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Hotspots analysis of disaster education in China

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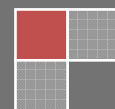
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ABSTRACT

To find out the research hot spots of disaster education in China, the paper used disaster education as subject term that got 647 articles related from National Knowledge Infrastructure in China between the year 2003 to 2013, and used Bicom and SPSS20.0 software to find out the hot spots based on the theory of co-word analysis and combined with theories of cluster analysis and multidimensional scale analysis. The paper got the conclusion that research on disaster education in China in the recent years focused on the fields of disaster nursing education, earthquake disasters and reconstruction after an earthquake, disaster management and comprehensive calamity alleviation, disaster awareness education and disaster education comparison research at home and abroad. Finally, the paper verified the knowledge map got from the research by the research hot spots in 2013. We found that Awareness of disaster, knowledge, and past disaster experience also function as educational information which contributes especially to the improvement of disaster emergency and various types of disaster education should be readily available at accessible places to the public by the analyses of the hot topics.

KEYWORDS

Disaster; Education; Hot spots; Co-word analysis; China.



INTRODUCTION

A disaster is an event that can be prepared for in advance. Most of governments, local communities, and social organizations all undertake measures for major disasters^[15]. Individuals also should reduce the impacts of normal disasters by learning what to do during disasters and by taking a variety of personal safety measures. This paper mainly uses the cluster analysis and multidimensional scale analysis, two kinds of methods, to discuss the research hot spots and development trend of Chinese disaster education in the nearly ten years, thus provides reference for the future disaster education researches. This study is guided by the following questions in China: what are the hot topics in the field of disaster education. In other words, what did Chinese scholars focus on? By comparing data from academic papers investigation and surveys conducted in China, this study intends to answer these questions.

Importance of the research

This study makes a contribution to knowledge in the following ways: first, a method for find the hot topics of disaster education is proposed, and this study introduces co-word analysis method, and takes the domestic 11 years disaster education research literature as the objects of the research, uses visualization technology to show disaster education research overview. Sequentially, we explore the hot trends of the field. The finding from this study are suggestive of the kinds of materials, means and approaches of disaster education necessary for people living in different cultures.

Literature review

Disaster education, also known as disaster prevention education or disaster prevention and mitigation^[2], has been researched through theoretical and empirical methods by Chinese scholars in recent years with the frequently occurred disasters in China. Under the theme of disaster education, there are many research aspects by different scholars. In the early years, scholars did research on disaster education mainly through theoretical methods, past few years, Chinese scholars have done literature reviews from disaster education content and the goal^[3], the general situation and the ways to implement, connotation - function - status - goal and content - educational way, etc. And these are individual and qualitative reviews based on a small amount of literature of disaster education, difficult to form the development context of macroscopic level about domestic disaster education. The development of more effective disaster education, which incorporates the public, regional, and cultural differences, is the important research task of many scholars for various populations to become more sufficiently ready for future disaster emergency. In an effort to develop a more integrative approach to environmental accident education, the University of Alabama at Birmingham, USA, has launched the "Environmental Disasters" project^[4-5]. Built around an experimental 40-hour course on chemical and nuclear accidents, the project crosses disciplinary boundaries with respect to both curriculum and enrollment. Students and developing professionals from a broad selection of fields work together closely, first as they examine scientific, regulatory, psychosocial and other dimensions of environmental accidents, and then as they tackle program and policy issues using a multidisciplinary team approach^[6].

Co-word analysis method is one of research methods and paradigms of literature metrology^[7-10]. It mainly analyses the phenomenon through the technical terms which appear in an article and can express one research subject or research direction of a certain discipline, and judges the relationship between the themes in a discipline. Compared with the citation analysis, the objects of co-word analysis are not literature but the keywords of the literature. Because the relationship between the words can perfectly represent the relationship between the concepts, the frequency which two vocabularies appear in the same article can well reflect the relationship between the two themes. The more frequently two words appear in the same article, the closer the relationship of the themes which two words represent are. Co-word analysis focuses on two questions: one is to explore the relationship between the research field, the second is to look for minor but potential growth areas. The multivariate statistical methods commonly used are three kinds: cluster analysis, factor analysis and multidimensional scale analysis.

