

Visualization Analysis of Career Education International Research in Universities

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Abstract: With the development of career education research, career education in colleges and universities presents different research and practice characteristics among countries and regions. It will be lowly efficient if we rely on traditional academic exchanges to actively obtain and summarize the current research situation, therefore we use Citespace, a visualization literature analysis software, to analyze the relevant documents in Web Of Science core database, and draw the conclusion automatically. It includes the progress and deficiency of cooperative research, the characteristics of interdisciplinary research, the emerging hot spots and directions, and the continuous diversification of research objects.

Keywords: Career education, Bibliometrics, Visualization, Universities

1. Introduction

Career education originated from the results of the Industrial Revolution: the rise of a large number of new occupations and the demand for labor force stimulated its germination and development. In the early time, career education mainly focus on “vocational education” and “vocational guidance”. For example, Frank Parsons mentioned in his published book that students should look for corresponding types of occupations according to their unique personality characteristics[1]. Herbt also mentioned in his monograph that secondary education should include helping students set career goals[2]. Until 1971, S.P.Marland of the United Nations General Administration of Education formally put forward the concept of” career education “and Super put forward the theory of” career development form “[3], accelerating the research on career education.

Since the 21st century, the research on career education has become diversified with its practice in various countries, among these countries, they have established their own independent, or attached to the universities and governments, career guidance institutions, to carry out career education research and practice, and they have formed a more mature theoretical system. However, the research on career education in colleges and universities is still relatively scattered, even though there have been international research exchanges in the form of trans-regional research institutions and international academic conferences[4]. Therefore, it is necessary to sort out, summarize and excavate the existing achievements on career education in colleges and universities, as well as be possible to find new characteristics and trends in the process.

2. Method

2.1 Data Sources and Samples

Using the website, Web of Science, selecting WOS core database, and search with the query shown in Table 1.

In the basic query, use “ OR “ to connect “ Career “ and “ Vocational “; The group (vocational OR care) is connected with “development” and “education” with “NEAR/4”, which means that the maximum interval is four words, so as to prevent the search results from being too small or wide. At the end of the search, “AND university” is added, so that the search results are all related to colleges and universities. Finally, the search is carried out with 1 # and 2 # query respectively, and then the results are merged with “OR”, 3628 valid documents are obtained.

Table 1. Query Clause and Result

	Number	Count	Search query
Basic Retrieval Form	# 1	1,723	TS= (((vocational OR care) NEAR/4 development) AND university)
	# 2	2,149	TS= (((vocational OR care) NEAR/4 education) AND university)
Combinatorial retrieval	# 3	3,628	# 2OR # 1

2.2 Process of Analysis

Exporting all the full records and cited references and storing them in the form of plain text, then imported them into Citespace software[5] for the process of co-authors, co-occurring and co-citation analysis, further clustering and keyword labeling[6], and finally drawing network diagram to implement the visualization of the results. Through explaining graphics and summary table, the characteristic internationalization research status of “college career education” is analyzed.

If there is no special statement, the network diagram in this paper will not be pruned. The node selection adopts G-index algorithm, and the K value is 25

2.3 Cooperative Research

2.3.1 Cooperative Research by Country

In Fig. 1, the outer layer of the those nodes that represent the United States, Britain, Australia and Spain has purple rings, which means that the four nodes are all key nodes with high centrality. The higher the centrality, the more connections these nodes have with other nodes. The size of the node (the radius of the circle) represents the number of documents published in the corresponding country



Fig.1 Network of Co-author's Countries

Table 2 Gives the Name, the Published Number and Centrality of Country, and Sorts Them in Descending Order by the Number of Published Documents.

Table 2. Main Result of Co-Author's Countries

Country	Count	Centrality
USA	734	0.49
CHINA	510	0.01
AUSTRALIA	271	0.11
RUSSIA	229	0.10
ENGLAND	226	0.37
SPAIN	173	0.18
GERMANY	123	0.12
TURKEY	122	0.01

The figure and the table jointly show that the United States, China and Australia are the top three countries in the number of documents published on the theme of “career education in colleges and

universities”, which shows they have provided more theme thesis than other countries in the WOS core database.

The United States, Britain, Australia and Germany are the top four countries in terms of centrality, which shows that researchers from these four countries have more background of transnational research groups, and these countries contribute more to the cooperation of international research on “career education in colleges and universities”.

The United States is both the node that contributes the most literature, and the node with the highest degree of center, so the United States plays an important role in the research of college career education.

