Study the Level of Inclusion in Disaster Risk Reduction for Inclusive Elementary School in Indonesia

Nisa Ageng Hayati[1], Chichi Elsa Nurhayati[2], Aceng Fahmi Idris[3] dan Triana Lestari[3]

Universitas Pendidikan Indonesia, Indonesia
Email: nisaageng21@upi.edu

Info Artikel	Abstract
	This research aims to explain how disaster risk reduction in elementary schools can be implemented inclusively and to comprehensively understand research trends regarding DRR in inclusive elementary schools in Indonesia in 2013-2023. *The research was conducted using bibliometric methods based on the 2013-2023 Google Scholar database. Data collection is supported using the Publish or Perish (PoP) application. We also use VOSviewer as a data visualization tool capable of creating meshes from processed data sets.* *From this search, 999 articles were found with the keywords inclusive, disaster risk reduction, elementary schools, and Indonesia. Found 11 terms based on network visualization which were grouped into 2 clusters. The term inclusive school appears 4 times and the term disaster risk reduction appears 14 times. Based on the research results, efforts are needed to be made through inclusive education programs in elementary schools that are in accordance with the need to reduce disaster risk in schools both before, during and after disasters.*

Abstrak

Penelitian ini bertujuan untuk menjelaskan bagaimana pengurangan risiko bencana di sekolah dasar dapat dilaksanakan secara inklusif dan untuk mengetahui secara komprehensif tren penelitian mengenai PRB di sekolah dasar inklusif di Indonesia Pada Tahun 2013-2023.

Penelitian dilakukan dengan menggunakan metode bibliometrik berdasarkan database Google Scholar tahun 2013-2023. Pengumpulan data didukung dengan menggunakan aplikasi Publish or Perish (PoP). Kami juga menggunakan VOSviewer sebagai alat visualisasi data yang mampu membuat jaring dari kumpulan data yang telah diproses.

Dari penelusuran tersebut ditemukan 999 artikel dengan kata kunci inklusif, pengurangan risiko bencana, sekolah dasar, dan Indonesia. Ditemukan 11 istilah berdasarkan visualisasi jaringan yang dikelompokkan menjadi 2 cluster. Istilah sekolah inklusif muncul sebanyak 4 kali dan istilah pengurangan risiko bencana muncul sebanyak 14 kali. Berdasarkan hasil penelitian diperlukan adanya upaya yang dilakukan melalui program pendidikan inklusif di sekolah dasar yang sesuai dengan kebutuhan untuk mengurangi risiko bencana di sekolah baik sebelum, saat, dan setelah bencana

INTRODUCTION

The increasing risk of natural disasters and other events that impact humans has become an international concern, especially in Indonesia. Disasters have a number of common themes, ranging from sudden disasters to deaths, injuries and widespread economic losses due to a system's inability to cope (Ronoh *et al*, 2015). A very important discussion in this research is the impact of disaster risk on children as a group that is vulnerable to disasters. However, this is rarely done, especially research on children with disabilities in the midst of disasters.

This research examines important things related to the participation of groups vulnerable to disasters such as Children with Special Needs, non-special needs, children with disabilities, and other vulnerable groups in the Disaster Risk Reduction (DRR) program. DRR can be a human right and must be given the same rights in reducing the risk of disasters that commonly occur in other communities. In DRR activities, children are often avoided and face greater physical, mental and educational vulnerabilities. Research on children with disabilities is still very limited, as are the potential benefits that can provide input for inclusive policies in DRR planning.Many researchers rarely consider the experiences of vulnerable groups during disasters, which is the reason they are neglected in DRR planning.

At primary school level education, DRR is very important because disasters often occur when children are at school and are vulnerable to disasters. This vulnerability is caused by limited resources that are important in children's daily lives as well as social structures that provide means of protection in DRR planning. For children with disabilities, opportunities to participate in DRR initiatives will help increase their participation and capacity in responding to disasters. Understanding the experiences of children with disabilities during disasters is the first step to involving them in disaster risk reduction initiatives.

