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Integrating disaster education into geography curriculum: Strengthening school-based preparedness

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ABSTRACT

Background: Sukabumi Regency is an area prone to natural disasters in West Java. Its location on the south coast, its mountainous and hilly morphology makes Sukabumi Regency prone to earthquakes, tsunamis and landslides. The aim of this research is to illustrate how geography subjects in schools can be a source of disaster education that supports school-based disaster preparedness. **Methods:** Using a qualitative approach, this study involved in-depth interviews, observations, and document evaluations at Public Senior High School 1 Warung Kiara, with geography teachers as the main informants. Data analysis was carried out through reduction, verification, and drawing conclusions, with local wisdom-based studies to improve learning materials before validation. **Findings**: Disaster education in schools plays an important role in improving student preparedness through integration into the geography curriculum, social activities, and mitigation training. Although there are challenges in delivering the material, a geographic literacy-based approach, disaster simulations, and partnerships with stakeholders can strengthen understanding and build a culture of preparedness. In addition, expanding disaster education through extracurricular activities such as scouting and the juvenile red cross can provide students with more in-depth practical experiences. **Conclusion:** The geography subject plays a crucial role in disaster education by enhancing students' awareness and preparedness for disaster risks. Through theoretical and practical approaches such as disaster simulations, risk mapping, and geographic information systems technology, students develop essential mitigation skills. Integrating multidisciplinary perspectives further strengthens school-based disaster preparedness efforts. **Novelty/Originality of this article:** The novelty of this research lies in illustrating how geography subjects in schools, combined with extracurricular activities, can effectively support disaster education and preparedness, especially in disaster-prone areas like Sukabumi Regency.

KEYWORDS: disaster; geography; preparedness.

1. Introduction

Indonesia is one of the countries with a high level of vulnerability to natural disasters. Geographically, Indonesia is located at the meeting point of three major tectonic plates: Eurasia, Indo-Australia, and the Pacific, which causes high seismic and volcanic activity. In addition, tropical climate conditions with high rainfall increase the risk of hydrometeorological disasters such as floods and landslides. According to data from the National Disaster Management Agency/*Badan Nasional Penanggulangan Bencana* (BNPB), most parts of Indonesia are at high risk of natural disasters (National Disaster Management Agency, 2021). Factors such as climate change and deforestation have also increased the frequency and intensity of disasters in Indonesia. A study by Kurniawan et al. (2021) showed that tropical cyclones, such as Cyclone Seroja, have a significant impact on

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increasing rainfall and high sea waves in East Nusa Tenggara, resulting in floods and landslides. In addition, research by Hadi et al. (2019) highlighted the low level of community preparedness in dealing with earthquake disasters, which contributed to the high number of fatalities and property losses. Therefore, mitigation efforts and increased preparedness involving various stakeholders are needed to reduce the risk and impact of disasters in Indonesia.

Disaster preparedness in Indonesia is very important considering the high risk of natural disasters faced by the country. As a country located at the confluence of three major tectonic plates, Indonesia is vulnerable to earthquakes, tsunamis, and volcanic eruptions. According to Madona (2021), "the majority of individual preparedness levels are in the Very Prepared category with a percentage of 44.40 percent". However, other studies show that community preparedness still needs to be improved. Khaerunnisa et al. (2023) found that "the preparedness of the Bandung city community for earthquake disasters is still very lacking, especially first aid after natural disasters". In addition, Azhari et al. (2024) stated that "the level of community preparedness in facing the threat of flooding in Situraja Village still needs to be improved". Therefore, efforts are needed to increase public knowledge and awareness through education and training, as well as strengthening early warning systems and resource mobilization to improve disaster preparedness in Indonesia.

Education plays a vital role in improving disaster preparedness in Indonesia, a country that is vulnerable to various natural disasters such as earthquakes, floods, and volcanic eruptions. Through education, communities can acquire the knowledge and skills needed to deal effectively with emergency situations. As stated by Madona (2021), "student involvement in disaster preparedness in their schools is an effective, dynamic, and sustainable strategy in efforts to disseminate disaster education efforts". In the literature studies in developed countries, disaster education is carried out in community-based disaster risk reduction (DRR) efforts and school-based disaster education programs must be a priority and promoted worldwide (Tatebe & Mutch, 2015; Toyoda et al., 2021). Even further based on Seddighi et al. (2023) disaster education programs must be increased to cover all levels of education and must be prioritized in budget allocation and distribution. This is certainly related to the development of facilities, infrastructure and the development of adequate human resources. That is why developed countries tend to be better prepared for disasters.

