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A scientometric review of disaster education: Does it matter?

Muhammad Zickryl Hakim Roslan[1B-D*], Davi Sofyan[2D], Ibraheem Musa Oluwatoyin[3C], Jeferson Roberto Rojo[4C], Khairul Hafezad Abdullah[5AC]

[*1]School of Languages, Civilisation and Philosophy, Universiti Utara Malaysia, Malaysia
[2]Department of Physical Education, Universitas Majalengka, Indonesia
[3]Department of Human Kinetic Education, Faculty of Education, University of Ilorin, Nigeria
[4]Department of Physical Education, Universidade Estadual de Maringadisabled, Maringa, Brazil
[5]Department of Academic Affairs, Universiti Teknologi MARA, Perlis Branch, Arau Campus, Malaysia

Corresponding author: Muhammad Zickryl Hakim Roslan, School of Languages, Civilisation, and Philosophy, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia; E-mail: zickrylhakim@gmail.com

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Abstract. Disaster preparedness and response require education and training; unavoidable disasters necessitate efficacious disaster education. It is still a new field of education, despite previous research in disaster risk management and environmental studies. This study examines the evolution of disaster education by using the renowned Scopus and Web of Science databases via ScientoPy. The parameters examined included publication growth, top source titles, countries, institutions, and analysis of author keywords. This study demonstrated that researchers in Japan are constantly engaged in active disaster education research to raise disaster awareness throughout the country. Between 2020 and 2021, the University College London produced the most publications and depicted that its top priorities are risk management, disaster mitigation, and emergency response. The IOP Conference Series: Earth and Environmental Science had the highest annual growth rate of publications. The primary terms associated with disaster education are "disaster", "disaster preparedness", "disaster risk reduction", and "earthquake". Future researchers should examine these keywords in greater detail to comprehend their relationship through scoping or systematic literature reviews. This study may be fascinated practitioners and researchers interested in advancing or discovering new knowledge in this field and developing rigorous disaster education research theories and practices.

Keywords: disaster education; scientometric; publication growth; Scopus; Web of Science

INTRODUCTION

Education and training are critical components of disaster preparedness and response, and they are required if a disaster is activated (Sonneborn et al., 2018). This scenario emphasised the crucial role of disaster education in addressing the massive challenge of unavoidable disasters. It is worth noting that disaster education research has been conducted in numerous professions, including disaster risk management and environmental studies (Hosseini & Izadkhah, 2020). It could be contended that the increasing frequency and scale of disasters and population growth in high-risk areas highlight the critical need for disaster education and training across a wide range of disciplines (Masterson et al., 2019). Yet, disaster education is a relatively new field of study in the realm of education (Kitagawa, 2021). In contrast, one of the most significant concerns in disaster management is involving the community in initiating preventative measures before a disaster on an individual level. Therefore, disaster education may provide the most critical response to this grave concern.

Lack of awareness and comprehension of hazards, vulnerabilities, and suspected risks contributes to people's inability to cope with disasters. Hence, preparedness for disasters must be instilled and trained at a young age through disaster education. A possible reason is that students are one of the most vulnerable people affected by disasters, suffering physically and psychologically (Tipler et al., 2017). Accordingly, students' well-being has been prioritised alongside global security efforts. In addition, horrific catastrophes in university laboratories due to a lack of awareness and grasp of dangers have been widely reported in the local media, but, nothing is known about them in the literature (Abdullah & Aziz, 2020). Concerns are growing as educational institutions lack adequate emergency preparedness programmes for students (Kruger et al., 2018). Tanner and Doberstein (2015) discovered that, even though student groups are the most vulnerable of all community groups in the event of a disaster, they are the most overlooked group regarding emergency preparedness. In a similar vein, Tan et al. (2017) conducted a study and discovered that less than half of university students possessed the necessary knowledge and skills for disaster rescue.

