Trend Analysis of Global Disaster Education Research Based on Scientific Knowledge Graphs

Min Zhang \(^1,2\) and Juanle Wang \(^1,3,4,\)\(^*\)

\(^1\) State Key Laboratory of Resources and Environmental Information System, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China; zhangmin@lreis.ac.cn
\(^2\) College of Resources and Environment, University of Chinese Academy of Sciences, Beijing 100049, China
\(^3\) China-Pakistan Joint Research Centre on Earth Sciences, Islamabad 45320, Pakistan
\(^4\) Jiangsu Centre for Collaborative Innovation in Geographical Information Resource Development and Application, Nanjing 210023, China

\(^*\) Correspondence: wangjlan@igsnrr.ac.cn; Tel.: +86-010-6488-8016

Abstract: Disaster reduction and prevention have become urgent issues worldwide. Disaster education is an effective way to deal with frequent global disaster risks, carry out disaster prevention and relief measures in a timely manner, and reduce disaster losses. Based on the Web of Science database, using bibliometrics and network analysis methods based on scientific knowledge graphs, we conducted a visual analysis of global disaster education research trends from the perspectives of national cooperation spatial distribution, research hotspot mining, hybrid network analysis, and institutional cooperation spatial distribution of disaster education. The following conclusions were drawn. (1) The spatial distribution of disaster education research is uneven: it is clustered in Europe, evenly distributed in Asia and Africa, and scattered in North America and Oceania. Moreover, the United States in North America, China and Japan in Asia, and Australia in Oceania have the largest number of articles. (2) The field of disaster education focuses mainly on the themes of education, disaster nursing, disaster risk and reduction, disaster awareness, and earthquakes. The general trend of research hotspots is disaster risk >> disaster preparedness >> disaster nurse >> disaster awareness >> disaster risk and reduction, realizing the great transformation from disaster rescue to disaster preparedness and then to disaster prevention awareness. (3) A hybrid network of keywords and countries revealed the research focus of various countries in the field of disaster education, and a hybrid network of keywords and categories showed that the research on disaster education primarily focuses on the disciplines of environment, nursing, geography, geology, atmosphere, ecology, and psychology. On this basis, the breadth and depth of the disaster education system should be further improved. (4) The spatial layout of disaster education research institutions showed a clustered distribution of research institutions in North America and Europe, even distribution in some regions in Asia, and sporadic distribution in Africa and Oceania. In-depth cooperation among institutions should be strengthened, the degree of attention paid to disaster education should be increased, and external cooperation should be actively carried out to improve the level of disaster education, particularly in Africa and Asia.

Keywords: disaster education; scientific knowledge graph; bibliometrics; network analysis; geographic spatial distribution

1. Introduction

In recent years, the increasing occurrence of global disasters has caused huge losses of life and property to human society, and disaster prevention and mitigation has become a common challenge facing the world [1]. Disaster education is an effective way to deal with frequent global disaster risks, implement disaster prevention and relief measures, and reduce disaster losses. This is also a common mission of mankind. Regarding the concept of
disaster education, different countries and regions have different categories, most of which
include natural disasters, man-made disasters, and other types of safety education [2]. In
the 1990s, disaster prevention education was comprehensively put on the agenda of disaster
risk and reduction in the United States. A disaster education model of “government-led
and social participation”, was formed. It promulgated a series of disaster education laws
and regulations [3]. Disaster education in Japan is characterized by “government-led, social
initiative, multiple participation, and diversified levels”. Schools are the primary body
of implementation; the state provides guarantees; and families, communities, and social
organizations cooperate and support [4]. After the Wenchuan earthquake in 2008, the
Chinese government proposed to incorporate disaster prevention knowledge into national
education, vigorously promote disaster education in primary and secondary schools in
China, and set “5.12” as the National Day for Disaster Prevention and Reduction [5]. In
2006, the UNESCO and Secretariat of the International Strategy for Disaster Reduction
launched the activity of “disaster reduction starts in schools”. They adopted it as the theme
of the International Day for Disaster Prevention and Reduction for two consecutive years
to encourage countries to incorporate disaster prevention and reduction into the syllabus
of general education and improve school safety. “Disaster education starts in schools,
and schools are the best place to carry out disaster education” has gradually become an
international consensus.