Research methods

This article selects Chinese academic journal network publishing database in the literature database of CNKI as research data sources, and in the rapid retrieval column types "disaster education" to inquire, then sorts the search results by the time literature published, a total of 720 literature records from 2003 to 2013 have been found. At the same time, in order to exclude the interference of unrelated literature, we eliminate the literature of non research such as the meeting notice, news reports, etc, and the literature which lack of identifying authors and keywords in the retrieval results, a total of 484 references are acquired, which can guarantee the credibility of the research.

After completing data retrieval, this study adopts Bicom b bibliography co-occur analysis system by medical information department of China medical university and SPSS20.0 data statistical software as the main research tools to conduct data transformation and data statistics. First, choose 20 articles per page as storage text format to save the literature selected above, and the fields saved are theme, author, keyword, work unit, journal and year. Second, transfer text format into ANSI code and save it to ensure Bicom software can get right text format to make co-word analysis of keywords. Third, do preliminary statistics for literature quantity of each author, literature quantity of each periodical, and literature quantity of each year by analyze the data in text format through the software. At the same time, make statistics for the frequency of each keyword and screen out high-frequency keywords limited by the keyword threshold of 8, and establish the common word matrix about high frequency keywords. Finally, guide the high frequency keywords common word matrix into SPSS20.0 to

do cluster analysis and multidimensional scale analysis, and explain the results to explore hot spots and the development vein in the subject according to the analysis.

RESULTS OF THE RESEARCH

Results of sample bibliometrics

The paper has gathered 516 literature of Chinese disaster education research from 2003 to 2013 nearly 11 years, and does statistics of these articles. The annual literature quantity of disaster education research is a kind of manifestation patterns which people attach great importance to the disaster education. Because the time span of the literature retrieval is from January 2003 to September 2013, the quantity of literature in 2013 can't reflect the overall condition of the year. Therefore, we can see that disaster education literature quantity has been increasing year after year according to the overall trend of line chart, which can also reflect that increasingly importance has been attached to the disaster education, a newly emerging field by the scholars and researchers.

In addition, we also do the literature quantity statistics of each periodical and literature quantity statistics of each author for these 516 articles. The journal in which the quantity of literature is most is Chinese disaster reduction, in which a total of 24 papers have been published. Disaster education has been involved in pedagogy, architecture, nursing, and other disciplines, so the articles about the theme of disaster education are published in the journals of the corresponding discipline, thus a relatively large amount of journals are involved. These journals are the main places in which the disaster education research literature is gathered. They rank high grade in the disaster education research field.

Statistics of keywords frequency

High frequency keywords selection and statistics based on certain literature are not only the basis of co-word analysis, but also can more directly help us to know the hot spots and development status in the field of research. We use Bicom comb bibliography co-occur analysis system to do statistics for keywords in 516 disaster education research article and gain a total of 2619 keywords. Under the limit of keywords threshold, the paper screen out the high-frequency keywords as shown in table 1. The research hot spots are natural disaster, disaster education, disaster prevention and mitigation, disaster, emergency, earthquake, disaster prevention consciousness and emergency management, emergency plan, earthquake disaster if selected from its frequency. The simple statistics for the high frequency keywords only can show development status and hot spots of disaster education research, but it is difficult to reflect the internal structure of discipline. Therefore, the relationship between the high frequency keywords should be analyzed, thus deep analysis should be done based on the information got from keywords.

TABLE 1 : Keywords frequency

keyword	F	keyword	F	keyword	F
Natural disaster	72	Integrated disaster mitigation	13	Disaster reduction education	10
Disaster education	64	Secure Community	13	America	10
Disaster prevention and mitigation	45	School	13	China	10
Disaster	37	Nursing education	12	Disaster alleviation	10
Emergency	30	Violent earthquake	12	Disaster nursing science	10
Earthquake	24	Disaster prevention	12	Volunteer	9
Disaster prevention consciousness	21	Countermeasure	11	Elementary education	9
Emergency management	20	Undergraduate	11	Nurse	9
Emergency plan	19	Geological disaster	11	Enlightenment	9
Earthquake disaster	18	Emergency mechanism	11	Post-disaster reconstruction	9
Safety education	17	Disaster assistance	11	Kobe earthquake	9
Disaster management	16	Disaster prevention and mitigation education	11	Earthquake prevention and mitigation	8
Disaster consciousness	16	Community	11	Library	8
Disaster nursing	15	Japan	11	Disaster reduction awareness	8
Colleges and universities	14	Calamity	11	Wenchuan earthquake	8
Crisis management	14	Sustainable development	11	Disaster prevention education	8
Education	14	Thinking	11	Emergency power	8
Urban disaster	13	Public	10	Meet an emergency	8