Also, the educational community must be aware of and understand the dangers within the educational institution and its environs. A possible explanation is that the learning community's readiness to increase knowledge and understanding of disaster risk reduction is the most critical control aspect. Simultaneously, the increasing frequency and severity of emergencies and disasters, as well as the devastation they cause, have increased a person's capacity and enabled them to apply it in their daily lives as the most effective way to reduce their vulnerability to such incidents (Adiyoso & Kanegae, 2012). One significant omission when examining the current discourse on disaster education is that the scientific aspect of disasters is frequently discussed and taught separately from the human dimension (Park, 2020). With the advancement of technology, acquiring knowledge and applying it to the realm of action is considered the only effective method of preventing disasters or mitigating their effects today (Torani et al., 2019). Additionally, target groups and individuals should be identified to ensure that disaster education programmes are as effective as possible for community members.

People have become more careless in their use of nature since the mid-20th century, which is the root of many of today's issues. According to Bulut (2020), nature's cycles and the effects of global warming have shaped our lives. People around the world are frequently confronted with natural disasters and their consequences. Disasters are facts and events that affect countries' sociological and psychological structures, causing loss of

life, property, and economics. In order to bolster disaster preparedness capacity, numerous initiatives can be undertaken, either directly or indirectly. As an inseparable social subsystem from society, schools have the potential to be the primary actors in developing community response and preparedness for disasters through education (Kamil et al., 2020). Educational initiatives must be equitable to reduce the likelihood of disasters affecting the most vulnerable people and infrastructure. It is also important to note that disaster education can significantly reduce the vulnerability of individuals, groups, their possessions, or their routines to natural hazards.

The current study was conducted to update scientific publications pertinent to disaster education. Scientific publications are regarded as the conscientious contribution of scholars to a particular subject. Consequently, analysing research activity on a specific topic enables scholars to identify areas of high interest that need additional research efforts (Abdullah, 2021). Additionally, scientometric studies are gaining significant attention for providing valuable information about scientific research and its progression within a particular field (Dey, 2022). Despite the growing public importance of disaster education research, there is currently a deficiency of scientometric studies on disaster education written by previous scholars. Previous researchers had focused their scientometric studies on natural disaster management (Sahil & Sood, 2021), smart disaster management (Neelam & Sood, 2020), urban disaster resilience (Xu et al., 2021), disaster risk perception (Yu et al., 2021), and disaster management and the use of information and communication technology (Kaur & Sood, 2020). Hence, the primary objective of this research was to better understand the available scientific knowledge in the field of disaster education and the evolution of this field by scrutinising Scopus and Web of Science (WoS) databases.

METHOD

Scopus and WoS databases were utilised to retrieve the list of publications in this study. These two primary bibliographic databases contain the most comprehensive publication metadata and impact metrics collection. As such, they serve as the primary tools for various tasks, ranging from journal and literature selection and personal career tracking to large-scale metric analyses and research evaluation practices at all levels (Pranckutė, 2021; Sofyan & Abdullah, 2022).

The Scopus and WoS databases were queried for a list of publications on disaster education using the search term "Disaster Education" on February 7, 2022. This process uses the search string by going over the selected keyword within the title, abstract, and author keywords in Scopus and WoS topic searches. And, it applied additional features by using keywords plus R in the WoS database. The search term strategy is enthused based on a trend analysis of disaster education research conducted by Zhang and Wang (2022).

The search strategy yielded 695 documents from both databases ranging from January 1, 1990 to December 31, 2021. It covered articles, proceeding papers, conference papers, review papers, and book chapters. The documents methodically collect and synthesise relevant literature to evaluate a specific research topic, substantive domain, theoretical approach, or methodology, providing readers with a contemporary grasp of the studied subject (Abdullah & Sofyan, 2022). The document types and year of initiation were set to default in the ScientoPy software (Ruiz-Rosero et al., 2019). Nevertheless, in terms of language, it was irrelevant in this study because the purpose of a scientometric review is to assess the impact of publications rather than read the entire document (Sofyan et al., 2022).