On the one hand, the ultimate purpose of disaster education is to enable students to
understand the relationship between natural disasters, the environment, and human beings;
cultivate awareness of disaster prevention and reduction; make correct judgments and take
measures to protect their safety when facing disasters; and train them for emergencies and
to aid mutual escape. On the other hand, disaster education helps students establish a
concept of morality, behavior, and sustainable development of harmonious coexistence
between humans and nature [3]. Disaster education is not only a knowledge education but
also a skill education. In carrying out the activities of the International Decade for Natural
Disaster Reduction, a consensus was reached: “Education is the center of disaster reduction
plans, and knowledge is the key to the success or failure of disaster reduction”. Therefore,
implementing safety education and disaster prevention education is an important way
to spread and popularize disaster knowledge to people and permanently and effectively
improve their disaster awareness and disaster prevention and reduction skills [6].

Disaster education has been proven to minimize the impact of disasters on society,
but there are still major financial, cultural, and technical obstacles to integrating disaster
prevention education into school curricula [7]. Kitagawa [8] discussed the continuation
of and changes in disaster education in Japan and proposed that the treatment mode of
disaster education in the curriculum has evolved from a scientific knowledge mode to a
citizen participation mode, to a multi-risk mode, to a daily life mode in a broader economic,
political, and social context. Hoffmann et al. analyzed the disaster prevention effect of
disaster education on residents in Thailand and the Philippines through social survey data.
They found that disaster education affects disaster preparedness primarily through social
capital and risk perception and that it will only improve the disaster prevention ability
of families with good education and who are not affected by disasters [9]. Combining
with the problems existing in disaster education in China, Shi [4] put forward relevant
suggestions on cultivating disaster culture, implementing comprehensive disaster educa-
tion and promoting disaster education through laws, regulations, and policies by studying
the background, positioning, changes, and practical exploration of disaster education in
Japan. Tanaka [10] investigated the earthquake preparedness of Americans and found
that respondents with disaster education were better prepared than those without, but
the improvement was not significant. Chen et al. [11] pointed out the current problems
of insufficient attention and understanding of disaster education, incomplete education
systems, and inadequate design in China and examined the value of disaster education
from philosophical, historical, realistic, and political viewpoints, proposing that multiple
action logics can promote the development of disaster education. Du [12] proposed that
the implementation of disaster education in China highlights an imbalance that restricts its effectiveness and hinders sustainable development. Zhang et al. [13] and Cheng et al. [14] used bibliometric methods to analyze the development trends and research hotspots of disaster education research in China.

According to the review, current research in the field of disaster education mainly focuses on the development process, problem analysis, enlightenment suggestions, or relevant curriculum research on disaster education in a country. However, the panorama of disaster education research is lacking, the spatial layout is vague, and the gap between regions is unclear.

To master the research trend of global disaster education, based on the Web of Science database, in this study, we conducted bibliometric and network analysis on the research of disaster education, in addition to discussing the development trend, research hotspots, and geospatial distribution of global disaster education, and providing an important reference for the wide and in-depth development of disaster education in the future.

2. Materials and Methods

2.1. Data Source

Disaster education research covers multiple disciplines, including environmental science, earth science, management, medicine, and psychology. To accurately grasp the research trends of global scholars on disaster education, based on the Web of Science (WOS) database, the world’s largest and most comprehensive academic platform covering disciplines, with “disaster education” as the subject term, this study retrieved more than 2100 relevant articles from 1990 to 2020. Non-academic papers such as news reports, conference reports, solicitation notices, volume headers, journal catalogues, and no authors were removed, and 1500 articles were retained as research samples to analyze the global dynamics of disaster education research.

2.2. Research Methods

This study used bibliometrics and network analysis to carry out research. Commonly used tools include CiteSpace, VOSviewer, SCI2, Gephi, etc. [15] Bibliometrics is using statistical methods to perform a simple statistical analysis on the characteristics of relevant documents containing strategic intelligence and using data to describe or explain the data characteristics and change laws of documents, so as to achieve the purpose of strategic intelligence research [16]. VOSviewer 1.6.9 and CiteSpace 5.3 R4 (64 bit) were the bibliometric tools used in this study. VOSviewer [17] is a software tool for constructing and visualizing relational networks. It was developed by Nees Jan van Eck and Ludo Waltman at the Science and Technology Research Center of Leiden University (CWTS). It can be used to extract important terms from the scientific literature and to construct a visual co-occurrence network with excellent visual effects. CiteSpace [18,19] is an information visualization software developed by Dr. Chen, a professor at the College of Information Science and Technology of Drexel University, based on citation analysis theory and using Java language. It integrates information visualization technology, applied mathematics, graphics, computer science, metrology, and other disciplines. Gephi [20] is an open-source free cross-platform JVM-based complex network analysis software that is mainly used for interactive visualization and detection of various networks and complex systems, as well as dynamic and hierarchical diagrams.