2.3.2 Cooperative Research by Institutions

The nodes labeled with Univ Toronto, Griffith Univ and Kazan Fed Univ tags in *Fig. 2* are the central nodes in the network of Co-author’s institution. These are all research institutions of universities, the three universities are located in the United States, Germany and Russia respectively.

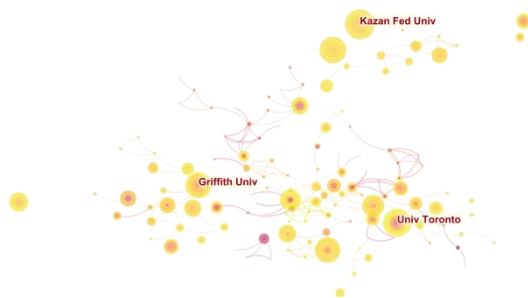


Fig.2 Network of Co-author's Institutions

However, in *Fig. 2*, the connections between nodes is not dense, indicating that the cooperation relationship between institutions is not close. The overall network density is low, which shows that the scale of institutional cooperation on the current research situation of career education in colleges and universities is insufficient, and the cooperative relationship between institutions needs to be further strengthened.

2.4 Research Direction

2.4.1 Keyword Identification

The network of co-occurring keywords in *Fig. 3* is generated with a special configuration: The TOP50% method for node selection, which means that the nodes with the first 50% occurrence times will finally participate in the calculation of each time slice (each year). Also, the generated network diagram is pruned by minimum spanning tree algorithm (MST), pruning the sliced network and the edged network.



Fig.3 Network of Co-Occurring Keyword

The size of the nodes in the figure represents the centrality of the corresponding keywords rather than the number of occurrences.

Excluding education, higher education, school and other non-special keywords, we can find that the relevant research on career education in colleges and universities at present mainly revolves around the following keywords:

Behavior, Adaptability, Attitude, Job Satisfaction, Lifelong Learning, Academic Care, Self Efficiency, Achievement, Gender, Predictor, Train and so on.

“Behavior” and “Attitude” show that the research on career education and development pays attention to the influence not only of physical behaviors of all parties, but also of their cognitive attitudes on the results of career education. “Gender” shows that career education in colleges and universities has begun to design specialized and subdivided programs. “Predictor” explains that academic circles are studying models that can be used to evaluate and predict the quality or results of career education. “Adaptability”, “Job Satisfaction” and “Self Efficiency” are the theoretical sources used to design relevant evaluation scales. The research status of some theories and proper nouns will be further elaborated in the following chapters of this article.

2.4.2 Interdisciplinary Fields in Research

Fig. 4 is a visual result after statistics and co-occurring calculation of WOS subject category to which all document sources belong, adopting TOP 50% node selection method, and minimum spanning tree algorithm, pruning sliced network.

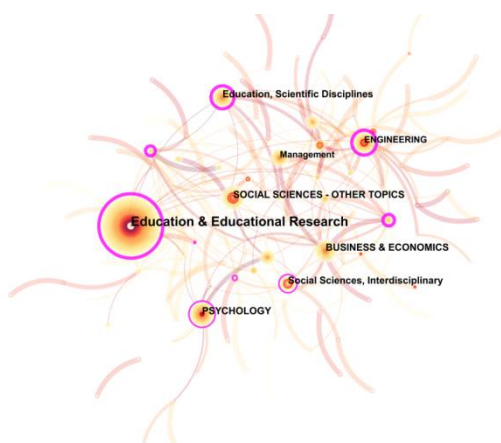


Fig.4 Network of Co-Occurring Subject Category

The research around “career education in colleges and universities” is mainly the research category of pedagogy, such as “Education & Education Research” and “Education, Scientific Disciplines”;

In addition, the research on career education in colleges and universities is also related to other major disciplines, such as “Management”, “Psychology”, “Business & Economics”. The classification of “Social Science”.

“Interdisciplinary” and “Social Science-Other Topics” shows that the research on career education has the characteristics of interdisciplinary. Finally, “Engineering” has also become one of the key disciplines, the possible reason might be that compared with other disciplines, engineering pays more attention to students' career and career planning (e.g. Career training of engineers).

2.5 Citation and Development

Fig. 5 shows the top 8 cited documents, as well as their authors and year of publication. Use TOP 50% node selection, and minimum spanning tree algorithm to prune sliced network when generating graphics.



Fig.5 Network of Co-Citation Document

TABLE 3 adds additional information about the cited document. The high frequency of citation indicates that the relevant documents have established a certain basic consensus in this research field and have high popularity and recognition, thus becoming the object of debate or adoption in subsequent research. The clustering result means most of its documents has a common keyword, so they are clustered into one label[6].