Several other studies also examine DRR, such as research on inclusive education and disaster risk reduction (Sheehy *et al*, 2022), children with disabilities and disaster risk reduction (Ronoh *et al*, 2015), the impact of direct disaster experience on knowledge (Astuti *et al*, 2021), schools and children (Stough *et al*, 2020). In **Table 1**, there are several previous studies to identify research related to comprehensive Disaster Risk Reduction (DRR) in Indonesia. Bibliometrics is a viable strategy for understanding current trends in research and is widely used in various fields **(see Table 2)**.

Tabel 1. Previous studies of inclusive disaster risk reduction

No	Topic Discussion	Educational Contribution	Research Year	References
1.	Exploring possible pathways to study the contribution of children with disabilities in disaster risk reduction education (DRRE).	contribution children with disabilities	2013-2023	Ronoh *et al*. (2015)
2.	This research examines the inequality regarding inclusive disaster risk reduction education (DRRE).	DRRE needs	2013-2023	Sheehy *et al*. (2022)
3.	Systematic research conducted in investigating schools and children with disabilities environmental hazard contexts.	vulnerability of children with disabilities	2013-2023	Stough *et al*. (2020)
4.	Explores important elements in disaster mitigation education in elementary schools in an inclusive environment.	disaster mitigation education	2013-2023	Rofiah *et al* (2021)

Table 2. Previous studies of bibliometric analysis.

No	Title	Topic Discussion	References
1.	Bibliometric approach for innovations analysis on Disaster Risk Reduction	Bibliometric method for analyzing DRR innovations in Indonesia.	Widuri *et al*. (2022)
2.	A bibliometric and descriptive analysis of inclusive education in science education	Mapping scientific production related to the inclusion of individuals with disabilities in science education.	Comarú *et al*. (2021)
3.	Natural hazards, disaster management and simulation: a bibliometric analysis of keyword searches	Themes of "disaster management", "natural hazards" and "simulation".	Barnes *et al*. (2019)

METHOD

Bibliometric research is a technique used to statistically examine published scientific literature (Rana *et al*. (2022). This research uses bibliometrics to provide an inclusive overview of the disaster risk reduction literature. All bibliometric data we collected in the research comes from various articles published between 2013 and 2023. Data collection carried out in this research was supported by the Publish or Perish (PoP) application (accessed on 22 September 2023). An overview of the research steps we carried out can be seen in **Figure 1.**
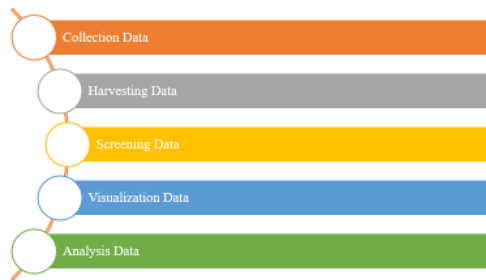

Figure 1. Diagram of bibliometric analysis steps.

The data collection process is supported by several applications such as using Publish or Perish (PoP) to search for various articles based on predetermined keywords, Microsoft Excel was used to analyze and filter research data, and the VOSviewer application is used to describe and visualize the display data.

At the data collection stage, we collected a number of research documents (articles) that had been published and were in accordance with the topic we mentioned, namely "Natural Disaster Risk Reduction for Inclusive Primary Schools in Indonesia". The keywords used to collect this data are "inclusion", "disaster risk reduction", "primary school" and "Indonesia" which were published in the last ten years or from 2013 to 2023.

In the data filtering stage, we select and filter the data that has been collected. Things that need to be considered at this stage are the year of publication of each article collected and the type of article according to the topic that will be used in this research, so we cannot analyze the documents collected directly. When we started data collection, we obtained a total of 999 articles, but after filtering, only a few articles could be used in this bibliometric analysis. Some articles are not relevant to the topic we are discussing and the metadata is incomplete.

To visualize the data, we uploaded the data saved in (*.ris) format to the VOSviewer application. At this point, the different terms of the VOSviewer network map visualization will be filtered.

At the data analysis stage, we analyze the information that has been visualized to obtain results which will be presented in the "results and discussion" section. To simplify the data analysis process, we also used the Microsoft Excel.ter risk reduction application in inclusive elementary schools in Indonesia.