In CiteSpace, the modularity represents the network modularity index. The larger the value, the better the clustering result of the network. The distribution range of the Q value is [0, 1]. When Q > 0.3, the divided clustering structure is significant. The average contour value S is an important basis for determining whether the knowledge graph structure and clustering information are reasonable. When the S value was greater than 0.5, the clustering information was considered effective [21,22]. Node selected country, keyword, category, and institution. Gephi calculates the degree of each node in the relational network and represents the number of connections with other nodes.
Export the relevant information of the 1500 studies after screening into two formats: (1) export as a tab-delimited file format, and directly import it into the project created by VOSviewer, then set parameters to draw the keyword scientific knowledge graph; (2) export to a plain text format, then import it into CiteSpace to perform the deduplication operation, set parameters as required, and draw the keyword-countries hybrid network and keyword-categories hybrid network. Finally, with the help of the Gephi network analysis tool, the national cooperation network and institutional cooperation network were visualized in geospatial space and in-depth analysis was carried out.

3. Results
3.1. Spatial Distribution of Disaster Education Research

The national partnership obtained using CiteSpace was combined with the global map in Gephi to obtain the geospatial distribution of the national cooperation network (Figure 1). The node size represents the number of publications in the field of disaster education. The top 10 countries with the number of publications and their corresponding cooperation number are shown in Table 1, where “degree” indicates the number of connections between the country and other countries, such as “degree” in the United States is 32, indicating that American scholars cooperate with scholars from another 32 countries to carry out disaster education research.

As shown in Figure 1 and Table 1, the United States, China, and Australia are the countries with the largest number of publications (183, 72, and 59, respectively). Among the main contributors to disaster education research, developed countries include Japan (51), Britain (33), New Zealand (19), South Korea (18), and Italy (16). Developed countries account for three-quarters of the countries with a large number of publications. In addition to China, Turkey (19) and Iran (15) are developing countries that have made important contributions to disaster education.

![Figure 1. Geographical distribution of country cooperation network.](image-url)
From the spatial distribution and connection density, it can be seen that cooperative countries are mainly concentrated in North America, Europe, Asia, and Oceania. The United States and Canada in North America cooperate more with other countries, with degrees 32 and 29, respectively. The United States is not only a leader in disaster education research on the African continent but also globally. Simultaneously, the intensive connection between the United States and Europe indicates that the United States cooperates closely with European countries. China has cooperated with scholars from 29 countries to conduct research. It is the most active country on the Asian continent, followed by Japan, with a degree of 14.

In addition, South Korea and Iran, which have relatively high volumes of publications, had significantly lower degrees (2 and 4, respectively). Australia, in Oceania, has relatively close cooperation with foreign countries. In addition to North America, there is more cooperation between Europe and Asia, of which Britain has the most foreign cooperation. Europe was the most important contributor to global disaster education research. More than half of the active countries come from this region, which has the largest number of countries studying disaster education.

3.2. Mining Research Hotspots of Disaster Education

3.2.1. Keywords Scientific Knowledge Graph

Figure 2 shows a keyword scientific knowledge graph. High-frequency keywords included natural disaster, education, disaster preparedness, emergency preparedness, nurses, resilience, earthquake, risk, knowledge, disaster risk reduction, perception, emergency, management, competence, disaster medicine, and vulnerability. The results of keyword clustering showed that $Q = 0.688$ and $S = 0.576$, indicating that the divided clustering structure is significant, and the clustering information is effective. The keywords were grouped into the following ten categories: increasing disaster preparedness, learner-centered education international principle, disaster health competencies, educational attachment, community welfare, public perception, disaster nursing, and methodological review. Therefore, the research hotspots in the field of disaster education can be summarized as disaster education, disaster awareness, earthquakes, disaster nursing, disaster risk reduction, and so on.