Table 3. Frequency, Centrality and Clustering Information of Cited Documents

Author	Frequency	Clustering result
Savickas ML (2012)	29	Career adaptability
Savickas ML (2013)	16	Career adaptability
Savickas ML (2009)	15	Career adaptability
Hirschi A	13	Career Planning
Holmes L	13	Entrepreneurship Education
Tymon A	12	Affective Organizational Commitment
Hair J	11	[null]
Guan YJ	11	Career adaptability
Bridgstock R	10	Entrepreneurship Education
Lent RW	10	vocational interests

Career adaptability is the cluster result of documents which citing Savikas and Guan YJ's research. Savickas proposed the concept of life design to replace the old concept of vocational choice[7], advocated the concept of "career adaptability" as one of the evaluation factors[8], and integrated it into the theory of career construction, hoping to be applied in the field of career and vocational education[9]. Guan YJ team designed a model to measure career adaptability based on career construction theory and self-efficacy theory[10]. Most of the document citing these literatures, use them as relevant theories, models, conclusions or data sources of career adaptability, or put forward improvement or criticism opinions on their original achievements.

Lent RW's cited paper mentions the social cognitive model[11], which is the fourth sub-model of the social cognitive career theory[12] he proposed on the basis of Bandura's general social cognitive theory and self-efficacy theory[13]. The model holds that people will take active adaptive career behaviors to realize their career goals. At present, the model has received extensive attention and discussion. Therefore, the research related to vocational interest mainly refers to Lent's paper.

Hirschi A's cited paper focuses on the predictive factors that affect the occupational adaptability of adolescents and proposes a predictive model based on them[14]. These papers citing this document are also committed to establishing or improving relevant prediction models that guide career planning, belong to Career Planning clustering result.

Holmes discuss three ways to measure employment adaptability and argue that employers and schools should think about how to improve their support for employees or students' employability[15]; Bridgstock mention graduates' career management skills, as an important factor in measuring their employability[16]. These two research results provide ideas for discussing and studying the ways of entrepreneurship education.

Tymon A believes that different grades of students have different views on employability, including

definition and understanding[17]. Cognitive differences in employability, organizational identity and loyalty are all cognitive factors that affect career choices and outcomes. Therefore, the relevant research cited this paper and is clustered as Affective Organizational Commitment.

The papers cited by Hair J lack clustering results, which may be related to the pruning of network. Hair J is the author of "Multivariate Data Analysis"[18], which means that the relevant research of career education in colleges and universities needs the knowledge of multivariate statistics and analysis. Quantification, evaluation and analysis of multiple factors are one of the methods to establish relevant models or evaluation systems.

3. Conclusion

3.1 Cooperative Research

In the research team of career education in colleges and universities, there are already some members of the team with transnational backgrounds, which will be conducive to the development of some empirical studies in many places and increase the portability and universality of research conclusions. However, inter-agency cooperation is still relatively lacking, agencies should promote the exchange and sharing of results, and design more cooperative scientific research projects.

3.2 Interdisciplinary

The research on career education in colleges and universities has obvious multi-disciplinary and cross-disciplinary characteristics. Sociology, behavioral psychology, pedagogy and many other social science disciplines are the theoretical sources of career education in colleges and universities.

This feature has more profound significance under the background of international research. When the international exchange and cooperation of research are closer, researchers from different disciplines will be more likely to apply the beneficial results of other disciplines to career education in colleges and universities through a number of unified project groups and combining their respective knowledge.

3.3 New Concepts and Theories

On the basis of interdisciplinary, With the progress of social science, the concept and theory of career education in colleges and universities have a rapid update speed. Whether it is the transformation and extension of the concept of career education itself in career choice, life design, career planning and other aspects, or the increase and supplement of relevant theories, such as self-efficacy, career satisfaction, career adaptability and so on.

3.4 Diversified Research Objects

The research object of career planning in colleges and universities is experiencing a process from single to multiple. It not only considers the problem from the perspective of colleges and universities or students, but also from the perspective of colleges and universities, graduates, enterprises, communities and even the whole society. On the one hand, this is due to the practical characteristics of career planning in colleges and universities. With the continuous expansion of its concept, the number of objects involved in career planning is also increasing. On the other hand, the characteristics of interdisciplinary also promote the diversification of objects. Different disciplines hold different research perspectives, making them choose different subjects for discussion.

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