RESULTS AND DISCUSSION

Definition, Policy, and Foundations of Inclusive Disaster Risk Reduction (IDRR) in Indonesia

Inclusive Disaster Risk Reduction (IDRR) emphasizes the equal right to safety for all individuals, including vulnerable groups, in the face of natural disasters. This approach underscores the importance of collective contributions to disaster risk reduction efforts. Indonesia's Comprehensive Disaster Risk Reduction Policy (RPI) aligns with this approach, prioritizing the safety and recovery of communities, particularly focusing on the needs of sensitive groups such as children, women, the elderly, and people with disabilities.

Mitigation efforts, as outlined in Ministry of National Education circular no. 70a/MPN/SE/2010, integrate disaster relief material into learning exercises, emphasizing the importance of a decentralized school system and mitigation education. However, there is a call for increased attention and development of the policy, with a focus on active participation, as advocated by UNICEF. Indonesia's commitment extends to creating an inclusive teaching framework, ensuring fair access for people with disabilities through financial systems, and collaborating with start-up companies to develop supportive media. These policies reflect the Indonesian government's comprehensive approach to Disaster Risk Reduction (DRR), aiming to protect all citizens and engage them in DRR initiatives, crucial for a nation vulnerable to various disasters.

Disaster Risk Reduction (DRR) requires a comprehensive perspective encompassing philosophical, empirical, psychological, pedagogical, and juridical foundations for fundamental advantages and relevance. The philosophical basis, rooted in principles of social justice and human rights, emphasizes equal security rights and participation in

decision-making for all, particularly vulnerable groups like people with disabilities. This aligns with the need to empower the most at-risk groups (Malik, F. *et al*, 2021). The juridical foundation, supported by laws like Number 24 of 2007 and Government Regulation Number 21 of 2008, plays a crucial role in safeguarding the rights and safety of vulnerable groups, focusing on the needs of children, women, the elderly, and those with disabilities (Achmad, 2023). Pedagogical and psychological foundations are intertwined, evident in mitigation education efforts aiming to enhance children's participation and response to disasters while considering psychological factors (Rofiah *et al*, 2021). An empirical basis, providing factual information and evidence on potential disasters and their impact, contributes to better DRR system planning (Paripurno, 2014).

Global Implementation of Inclusive Disaster Risk Reduction (IDRR)

Disaster literature effect of disasters on humans. This suggests that children in particular may experience increased vulnerability, having spent a large part of the week at school and therefore here's a have to be consider DRR in schools. In 2001 in Gujarat, India, and Wenchuan in 2008 in China, there was an earthquake which caused several schools and children to be affected. Several studies in schools shed significant light on children with disabilities. IDRR must understand diversity and ensure that all groups, such as children with disabilities, take part, and contribute as stakeholders in it (Community for Handicap Exploration and Strategy in Ronoh, S. 2017).

In the IDRR effort, of course each country has its own way of implementing it. Research conducted by Villeneuve, M. (2021), reveals how Australia implemented a gradual development of its approach to Person-Centred Emergency Preparedness (P-CEP), which is contained in a User Guide and a series of recordings that illustrate P-CEP in real life. P-CEP aims to be used by people with disabilities and various groups who need to activate emergency preparedness and is used directly by people with disabilities to plan the support provided to them when they are in an emergency.

The complexity of Disability IDRR requires a multi-stakeholder approach including a better approach to reflecting, collaborating and implementing change. Stakeholders here have their own tasks, including developing a shared focus on shared freedoms and quality ways to deal with the impact of individuals with

disabilities in DRR, expanding the overall understanding of the main causes of vulnerability of individuals with disabilities during disasters, developing better approaches in working exclusively and across sectors to remove DRR barriers for individuals with disabilities and community groups who support them, and introduce progressive change in a practical way by increasing the attention and cooperation of people with disabilities and support groups in all phases of disaster risk management.