After being imported from the Scopus and Web of Science databases, data was aggregated before operating through ScientoPy. ScientoPy software was utilised to investigate the study's trending topics and parameters. ScientoPy is a Python-based scientometric analysis tool that could eliminate bias in individual publications through its unique pre-processing segment (Ruiz-Rosero et al., 2019).

The data is harmonised during pre-processing stage by replacing the comma in the author's name with a semicolon, removing dots, commas, and unusual accents from the author's name, and removing duplicated samples with identical titles and authors. This procedure increases the reliability and precision of the datasets (Ruiz-Rosero et al., 2019). The data were listed together in the new dataset after pre-processing.

Table 1 signified the final sample examined in this study, with 405 documents produced after duplicate data was removed. It was made up of 276 Scopus and 129 WoS lists. It is critical to note that, after duplicate removal, the total papers meet the minimum requirement of metric analysis with more significance than 300, as Donthu et al. (2021) outlined.

Table 1. Information on Initial Data Analysis

Information	Number	Percentage (%)
Loaded papers	695	
Omitted papers by document type	49	7.10
Total papers after omitted papers removed	646	
Loaded papers from WoS	276	42.70
Loaded papers from Scopus	370	57.30
Duplicated removal results:		
Duplicated papers found	241	37.30
Removed duplicated papers from WoS	0	0.00
Removed duplicated papers from Scopus	241	65.10
Duplicated documents with different cites by	161	66.80
Total papers after duplicate removal	405	
Papers from WoS	276	68.10
Papers from Scopus	129	31.90

RESULT

Publication Growth

Figure 1 illustrates the remarkable growth of publications on disaster education in both databases. Notably, compared to the Scopus database, the publication trajectory in WoS has increased significantly since 2012. This phenomenon is best explained by the fact that education is a critical component of disaster risk reduction in the modern world.

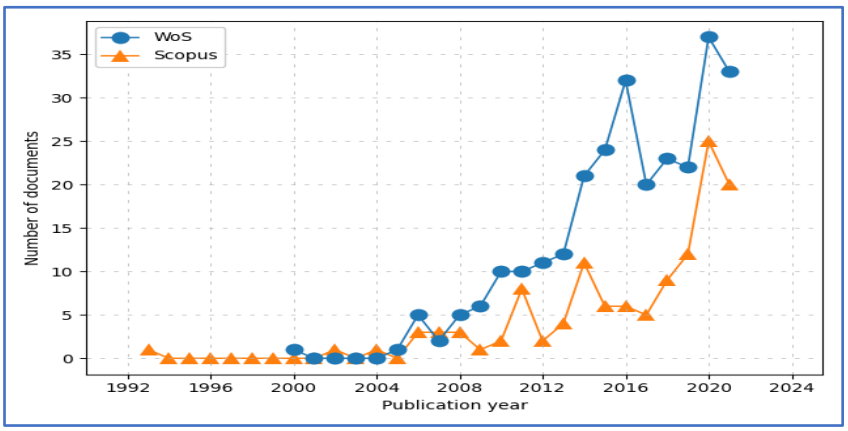

Figure 1. Database timeline

According to Septiana et al. (2019), the disaster management cycle should include educational components, as education is a component of disaster management aimed at increasing disaster awareness and understanding. Moreover, disaster education can be conducted informally to be implemented formally, such as through community wisdom. It could support Sonneborn et al. (2018) assertion that education and training are critical components of disaster preparedness and response and are required in the event of a disaster activation. Indirectly, this scenario underscored the essential role of disaster education in addressing the enormous challenge posed by unavoidable disasters. Disaster education is not only a knowledge-based endeavour but also a skill-based one. Thus, implementing disaster education is critical for disseminating and popularising disaster knowledge and permanently and effectively improving people's disaster awareness, prevention, and reduction skills (Zhang & Wang, 2022).