3.2.2. Keyword Time-Zone Graph

The time-zone graph is the time factor added to the scientific knowledge graph, also known as the theme path graph. The time zone graph of the keywords was drawn based on the keyword scientific knowledge graph (Figure 3). “+” in Figure 3 represents the keyword, and the corresponding timeline is the year when the keyword first appeared in the dataset. The line represents the relationship between the keywords. The keyword was fixed in the year when it first appeared. Subsequently, it will no longer be repeated in the time-zone graph if it appears in the paper and only increases the frequency of the first occurrence by 1; the “+” will be larger with the increase in frequency. If it appears in the same article with previous keywords, it is linked with lines.
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As shown in Figure 3, research on disaster education first appeared in 1996, and repeatedly in subsequent literature. It is the keyword with the most frequency in the field of disaster education; hence, the corresponding '+' is the largest. From 2006 to 2010, there were many nodes and dense connections, indicating that during this period, the number of keywords related to disaster education increased significantly, including disaster preparedness, earthquake, nurse, vulnerability, perception, resilience, emergency preparedness, disaster medicine, children, knowledge, and disaster risk reduction. Although there were few nodes in 2012–2018, which means that there were few new keywords, this does not mean that few relevant papers were published in this period. It may be possible that most of the keywords in the papers appeared and hence were accumulated in the year of their first appearance. In early 2020, COVID-19 broke out, and related papers emerged; hence, COVID-19 appeared in 2020 with a higher frequency.

Figure 2. Keywords scientific knowledge graph.

Figure 3. Disaster education time-zone graph.
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3.3. Hybrid Network Based on Research Hotspots

3.3.1. Hybrid Network of Keywords and Countries

By selecting countries and keywords as nodes of the co-occurrence network, a hybrid network of countries and research hotspots was generated (Figure 4). Each square node in Figure 4 represents a research hotspot and is associated with a country or region, revealing the relationship between disaster education research hotspot and the country, such as those between the USA and “public health,” people R China and “nursing”, “management”, Japan and “disaster risk reduction”, Italy and “disaster medicine”, Australia and “preparedness”, Austria and “risk”, “vulnerability”, etc. These connections represent research hotspots. American scholars focus on post-disaster public health research, Chinese scholars focus on disaster nursing and disaster management, Japanese scholars pay more attention to disaster prevention and reduction, Italian scholars focus on disaster medicine, and disaster risk and vulnerability are research hotspots for scholars in Austria. Furthermore, Figure 4 reveals the relationship between major natural disaster events and the country. For example, “Hurricane Katrina” points to the USA, indicating that American scholars have paid considerable attention to disaster events. This can also be explained by the spatial connection between the disaster events and the country. Hurricane Katrina landed in Florida on 25 August 2005, causing serious damage to New Orleans, resulting in more than 1833 deaths.

Figure 4. A hybrid network of keywords and countries.
Figure 5. A hybrid network of keywords and categories.

3.4. Spatial Distribution of Disaster Education Research Institutions

Figure 6 shows the spatial distribution of the cooperative network of research institutions, and the node size indicates the number of publications by research institutions. The top 12 countries with the number of publications and their corresponding cooperation frequency are shown in Table 2, where “degree” refers to the number of connections between the research institution and other institutions. Based on the analysis of information in Figure 6 and Table 2, from the perspective of publications, Flinders Univ S Australia and Kyoto Univ have the largest number of papers, each with 10, followed by Univ Piemonte Orientale, Hong Kong Polytech Univ, Sichuan Univ, Harvard Univ, and Chinese Acad Sci. Two-thirds of the institutions in Table 2 belong to developed countries, and the remaining one-third belong to China, which shows that China is a developing country that has made important contributions to disaster education and research. In terms of spatial distribution and connection density, research institutions are primarily distributed in North America, Europe, Asia, and Oceania, while scattered in Africa, Oceania, and South America. North
America has the largest number of institutions carrying out research on disaster education, mainly in the United States, which is distributed in clusters. The representative research institution is Harvard Univ. Moreover, research institutions in North America cooperate more with other regions, especially with European research institutions. Research institutions in the European region are mainly concentrated in Western and southern Europe, and Univ Piemonte Orientale is the research institution with the highest number of publications in the region, but there is relatively little cooperation among Europe, Asia, and Oceania. The distribution of institutions in Asia is relatively even in East Asia, Southeast Asia, South Asia, and West Asia, but the institutions with high publications are concentrated in East Asia, mainly in China and Japan, including Kyoto Univ, Hong Kong Polytech Univ, Sichuan Univ, Chinese Acad Sci, and Chinese Univ Hong Kong. Flinders Univ S Australia in Oceania has a prominent number of papers but has less cooperation with other research institutions.