Inclusive Disaster Risk Reduction in Indonesia Primary School
a. Conditions and Program of Inclusive Disaster Risk Reduction (DRR) in Elementary Schools in Indonesia

Indonesia is one of the countries that has a real chance of disasters occurring, because it is located between four plates, namely 2 continental plates, the Eurasian plate and the Australian plate, 2 oceanic plates, as well as the Philippine plate and the Pacific plate. Petrović states that the number and escalation of general disasters increases over time (Petrović *et al*., 2017). Based on National Disaster Management Agency records, in 2017 almost 99% of 2,862 disasters occurred such as large waves, tornadoes, landslides, forest and land fires, dry seasons, and volcanoes (Rofiah *et al*, 2021).

In Indonesia, disasters occur that impact educational units such as elementary schools, while schools are the center of post-disaster communities and provide important knowledge for planning and prevention (Tatebe & Mutch, 2015). Boon *et al* (in Sheehy *et al*., 2022) mention the impact of natural disasters on educational units, namely death, disability or injury, schools cannot be used for learning, and so on. According to Anderson's research, each person's vulnerability to natural disasters is different and this impacts their level of support in DRR (Ronoh *et al*, 2015). The effect of disasters on children such as the blind, deaf, disabled, and so on requires natural disaster Disaster Risk Reduction (DRR) efforts carried out by educational units or schools. Schools that have a large population and have been around for a long time are elementary schools (Lukitoaji, 2020); (Ardianti *et al*, 2021). However, it is hoped that schools can be established for all levels of society so that children can continue to learn using methods that suit their needs.

DRR education in Indonesia certainly has its own challenges, but Saique's research shows that most teachers believe that children are

willing to engage in disaster awareness and are sensitive to disasters. They also strongly believe that children should be informed about disaster risk reduction measures at school and participate in emergency response plans at home and school (Baluran, 2023). This shows that teachers in DRRE are able to overcome existing challenges.

DRR strategies can be developed for all individuals, regardless of race, geographic location, or ethnicity (Rahman *et al*, 2022). In Indonesia, several schools are aware and ready to serve special needs (Ediyanto *et al*, 2017). This means that disaster risk reduction education must implement inclusive pedagogy to make learning fair and positive in the classroom (Hehir in Sheehy *et al*., 2023) and ensure that all children must be able to access education regardless of their abilities or disabilities (Sheehy in Cabatay & Azizah, 2023). Supporting students with special needs by providing individual teaching plans, supporting innovation, and special education is the goal of learning services in inclusive schools (Sproston *et al* in Marza *et al*, 2023).

The high level of community vulnerability and disaster risk is caused by a lack of community knowledge, awareness and motivation, thus hampering mitigation (Ndah & Odihi, 2017). Therefore, it is necessary to disseminate educational messages to increase public health awareness after disasters and reduce their vulnerability (Fathollahzadeh *et al*, 2023). Health services are the main adequate system for disaster victims (Khadimipour & Sheikhbardsiri, 2022), but disaster risk reduction can first be introduced to elementary school students in a comprehensive manner. The following efforts aim to reduce the risk of natural disasters through inclusive education programs in elementary schools.

1) The Role of Stakeholders in Realizing DRR Education

DRR education can start from elementary school, in keeping with piaget theory concrete operational stage. At this point in their development, students are better at identifying things and quickly replicating what they have learned, showing improved learning and imitation skills to learn concepts begins to increase, they can learn conditions, situations and objects from the influence of the children around them (Edyyul & Haryanto, 2019). When incorporating this educational approach, it is crucial to establish collaborative practices among interdisciplinary working groups that encompass schools, non-formal learning centers, and various other organizations to develop inclusive accessible learning programs to reduce the risk of natural disasters for blind and deaf children (Nikolaraizi *et al*., 2021).

Proper planning is necessary for disaster risk reduction education and developed by the government, educational units and individuals. Apart from that, countries must also strengthen their capacity to support disaster risk reduction programs that can reduce the loss of life so they must understand the need to be alert and sensitive to disasters (Freddi *et al*, 2021). Since schools are government-affiliated institutions, it is the government's responsibility to ensure the safety of students with special needs and provide protection in the event of a school disaster.