Descriptive category of analysis

The study's first descriptive category of analysis was source titles. This classification has 222 source titles for published disaster education articles. Table 2 lists the top ten source titles with the most articles published between 1990 and 2021. The International Journal of Disaster Risk Reduction published the most papers, with 26. The following source title contained 22 documents: Journal of Disaster Research, and the third composed 18 documents: Prehospital and Disaster Medicine.

Moreover, Table 2 demonstrates that the source titles appear first and second; its average annual growth rate (AGR) was positive in 2020 and 2021. As a result, the number of articles produced increased. The source titles indicate that the interest in publishing research on disaster education in empirical and theoretical studies continues to grow. This information will assist readers, and future researchers in obtaining the most up-to-date information from these source titles to advance their current research using the most up-to-date evidence and pertinent issues. Rather than that, the third journal had a negative AGR during the same period.

On the other hand, prehospital and Disaster Medicine has the highest Hirsch index (h-index) at ten. The IOP Conference Series: Earth and Environmental Science received the highest AGR in this study. A likely reason is that the number of publications based on conference proceedings is increasing rapidly, indicating the growing importance of conference proceedings among contemporary researchers.

The second descriptive category examined in this study is country. 66 countries actively publish articles on disaster education. Figure 2 depicts the top ten countries regarding the number of articles published, with at least five publications. Over 100 articles on disaster education were published by Japanese scholars, totalling 126 documents. The findings indicated that Japan, as a country prone to natural disasters, particularly earthquakes, tsunamis, and typhoons, has a long history of disaster education. The findings also indicated how Japan's public disaster education is vital to propagate disaster awareness (Kitagawa, 2016) constantly. In this study, the United States became the second-largest publishing country, with 73 publications and Indonesia is ranked third, with 50 publications. These countries formed the nucleus of scientific production in disaster education, with document production increasing steadily since 2004. Indonesia has the highest average number of documents per year (ADY) at 15, followed by Japan (9.5) and China (6.5). Indonesian scholars have been doing more research on disaster education annually. Education programmes have been implemented to reduce disaster losses and make people more resilient, leading to better disaster management in Indonesia (Amri et al., 2017). Likewise, China has advanced disaster education by

publishing additional topics to increase disaster awareness and capability regarding disaster prevention (Zhu & Zhang, 2017). Based on these findings, scholars from various countries published research on disaster education, demonstrating the critical nature of identifying and specifying the factors contributing to disaster mitigation efforts' success. It was also vital to provide the appropriate information with necessary actions and response information to avoid loss of life and property (Hammood et al., 2021).

Table 2. The top ten source titles

Position	Source Title	Total	AGR	h-Index
1	International Journal of Disaster Risk Reduction	26	1.5	9
2	Journal of Disaster Research	22	1.5	6
3	Prehospital and Disaster Medicine	18	-1	10
4	Disaster Medicine and Public Health Preparedness	14	-0.5	7
5	IOP Conference Series: Earth and Environmental Science	13	3	2
6	Natural Hazards	12	2	6
7	Disaster Prevention and Management	9	-0.5	6
8	International Journal of Environmental Research and Public Health	8	1	3
9	American Journal of Disaster Medicine	5	-0.5	3
10	Australian Journal of Emergency Management	4	0	1