Similarity and dissimilarity matrix of keywords

As different multivariate statistical methods need different matrix data structures, the paper constructs the high-frequency key words similarity and dissimilarity matrix by two kinds of multivariate statistical methods to satisfy data requirements. At first, use the Bicom system to conduct co-word analysis of high-frequency key words in table 1 to construct keywords similarity matrix. Second, use SPSS20.0 to generate word matrix through data got from the first step. The data in similarity matrix reflects the affinity and disaffinity relationship between the key vocabularies, and its numerical value ranges is [0,1]. The more closely the numerical value approaches to 1, the more intimate the relationship between the high frequency keywords is, the deeper the degree of similarity is. The more closely the numerical value approaches to 0, the worse the degree of similarity is. Then, To eliminate statistical errors brought by similar matrix and further process data conveniently, the paper construct high frequency keywords dissimilarity matrix while using value 1 to subtract each data in similarity matrix and form the high frequency keywords dissimilarity matrix. The dissimilarity degree between keywords appears clearly through the dissimilarity matrix. According to the similarity matrix and dissimilarity matrix which have been built above, we can enter into the next phase of the multivariate statistical analysis.

Results of cluster analysis

Cluster analysis refers to a analytic process to classify the physical or abstract object sets into multiple groups and the objects form one group are the same. It is a kind of important people's behavior. From the perspective of the data, the cluster analysis is to calculate the distance between the key words in common word relation network, which gathers variables of close distance (close relationship) into a relatively independent group. Thus the similarity degree of the variables within the group is the largest; the similarity degree between the groups is the smallest. In the field of disaster education research, representing high frequency keywords of highly similar as the group forms can visually generalize the current situation of the study of disaster education. This paper uses the statistical software SPSS20.0 to carry on the hierarchical clustering on the basis of the similarity matrix and acquires clustering analysis map of high frequency keywords.

Through the comparison and analysis, this study suggests that classifying the cluster analysis results into seven categories is more appropriate. In order to make the classification process clear to the reader, we take case 2 for example. Specifically, before clustering, each key word is a independent category, then by calculating the similarity of two keywords "disaster nursing" and "nursing education", polymerize them into a small category. The next, polymerize the small above and the other small category polymerized by the words "disaster relief" and "basic education" into a bigger category. Finally, merge the bigger above and the other bigger category composed of "disaster nursing" and "nurse" into a biggest category. Similarly, polymerize into another six biggest categories. Seven biggest categories are merged into "disaster education research".

Through the structure of tree diagram can we know the polymerization conditions of seven kinds of keywords. The first kind is composed of the keywords 19, 20, 42. The second type is composed of the keywords 41, 44, 14, 22, 29, 43. The third type is composed of the keywords 24, 54, 47, 10, 23, 32, 12. The fourth kind is composed of the keywords 11,26,35,17,33,16,31,38. The fifth type is merged by the keywords 37,45,25,39,4,52,6,46,49,51,28,15. The sixth kind is composed of the keywords 8,48,18,53,5,9. The seventh type is merged by the keywords 27,34,1,3,2,13,40,36,50,21,30,7. According to keywords' combination meaning of each category, we named these seven categories orderly: community integrated disaster reduction, disaster nursing education, earthquake disaster and earthquake disaster education, target groups of disaster education, disaster education enlightenment and countermeasures, disaster emergency management, disaster awareness education.

Results of multidimensional scale analysis

The main purpose of multidimensional scale analysis is to find the relationship between the variables by measuring the distance between the variables. In other words, it is to show the relationship between the objects by the concept space (usually two dimensional or three dimensional space) and reflect the similarity degree between objects by the plane distance. In the multidimensional scale analysis map, each object distributes as punctuate pattern, the relative positions of the points reflect the similarity of the objects. The keywords of high similarity are polymerized together to form a kind of groups. The more closely the keyword approaches to the center position of one group, the more keywords are linked with it, the more central the keyword is in the group. Conversely, what the keywords are in the periphery of the group means that the research topics represented by the keywords are narrow or transit to another research topics constantly. Based on this principle, this paper builds the multidimensional scale analysis chart, which can clearly estimates the academic hot spots and the location of each theme in the field of the research. It is more progressive than previous cluster analysis.