To improve education regarding risk reduction efforts for high-risk groups, support from various stakeholders is needed, such as the Multi-Stakeholder Partnership (MSP). This support will be provided to refugee children from high-risk groups affected by natural disasters. Thanks to the educational opportunities provided to refugee children, several stakeholders have implemented inclusive education efforts for refugee children in Indonesia well (Suwartiningsih, 2022).

In addition to refugee children, Petal (Stough *et al*., 2020) provides two examples of disaster risk reduction education that includes children with disabilities. One example is the earthquake awareness training program implemented in 60 special schools in Indonesia, where earthquake disaster awareness material is adapted for children who have difficulty hearing and are visually impaired through the collaborative efforts of various teams, Non-Governmental Organizations (NGOs), and communication training including the use of simplified sign language.

Education that considers outcomes such as behavior, principles, or norms can influence practices closely related to disaster risk reduction (Vaughan-Lee *et al*., 2018). Elementary schools are suitable for providing education that focuses on teaching disaster education, what students and teachers should do when a disaster occurs, direct activities such as disaster simulations, and so on. Teachers or educational authorities should understand that DREE is very useful and are expected to integrate disaster-related learning into classroom activities (Rofiah *et al*, 2021).

2) Informing about Disaster Risk Reduction

Preparing students to face disasters can be done in many ways, such as making

elementary school students and the entire school community aware of being prepared to face the risk of natural disasters and minimizing loss of life (Fathollahzadeh *et al*, 2023). Enhancing public consciousness regarding the threat of natural disasters can be achieved through the explanation of the fundamental components of the risk system (Saja *et al,* 2018) by exchanging information presented in the form of written text and then read by students or by communication between teachers and students, Among students, and their families at house.

One strategy that can be used is the repetition of effective initial reading lessons and the use of initial reading strategies in each lesson (Azzahra *et al*, 2023). If this strategy is successfully implemented, students with special needs will be able to read information about disaster prevention and response as easily as other students. Increasing awareness can also be done through communication between students and teachers, such as teachers explaining disaster risks in class. Tuladhar *et al* stated that during the teaching and In the process of learning, educators can also incorporate tangible media like FM radio and television to convey information about natural disasters (Rofiah *et al*, 2021).

UN ESCAP (2019) Asserts that leveraging Information and Communication Technology (ICT) effectively presents significant potential for mitigating dangers and vulnerabilities throughout every phase of disaster management, enhancing disaster readiness and preparedness measures (Latif, 2022). The advancement of digital technologies, including platforms like social media and geographic information systems, various geospatial information systems, and so on can help someone get information about a disaster. Apart from that, social media can be used to raise funds for all disaster victims. According to (Kusumatuti *et al*, 2014), this priority is given to children with disabilities who have acquired new disabilities due to natural disasters, because this research shows a number of problems identified and requiring action to strengthen the involvement of people with disabilities.

3) Using a Variety of Learning Methods

The key figure in inclusive practice in educational settings is the teacher, as they interact directly with students, whether they have special needs or not (Larosa *et al*., 2022). Destitute social, cultural, and financial situations lead to physical and psychosocial vulnerabilities. This requires a law based approach in the classroom by creating child-centered environments and teachers who understand the diverse learning abilities of students (Djone & Suryani, 2019). To achieve inclusion, learning must be transformative and ensure that all parties ensure successful learning implementation to create a conducive learning environment (Marza *et al*., 2022).

In addition, teachers also need to understand the importance of fostering mutual respect among students so that there is harmony among students in school (Nurdin, 2017). DRR teaching materials are divided into three stages, some time before a disaster occurs, during a disaster, and after a disaster. Therefore, teachers need to have learning designs such as preparing curriculum and learning implementation plans (RPPs) based on students' characteristics and learning situations based on disaster risk reduction (Edyyul & Haryanto, 2019). Mainstreaming DRR in schools and implementing DRR education in schools remains paternalistic because schools rely heavily on local government initiatives (Amri *et al,* 2022). The more diverse the students with disabilities, the more diverse the teaching methods. Teaching methods can use a carefully structured step-by-step approach to provide guidance and active learning experiences, while enhancing student confidence and motivation (Marza *et al*, 2023). Oyao *et al* (2015) Proposes the use of a competency-based learning framework in science education applied to research on natural hazards and disaster risk reduction.