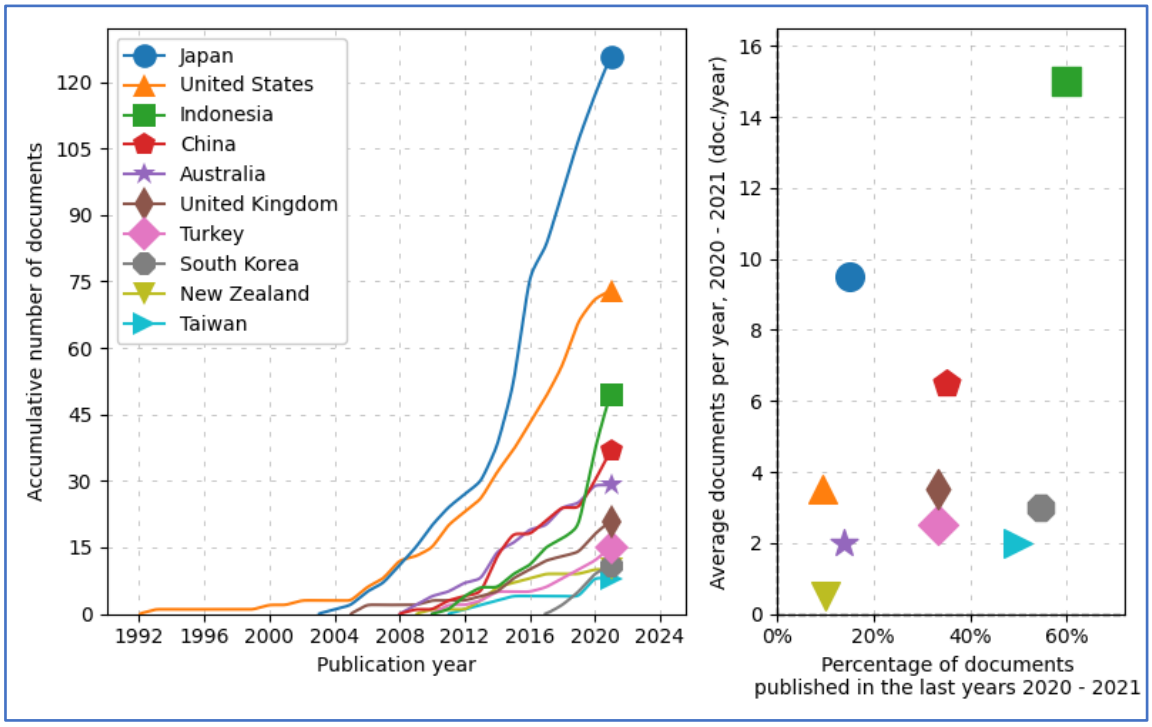

Figure 2. Ranking the most productive countries on disaster education

Meanwhile, articles on disaster education have been published by 423 institutions. The ten institutions with the most articles published are depicted in Figure 3. Kyoto University had the most articles published in this field, with a total of 20, and the total number of publications between 2020 and 2021 was 10%. Tohoku University was in the second position with 16 publications, accounting for 6% of all publications between 2020 and 2021. With nine publications, Syiah Kuala University in Indonesia is ranked third. In this study, University College London (UCL) contributed the highest percentage of publications (75%) between 2020 and 2021. It is indicated that assessing global risks, mitigating disasters, and resolving humanitarian crises are significant challenges requiring

coordinated and collaborative action by UCL. The UCL aspires to be a global leader in risk management, disaster reduction, and emergency response (University College London, 2022). The University of Tokyo is the second-highest-ranking institution in disaster education research published in the last two years (33%). The authors' affiliations dictated the institution's country of origin in this study. It is noted that Japan has the most articles published, with five of the top ten institutions being Japanese. This matter indicated that natural disaster preparedness had been a constant priority in Japan due to its geographic location, where disaster education has taken place in formal and informal settings (Kitagawa, 2015).