This paper mainly uses multidimensional scale analysis function (Multidimensional Scale, ALSCAL) of metric function in SPSS20.0 statistical software to conduct two dimensional scale analysis for high frequency keywords dissimilarity matrix by Euclidean distance model, then obtains the corresponding visual map.

According to the multidimensional scale analysis map, cluster analysis results and consulting the related literature of disaster education research, based on the classification of the graphic keywords can we see that disaster education research nearly 11 years mainly focuses on the following five areas: disaster nursing education, earthquake disaster and earthquake reconstruction, disaster management and comprehensive calamity alleviation, disaster consciousness education, disaster education comparison research at home and abroad.

The first field is composed of the keywords disaster, nursing education, disaster nursing ,etc. These keywords all express related content about disaster rescue and nursing, so named the field disaster nursing education is more appropriate.

The second field is composed of the keywords earthquake disaster, earthquake, violent earthquake, Wenchuan earthquake, etc. From them can we see that the earthquake disaster as one type of disasters is studied and discussed specially by the researchers. The research content is not only related to earthquake disaster cognition, also the enlightenments brought by post-disaster reconstruction and the establishment of the emergency mechanism after major earthquake disaster.

The third field includes disaster management, crisis management, emergency, emergency plan and other keywords. These keywords mainly embodies the response measures to the disasters and emergency, and emergency power, emergency management, emergency plan and other key words jointly represent the core concept about emergency management. In this field, polymerization degree of keywords is relatively higher, and disaster management is in the relatively core position of the field, from which can we see that the research in this field begins with emergency management, then continually approaches to disaster comprehensive management and lays a great foundation for conducting integrated disaster mitigation works.

The fourth field includes the keywords disaster alleviation, disaster mitigation education, disaster awareness, awareness of disaster reduction,etc, which express the concept about disaster consciousness education. The polymerization degree of these keywords is higher. According to the distribution condition of each point in the field, the content of the research in this area transits from early disaster alleviation, disaster reduction education to later disaster consciousness education (keyword "disaster consciousness" is in the core position of the field).

The fifth field is mainly concerned with China, the United States, community, countermeasures and other keywords. Comparing to other areas, the meaning expressed by the keywords of this field is more abstract. Therefore, we refer to the corresponding sample literature of these keywords. The literature mainly express the meaning about the situation of the disaster education research at home and abroad, so we think that named the field comparative study of disaster education between the domestic and foreign countries is relatively appropriate.

CONCLUSIONS

To sum up, Disaster education research in China mainly concentrates on disaster nursing education, earthquake disaster and reconstruction after an earthquake, disaster management and comprehensive calamity alleviation, disaster awareness education , education comparison research at home and abroad these five fields from 2003 to 2013 nearly 11years.

With disaster accidents representing an on-going threat to human society, the hot topics of disaster education concluded in this article may prove useful in a variety of educational settings. For example, most of the Disasters education projects at China can be designed to provide a rigorous introduction to disaster accident issues, and many of them should do so in an innovative way. Besides, by employing a fully multi-disciplinary curriculum, the courses of disaster education can help participants to better understand the complexity of disaster accident situations. In addition, by bringing together individuals from a wide variety of fields, the course of disaster education can create bridges across disciplinary boundaries and is helpful to enable participants to actively explore how the various facets of disaster emergency interconnect. At the same time, the courses of disaster education can offer developing professionals not only a broad range of theoretical and practical information, but also a unique opportunity to practice working in integrated, multi-profession teams that are similar to teams found in the real world.

However, the selection of any kind of method is not the most scientific. Several flaws deserve being put down. The objects selected in this research are general keywords rather than specific literature contents, so we do not exclude the impacts brought by that " the keywords are the same but the meanings are different " and " the keywords are different but the meanings are the same" when using Bicom software to carry on keywords frequency statistics. Still, keywords whose frequency is below the threshold are not brought into the domain of study, but this does not mean that these keywords in the field of the subject are without any meaning. At fact, only by continuously reducing the influence factors of study can we make the results more perfect. At the same time, we can also look forward to more and more scholars' coming to explore the hot spots of disaster education research.

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