Aghei said although schools have tried their best to use disaster risk management plans, teaching strategies still need to be improved to increase disaster awareness among students and staff another member of the school (Phelan *et al* in Baluran, 2023). Learning methods in the learning process are very important because they can help students understand the concepts being taught. Learning media will help teachers convey the material needed when implementing the learning model (Nikmah, *et al* in Wardana *et al*, 2023). Aristia *et al*. (2020) stated that teachers can create appropriate learning implementation plans, which can improve student development in building material.

Based on the research conducted (Astuti *et al*, 2021), it has been proven that a person who has experienced a disaster will improve their understanding of disaster risk reduction. This increase was also observed in school-based disaster risk reduction activities and participation in school DRR programs. Through this experience, many children understand what to do when a disaster occurs. To be effective,

learning activities in class can be carried out by asking the principal to guide the learning process, while other teachers will help students if they experience learning difficulties and are interested in learning (Azzahra *et al*, 2023). To be effective, learning activities in class can be carried out by asking the principal to guide the learning process, while other teachers will help students if they experience learning difficulties and are interested in learning (Marza *et al*, 2023).

4) Preparing Adequate Facilities and Infrastructure

Facilities and infrastructure for students with special needs are always the same as for normal children in general. Gummesson said school buildings need to be built solidly so that in the event of a disaster, they are not easily destroyed. If a school is destroyed, it will ruin the lives of children and teachers, and make it impossible for them to continue their education after the disaster (Mwangi in Baluran, 2023). Besides physical facilities, facilities such as desks, chairs, classrooms and other areas of the school must ensure safety for all students.

Children with special needs should benefit from all the same facilities as children in general, including schools. Therefore, physical development is necessary so that everyone can use it. Physical development can be achieved by creating ramps for wheelchair users, installing guides for the blind, as well as walking paths and toilets for disabled people (Margaretha in Rofah *et al*., 2021). In addition, schools need to prepare teaching materials, support for autistic children, special rooms for disabled children such as soundproof rooms for deaf children and other equipment for effective and optimal learning.

Children with disabilities should also be entitled to rights such as affirmative action or special comfort and treatment when exercising their constitutional rights (Malik *et al,* 2021). The International Disability Alliance (Karnay *et al*, 2023) highlights that some people with disabilities depend on physical assistance or assistive devices such as canes, wheelchairs, and information provided in the form of letters or braille, to the point of requiring tactile interaction. Therefore, governments or inclusive schools can provide these tools to support children with learning difficulties, such as those facing difficulties due to natural disasters or birth defects. With this tool, post-disaster evacuation can become easier, as not having an evacuation route would become an obstacle for high-risk children trying to escape.

b. Result Metrics

Table 3 presents the results of a literature search related to disaster risk reduction (DRR) in inclusive elementary schools. The annual cycle of all publications analyzed in this research is from 2013 to 2023. The H-index is a metric used to measure the contribution and impact of researchers' scientific publications (Cormode *et al*., 2013). The H-index can be calculated by looking at the number of citations for all articles published by a researcher. In this research, it can be seen that the H-index is 71, which means there are 71 articles that have been cited at least 71 times **(see Table 3)**.

Table 3. Result publishing disaster risk reduction metrics in inclusive elementary schools

Publication years	2013-2023
Citation years	10 (2013-2023)
Papers	999
Citations	21181
Cites/year	2118.10
Cites/paper	21.21
H-index	71
G-Index	108
h1, norm	41
h1, annual	4.10
hA-index	32