Figure 6. Spatial distribution of research institutions cooperation network.

Table 2. Number of publications and cooperation frequency of research institutions.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of Publications</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyoto Univ</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Flinders Univ S Australia</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Univ Piemonte Orientale</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Hong Kong Polytech Univ</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Sichuan Univ</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Harvard Univ</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Chinese Acad Sci</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Massey Univ</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Univ Auckland</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Chinese Univ Hong Kong</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Clin Emergency Hosp</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Columbia Univ</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>
Flinders Univ S Australia ranked first in the number of articles published because its training majors include education, medicine, and public health, nursing and health sciences, etc. The main reason for the top ranking of Hong Kong Polytechnic University and Sichuan University is that after the Wenchuan earthquake in 2008, Sichuan University and Hong Kong Polytechnic University jointly established the Institute for Disaster Management and Reconstruction, an international and high-level new college integrating scientific research, talent training, and social services in the field of disaster prevention and mitigation and post-disaster reconstruction, focusing on the interdisciplinary preface of comprehensive disaster reduction and emergency management. The college focuses on disaster medicine and health, disaster science and engineering, disaster sociology, and emergency management.

4. Discussion

4.1. The Spatial Distribution of Disaster Education Research Is Uneven

The spatial distribution of disaster education research is unbalanced and can be divided into three modes: aggregate, even, and sporadic. Europe has an aggregated distribution, Asia and Africa are evenly distributed, and North America and Oceania are scattered distribution. Although there are no countries with a prominent number of publications in Europe, most of the countries in the region are developed, and many countries have conducted research on disaster education. Asia, Africa, and South America are mostly developing countries with backward economies, technology, and frequent natural disasters. Although a large number of countries implement disaster education, disaster education in the region needs to be popularized and strengthened according to the needs of disaster prevention and reduction. The number of countries in North America and Oceania is small, and fewer countries are involved in disaster education research; therefore, they are scattered. Specifically, countries such as the United States in North America, China and Japan in Asia, and Australia in Oceania have a large number of publications and cooperation. South Korea, Iran, and New Zealand have similar models, with a large number of publications but relatively little cooperation. Britain and Italy in Europe have a small number of publications but more frequent cooperation. Most of the other countries, especially African countries, have a small number of publications and collaborations.

4.2. Trend Change of Disaster Education Research

Based on the mining results of disaster education research hotspots, the current field of disaster education mainly focuses on the themes of disaster education, disaster nursing, disaster risk and reduction, disaster awareness, earthquakes, and so on. According to the sequence of high-frequency keywords, the keyword time-zone graph shows that the research on disaster education began in 1996. At the same time, it also reveals the general trend of hotspots in the field of disaster education, showing a transformation from disaster risk >> disaster preparedness >> disaster nursing >> disaster awareness >> disaster risk and reduction, and realizing a great transformation from disaster relief to disaster preparedness and then to disaster prevention awareness. It also focuses on the research on the deep principles and mechanisms of disaster risk, vulnerability, resilience, and other impacts during or after disasters.

4.3. Disaster Education System Needs to Be Improved

The hybrid network of keywords and countries revealed the research priorities of various countries in the field of disaster education. For example, scholars in Austria pay attention to research on pre-disaster risk and vulnerability assessment, Japanese scholars are interested in disaster prevention and mitigation before and during disasters, and American and Italian scholars focus on post-disaster medicine and public health, but each stage of disaster does not exist independently. Good pre-disaster assessment and management can effectively reduce disaster losses and reduce the pressure on medical nursing during and after disasters. Therefore, countries must learn from each other. In addition, the hybrid network of keywords and categories showed that disaster education research is
mainly concentrated in the fields of environment, nursing, geography, geology, atmosphere, ecology, and psychology, which is consistent with the research trend analysis results of Shen et al. [23] in the field of natural disasters. Therefore, the breadth and depth of disaster education systems should be further improved, and geography and psychology education should be strengthened. Moreover, disaster education should not be limited to only students. Other people in society also need to acquire disaster knowledge [24]. Through discussion, practice, simulation, and other educational methods, a new model of cooperative learning was introduced to establish a long-term disaster education mechanism with college attention, teacher responsibility, family support, and government assistance [25]. After the Wenchuan earthquake in 2008, General Secretary Hu Jintao proposed integrating disaster prevention and reduction knowledge into the national education system, and some experts suggested integrating disaster education research into the sustainable development strategy system [26]. It can be seen that disaster education has an important impact on personal life safety and national economic development; therefore, a perfect disaster education system is important and urgent to improve national disaster awareness and disaster prevention literacy.

