prediction is that the cooperation network structure of the entrepreneurship education research authors by 2022 will be more complex and there will be a significant increase in the number of authors with more extensive cooperation. In brief, according to the present development actualities, even if there is no exterior intervention, there will be more scholars engaged in the studies on entrepreneurship education in China, and if there is more funding assistance and cooperation between organizations, the entrepreneurship education research in China will inevitably be expanded deeper longitudinally.

### **Bottlenecks needing a breakthrough**

Rapid growth of the number of journal articles in both the “past” and “present” entrepreneurship education research in China indicates the keen grasp of Chinese scholars to the subject of entrepreneurship education in the Chinese context, and it is also a vivid reflection of continuous advance of the process of entrepreneurship education in China. For some time to come, entrepreneurship education will continue to be an important component of China's higher education system reform, which needs relevant researches in a more extensive angle of view, so entrepreneurship education in China needs to break through its past bottleneck, and needs improvement in research topic selection, dominant disciplines and cooperative innovation. It requires the researchers to take the initiative to change, also expects external intervention by related parties.

**Active change.** Active change means we need to take initiatives to change. If we say the Opinions on Energetically Promoting Innovation and Entrepreneurship Education in Colleges and Universities and Undergraduates' Self-Innovation issued by the Ministry of Education in 2010 and the Implementation Opinions on Deepen the Innovation and Entrepreneurship Reform in Colleges and Universities by the General Office of the State Council in 2015 have driven a rapid growth of entrepreneurship education research in China in the past ten year, the relevant policy documents to be issued in the future by the national and local governments will further promote more people to be engaged in entrepreneurship education research. In summary, the following areas will continue to have a breakthrough in the future:

(1) Interdisciplinary and cross-region exchanges and cooperation need to be further promoted. Although entrepreneurship education belongs to the category of pedagogy research, it still covers theories and methods of management, economics and other disciplines, so for the researchers they need to transcend disciplinary boundaries, break through thinking inertia, promote multilateral exchanges and cooperation between pedagogy,

economics, management and other disciplines, so as to be better devoted to solving the realistic problems of entrepreneurship education. However, scholars engaged in entrepreneurship education research in China are mainly concentrated in the field of pedagogy, with less intersection of the subjects and weak cooperative networks. If interdisciplinary interactions can be realized in the future so as to share experience and methods in the face of the problem of entrepreneurship education, research results of entrepreneurship education are bound to boom.

(2) The research hot spot topic needs to be further close to the real demands. There is no doubt that along with the further improvement and release of relevant policies, the entrepreneurship education practice will step into a new stage of development, which requires the hot topic of Chinese entrepreneurship education research to be more precisely close to the real demands. According to the analysis of the “past” and “present” hot spots of entrepreneurship education research in China, hot topics entrepreneurship education research are more centralized, but more of them focus on the theoretical discussion of the existing problems, foreign experience, development mode and enlightenment from experience, lacking research based on evaluation of entrepreneurship education effects. The academic circles should focus on and think about the implementation effects of entrepreneurship education based on the current achievements, on the premise of following the central and local policies in the future.

(3) Innovative development of entrepreneurship education theories in Chinese context. Compared with western countries such as America and Britain, entrepreneurship education practice in China started late, so more implementation experience is borrowed from entrepreneurship education practice mode and features abroad. Although distinct features already formed for a long time in the entrepreneurship education abroad is worth for reference in China, how to combine them with the Chinese realistic national conditions and construct the entrepreneurship education model complying with Chinese characteristics is a problem that scholars should think about and explore. Among the existing research results, there are few on discussing entrepreneurship education practice modes in the perspective of the Chinese characteristics, so scholars are required to explore what contents, factors and features should be contained in the entrepreneurial education theory in the Chinese context, rather than just learning from abroad.

**External intervention.** As already analyzed above, even if there is no external intervention, entrepreneurship education research in China has become the current hot topic and there will be more scholars paying close attention to this field in the future. In order to improve the matching degree between Chinese entrepreneurship education research and entrepreneurial education practice needs, the government departments at all levels should actively implement the central policy documents on entrepreneurship education, actively support and promote entrepreneurship education theory research and practice, unite all forces to carry out in-depth analysis of the policies and paths for effective implementation of the entrepreneurship education and actively practice them.

(1) It is required to further strengthen funding scope and strength. As an important indicator of support for basic research, scientific funds are required to lead the basic research in fund scale, subject domain and other areas. It is suggested in the future that the national natural science foundation of China and national social science foundation as well as provincial and ministerial foundations at all levels may further strengthen

entrepreneurship education research in the project application guide, so as to specifically detail of the theme direction of entrepreneurship education research while encouraging interdisciplinary cooperation and exchanges. Also, they may consider setting up major projects concerning entrepreneurship education research, improving funding strength and promoting cooperation between Chinese scholars, so as to better advance entrepreneurship education research.

(2) It is required to actively promote construction of entrepreneurship education base and think tank in China. Now the Party Central Committee and the Ministry of Education have attached great importance to entrepreneurship education, so both "top-down" and "bottom-up" should make positive responses. In building entrepreneurship education research base and think tank, the governments can actively rely on colleges and universities, as well as research institutes, etc., encourage colleges and universities to cooperate with the government, and bring different universities unite with research institutions. In view of the interdisciplinary and systematic characteristics of entrepreneurship education, it is required to integrate resources between different disciplines and departments, gather experts and scholars in the field of entrepreneurship education in China, encourage crossover studies on related issues in the form of seminars and academic forums, actively promote the research base and think-tank results to serve the local practice.

(3) Chinese scholars should be encouraged to "go out" and carry out pragmatic cooperation with related research institutions in the field of entrepreneurship education in developed countries, to carry forward and spread theories and experience related to entrepreneurship education in China. Although some scholars have put forward enlightenment for entrepreneurship education in China from the prospective of the entrepreneurship education practice abroad, there are very rare scholars who really have been abroad for empirical investigation and research, which is unfavorable for deep understanding and grasp of essence of entrepreneurship education practice abroad. It is suggested in the future that researchers should go abroad for field investigation of entrepreneurship education in person and carry out long-term in-depth cooperation on this subject with foreign famous universities and research institutions, while spreading China's theories and practice on entrepreneurship education on the premise of knowing about the present situation in foreign countries.

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