c. Annual Publication Report

In Figure 2 below, it can be seen that the annual research report on disaster risk reduction in inclusive elementary schools experiences increases and decreases every year. In 2014 there was 1 article, in 2015 there were 4 articles, in 2016 there were 2 articles, in 2017 there were 4 articles, in 2018 there were 2 articles, in 2019 there were 2 articles, in 2020 there were 2 articles, in 2021 there were 5 articles, in In 2022 there will be 8 articles, and in 2023 there will be 7 articles. If we look at the investigation in 2023 there will be a decline. This may be due to the publication of this research in November 2023 so that all months of 2023 have not been completed and this makes it possible to carry out further research regarding disaster risk reduction in inclusive elementary schools in 2023.
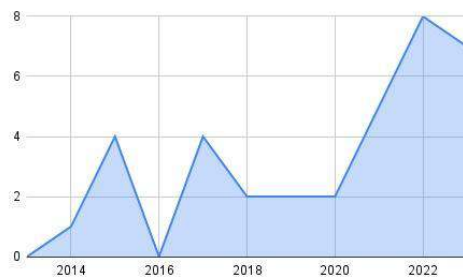
Figure 2. Annual publication report on disaster risk reduction in inclusive elementary schools

d. Article Trends Based on the Number of Citations

Table 4 presents a classification of articles about disaster risk reduction in inclusive elementary schools. It can be seen in **Table 4**, the article that has a total number of citations is 167 and is the most cited article, namely the article (Saja *et al*, 2018). Based on this, it was found that research on inclusive and adaptive systems for measuring the power of social media against disasters was widely used as a reference in 2018.

Table 4. Disaster risk reduction in inclusive elementary schools topics data.

No	Cites	Authors	Title	Year	Source
1.	167	Saja *et al*.	An inclusive and adaptive framework for measuring social resilience to disasters	2018	International Journal of Disaster Risk Reduction
2.	90	Malik *et al.*	Legal protection for people with disabilities in the perspective of human rights in indonesia	2021	International Journal
3.	86	Ronoh *et al.*	Children with disabilities and disaster risk reduction: a review	2015	International Journal of Disaster Risk Science
4.	67	Fredd *et al.*	Innovations in earthquake risk reduction for resilience: recent advances and challenges	2021	International Journal of Disaster Risk Reduction
5.	66	Tatebe and Mutch	Perspectives on education, children and young people in disaster risk reduction	2015	International Journal of Disaster Risk Reduction
6.	51	Ediyanto *et al.*	Inclusive education in Indonesia from the perspective of widyaiswara in center for development and empowerment of teachers and education personnel of kindergartens and special education.	2017	Indonesian Journal of Disability Studies
7.	40	Kusumastuti *et al*.	The problems of people with disability in indonesia and what is being learned from the world report on disability	2014	American Journal of Physical Medicine And Rehabilitation
8.	31	Astuti *et al.*	Impacts of direct disaster experience on teachers' knowledge, attitudes and perceptions of disaster risk reduction curriculum implementation in central sulawesi, indonesia	2021	International Journal of Disaster Risk Reduction
9.	30	Ndah and Odihi	A systematic study of disaster risk in Brunei Darussalam and options for vulnerability-based disaster risk reduction	2017	International Journal of Disaster Risk Science
10.	29	Oyao *et al.*	A competence-based science learning framework illustrated through the study of natural hazards and disaster risk reduction	2015	International Journal of Science Education

e. Co-occurrences Analyst

Co-occurrence investigation is an examination based on the high number of occurrences of an event (Li *et al*, 2018). In this investigation, co-occurrence was carried out based on the repetition of terms and creators in distributions related to disaster risk reduction in inclusive elementary schools through bibliometrics and the VOSviewer application. Each event is used as a visualization of the relationships between nodes. To see the frequency of occurrence of terms and authors, you can use three types of visualization, namely network **(Figure 3)**, superposition **(Figure 4)**, and density **(Figure 5)**.

Figure 3 shows a visualization of the research network in Indonesia and shows the relationships between tribes. Terms found in searches for disaster risk reduction in inclusive elementary schools in Indonesia is limited to a minimum of 3 occurrences until 11 terms are obtained. The eleven terms are divided into 2 clusters, where the term inclusive school appears

4 times and the term disaster risk reduction appears 14 times.

1) Cluster 1 in red has 6 items, namely children, inclusive education, inclusive school, lack, special needs, and teachers. These six items are interrelated, discussing the weak implementation of inclusive education by teachers for children with disabilities, children with special needs, and other vulnerable groups.