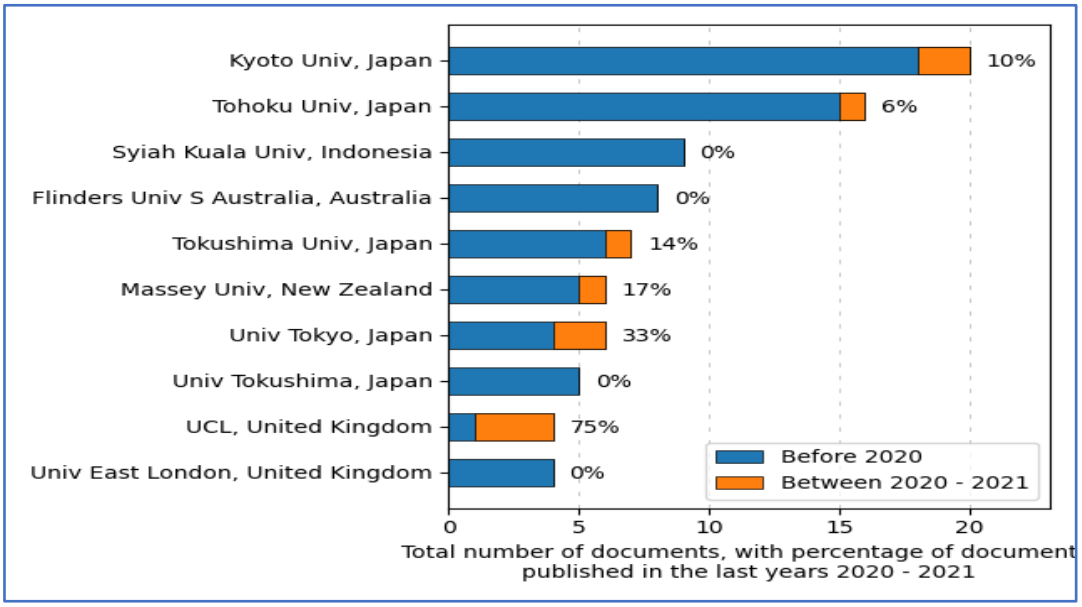

Figure 3. Ranking the most productive institutions on disaster education

Analysis of the authors' keywords

Author keywords in research articles define the article's field, subfield, topic, and research issue. Additionally, other researchers can locate papers by conducting a topic search (Abd Aziz et al., 2021). Author keywords are used by most electronic search engines, databases, and journal websites to identify relevant documents and display them to interested readers. The top ten author keywords were analysed in this study based on their co-occurrence in previous studies. Figure 4 shows the total number of documents, with the percentage published in the last two years (2020 to 2021).

As illustrated in Figure 4, the most frequently used keywords in previous studies are "Disaster education", "Disaster", and "Disaster preparedness". Data processing gave precedence to this broad term directly related to the subject; subsequently, significant keywords are made available to assist readers, and future researchers in determining which ones to use when conducting document analysis (Abdullah et al., 2022). These results showed that disaster education is an effective method of dealing with the frequent occurrence of global disaster phenomena, disaster prevention, risk reduction, relief, and disaster loss minimisation, which is in line with a study conducted by Zhang and Wang (2022). Figure 4 also depicts the percentage of documents published in prior years (PDLY) (2019–2020) as a proxy for relative growth. This indicator demonstrates that while "Disaster risk reduction" is the sixth item on this list, it has the highest PDLY value (53%). It is self-evident that the topic has grown the most in popularity over the last two years

compared to other keywords. "Disaster preparedness" and "Earthquake" are two additional topics with a high PDLY of more than 30%.

These popular search terms demonstrate that disasters are erratic events that can wreak havoc and claim lives at any time. Thus, education and communication are critical components in strengthening the resilience of communities vulnerable to disasters (Sarker et al., 2020). Besides, disaster risk reduction efforts in a country frequently overlook organisations by assisting them in becoming more resilient to disasters; consequently, society becomes more resilient. Building community resilience is becoming a critical focus in disaster risk reduction activities. Today, it is vital to conduct practical research to explain the causes and consequences of disaster risk reduction efforts to increase community resilience to disasters (Cui et al., 2018). Also, legislation requires guidance to effectively reduce disaster risk (Horsfall et al., 2022).