4.4. Collaboration with Disaster Education Research Institutions

The spatial distribution of research institutions in the field of disaster education can be summarized as follows: research institutions in North America and Europe are clustered; Asia is evenly distributed in local regions; and Africa and Oceania are scattered distribution. The United States in North America; Britain, Germany, and Italy in Europe; and China and Japan in Asia have a relatively high degree of aggregation. Africa’s economy is backward, and natural disasters such as drought exist throughout the year; however, there are few disasters education and research institutions in the region. Specifically, research institutions such as Flinders Univ S Australia, Univ Piemonte Orientale, Hong Kong Polytech Univ, Sichuan Univ, Harvard Univ, and Chinese Acad Sci have the characteristics of having a large number of publications and cooperation. Kyoto Univ has the highest number of publications but less foreign cooperation and is only connected with Flinders Univ S Australia. Massey Univ, Univ Auckland, Chinese Univ Hong Kong, Clin Emergency Hosp, and Columbia Univ have the same number of publications, but the first three have a relatively higher number of publications but less cooperation, whereas the latter two have more cooperation. Disaster education is a long-term and arduous task that requires relevant global institutions to cooperate and learn from one another. Therefore, we should strengthen in-depth cooperation among institutions, pay more attention to disaster education, realize the necessity and urgency of disaster education in disaster risk and reduction, and advocate active cooperation with foreign countries to promote disaster education and improve their level of disaster education, especially in Africa and Asia.

This study only analyzed the English literature, and due to the limitations of VOSviewer and CiteSpace software, and some errors in data processing and conversion, there may be some differences in the scientific knowledge graph drawn. However, compared with the previous relevant literature [14], the conclusions are generally reliable and credible.

5. Conclusions

Disaster education is an effective way to deal with the frequent occurrence of global disaster phenomena; carry out disaster prevention, risk reduction, and relief; as well as minimize potential disaster losses. Currently, countries have reached a consensus that “Education is the center of disaster reduction plans, and knowledge is the key to the success or failure of disaster reduction”. Therefore, based on the Web of Science database, in this study, we searched the literature with the theme of “disaster education”, carried out bibliometric and network analysis with the help of VOSviewer, CiteSpace and Gephi, and conducted a visual analysis of the research trend of global disaster education from the perspectives of the spatial distribution of disaster education research, mining of research hotspots, hybrid network analysis and spatial distribution of research institutions. The
following conclusions were drawn: (1) The spatial distribution of disaster education research is uneven: Europe is clustered, Asia and Africa are evenly distributed, and North America and Oceania are scattered distribution. The United States in North America, China and Japan in Asia, and Australia in Oceania have the largest number of publications and cooperation; South Korea, Iran, and New Zealand have a large number of publications but less cooperation; Britain and Italy in Europe have relatively fewer publications but more frequent cooperation. Most other countries, especially African countries, have few publications or cooperation. (2) At present, the field of disaster education focuses mainly on the themes of disaster education, disaster nursing, disaster prevention and reduction, disaster awareness, and earthquakes. The general trend of research hotspots shows the transformation from disaster risk >> disaster preparedness >> disaster nursing >> disaster awareness >> disaster risk and reduction, realizing the great transformation from disaster rescue to disaster preparedness and then to disaster prevention awareness, and paying attention to the study of the in-depth principles and mechanisms of disaster risk, vulnerability, resilience, and other impacts during and after disasters. (3) The hybrid network of keywords and countries reveals the research focus of various countries in the field of disaster education; however, each disaster stage does not exist independently. For example, good pre-disaster assessment and management can effectively reduce disaster loss and pressure on medical nursing during and after disasters. The hybrid network of keywords and categories shows that disaster education research is mainly concentrated in the disciplines of the environment, nursing, geography, geology, atmosphere, ecology, and psychology. Therefore, the breadth and depth of disaster education systems should be further improved, and geography and psychology education should be strengthened. (4) The spatial distribution of disaster education research institutions is concentrated in North America and Europe, evenly distributed in some regions of Asia, and scattered in Africa, Oceania, and South America. We should strengthen in-depth cooperation among institutions, pay more attention to disaster education, actively cooperate with foreign countries, and improve the level of disaster education, particularly in Africa and Asia.

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