2) Cluster 2 in green has 5 items, namely disability, disaster, disaster risk reduction, DRR, and study. These five items discuss how to reduce disaster risk for disability groups through learning.
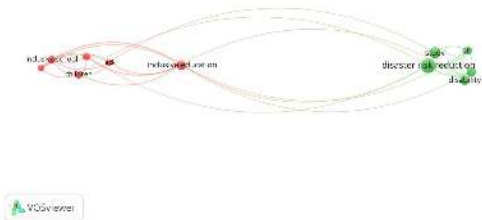

Figure 3. Network visualization of disaster risk reduction in inclusive elementary schools in Indonesia.

The overlay visualization is shown in **Figure 4**. In **Figure 4**, the trend for inclusive disaster risk reduction for elementary schools in Indonesia is obtained based on research and the trend of these terms appearing in the period 2019 to 2023. Some of the most recently emerging terms are special needs and deprivation.
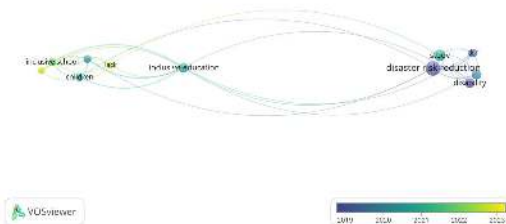

Figure 4. Overlay visualization of disaster risk reduction in inclusive elementary schools in Indonesia.

The following is **Figure 5** which shows a visualization of the density of publications on inclusive disaster risk reduction for elementary schools in Indonesia. It can be seen in **Figure 5**, the color of each node can be used to determine

the frequency of node appearance and is used in discussing disaster risk reduction articles in inclusive elementary schools in Indonesia. If something has a high occurrence value, the color will become brighter or lead to a deep yellow color in the visualization density.
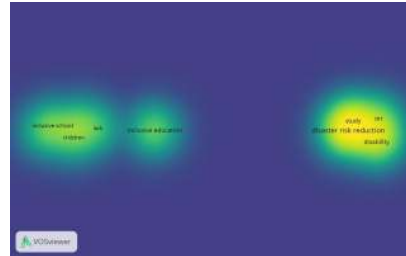

Figure 5. Density visualization of disaster risk reduction in inclusive elementary schools in Indonesia.

In this study, we analyzed the authors who contributed to writing articles about disaster risk reduction in inclusive elementary schools in Indonesia whose journals were indexed on Google Scholar. Based on co-authorship searches, it is known that 85 researchers have participation articles regarding disaster risk reduction in inclusive elementary schools in Indonesia from 2013 to 2023. Based on Table 5, it can be seen that 3 researchers have contributed the most articles, namely Kawai, Sheehy, and Marza. Kawai has 2 documents, 5 link strengths, and is included in cluster 1. Sheehy has a total of 2 documents, 4 link strengths, and is included in cluster 3. Meanwhile, Marza has 2 documents, 2 link strengths, and is included in cluster 20. Each researcher collaborates as shown in **Figure 6** So there is a connection between the creator and the strength of the link contained in it **Table 5 (see Table 5).**
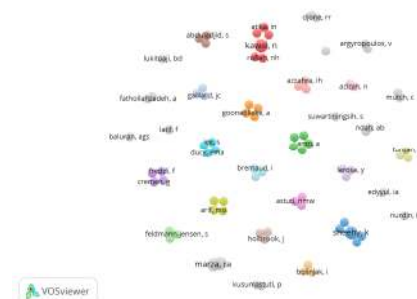

Figure 6. Visualization of author networks in publications on disaster risk reduction in inclusive elementary schools in Indonesia

CONCLUSION

Based on the research results, it was found that stakeholders such as government, civil society, educational institutions and Non-Governmental Organizations (NGOs) have an important role in developing the framework and strength of early warning against disasters. In this case, education regarding DRR is a top priority for elementary school students who are vulnerable to natural disasters. Apart from that, Children with Special Needs, people with disabilities, refugee children and other vulnerable groups must also be prioritized to participate in the DRR education program in inclusive elementary schools. This program can be an effort to reduce disaster risk in schools, both before, during and after a disaster occurs. This is done so that children are not exposed to high risks due to natural disasters. This research also uses bibliometric analysis to help find the latest research trends on disaster risk reduction in inclusive elementary schools.

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