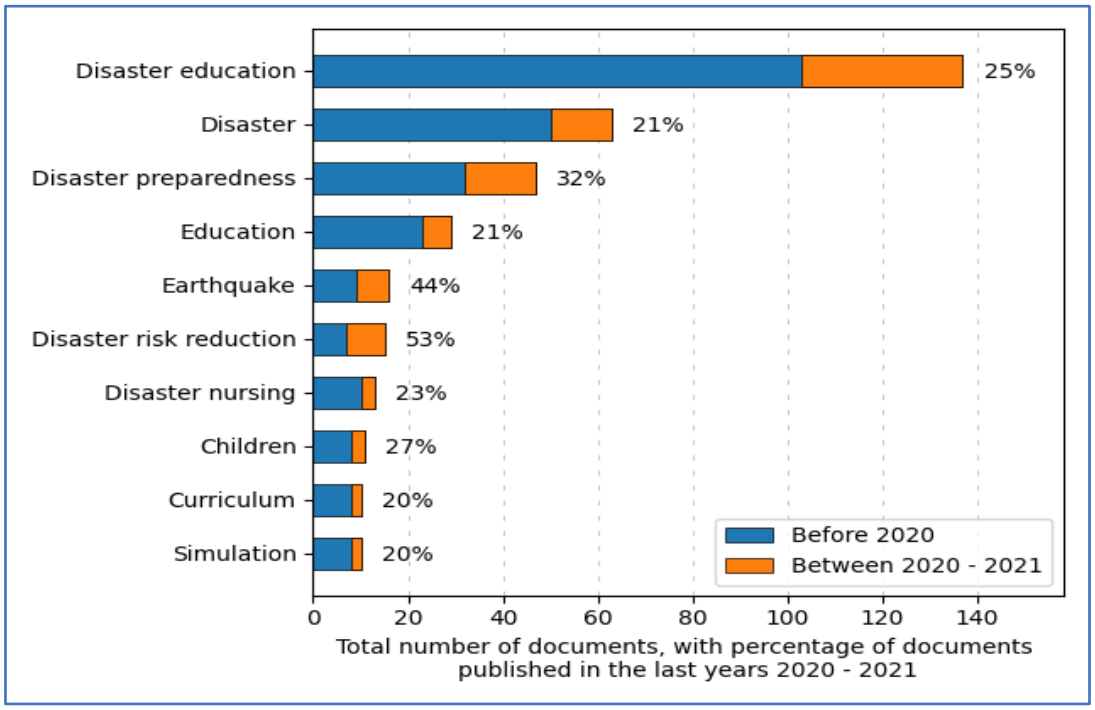

Figure 4. The top 10 authors' keywords on disaster education research

CONCLUSION

A scientometric method is a practical approach for mapping the published research on disaster education. Additionally, significant concepts from the literature were acknowledged, as was an understanding of the evolution and interaction of the field's research trends. Conference proceedings are increasing rapidly, indicating the growing importance of conferences to contemporary researchers seeking to publish papers on disaster education.

This study showed that Japan has a long history of disaster education due to its vulnerability to natural disasters, particularly earthquakes, tsunamis, and typhoons. Additionally, the findings indicated that researchers in Japan conducted active research on disaster education to spread disaster awareness throughout the country constantly. Also, natural disaster preparedness has been a constant priority due to Japan's geographic location, and disaster education has occurred in formal and informal settings. Between 2020 and 2021, UCL produced the most publications; assessing global risks, mitigating

disasters, and resolving humanitarian crises require coordinated and collaborative action. UCL's top priorities are risk management, disaster mitigation, and emergency response.

"Disaster education", "Disaster", "Disaster preparedness", "Disaster risk reduction", and "Earthquake" are the primary keywords associated with disaster education. These keywords are critical for future researchers to examine in greater detail to comprehend their relationship through scoping reviews or systematic literature reviews. This study is a starting point that could be supplemented with a more in-depth examination of thematic content. The results obtained in this study may provide a theoretical perspective on the subject and a map of the state of the art and make potential gaps in scientific research readily apparent. A significant aspect of this scientific analysis is that it may serve as a springboard for future research on the enthusiasm for disaster education. This could be concentrated on disaster education policy, disaster education and its impact on disaster mitigation, or even a more in-depth examination of specific issues raised in this study.

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