In the study of disaster education in developing countries such as Indonesia which is much more lagging behind compared to developed countries, disaster education is more directed at building perceptions (Shoji et al., 2020). For residents in disaster-prone areas, disaster education can influence the formation of risk perceptions and by increasing the risk perception of the population becomes an important factor in disaster risk reduction activities (Wang et al., 2022). Disaster education programs in schools help foster children as "agents of change" to create a disaster-resilient society (Sakurai et al., 2020). Disaster preparedness education not only increases knowledge, but also forms proactive attitudes and behaviors in dealing with disasters. Thus, education plays a role in forming a disaster awareness culture that is essential to reduce the negative impacts when a disaster occurs.

However, challenges in implementing disaster preparedness education still exist, such as limited resources and lack of support from various parties. Therefore, cross-sector collaboration is needed to ensure the sustainability of the program and significantly reduce disaster risks. With structured and collaborative educational efforts, it is hoped that the Indonesian people, especially the younger generation, can be more responsive and prepared to face various potential disasters in the future. However, education in Indonesia until now has not had a systematic and concrete policy to include disaster content in the school curriculum. Because what is seen is that the content of disaster education is still limited to issues that develop when a major natural disaster occurs which is the center of attention of the government and society. So that Disaster Education through school-based is still being pursued independently by teachers in the learning process.

According to Tahmidaten & Krismanto (2019) education is a strategic means to introduce potential disasters and their risks to every student, so that in the future they

become citizens who are aware of natural disasters. Risk education for natural disasters or more popularly known as disaster education or disaster risk education is a process of building awareness that starts from building knowledge, understanding and actions that encourage preparedness, prevention and recovery. Disaster education is a process of socialization, understanding science (natural phenomena) and developing skills towards safety, which is accompanied by building awareness of natural disasters (Bernhardsdottir et al., 2016). In studies of disaster education in developing countries such as Indonesia, which is far behind developed countries, disaster education is more directed at building perceptions (Shoji et al., 2020). For residents in disaster-prone areas, disaster education can influence the formation of risk perception and with increasing population risk perception it becomes an important factor in disaster risk reduction activities (Wang et al., 2022). Disaster education programs in schools help develop children as "agents of change" to create a disaster-resilient society (Sakurai et al., 2020).

The most potential school subject to become a medium for disaster education is geography. The presence of geography in disaster education is very important because it is in accordance with the character of the science that geography is the science of location. The location referred to in disaster education is information on the location of disaster-prone areas. In addition, geography is a science that studies the interaction between humans and their environment. This means that with geography, human knowledge and attitudes about the surrounding environment that is prone to disasters can be studied. However, with various multidisciplinary approaches, it is not impossible that disaster education is provided with an approach to other subjects, so that the process of school-based disaster preparedness is achieved optimally. Geography teachers in learning about Disaster Education must have detailed knowledge competencies about information on the character and potential for disasters in the area where students live. Not only explaining the potential for disasters on a national, regional, provincial, district/city, or sub-district scale. Geography teachers must also be trained in rescue efforts in the event of a disaster by participating in training on disaster mitigation.

One of the schools in Sukabumi Regency, precisely at Public Senior High School 1 Warung Kiara, is an example of how schools are committed to improving student preparedness in facing disasters. This school is also a medium for the Regional Disaster Management Agency/*Badan Penanggulangan Bencana Daerah* (BPBD) in increasing awareness by holding socialization, disaster preparedness roll calls and disaster mitigation simulations for students. In addition, as a follow-up, geography teachers at this school insert disaster material into the learning process. It is hoped that knowledge and disaster preparedness are formed through learning output and these students can expand their knowledge in the realm of their families and their residential environments. Warung Kiara District, Sukabumi Regency is located at an altitude of between 100-320 meters above sea level with a dominant area in the form of plains and hilly slopes so that it has a fairly high potential for disasters. The potential for disasters that exist include earthquakes, landslides, and landslides. The local government routinely holds disaster preparedness rolls in an effort to build preparedness with regional stakeholders to address potential disasters as early as possible. Education is one part of this process.

Indonesia has developed various school-based disaster education initiatives; however, most programs remain fragmented, sporadic, and strongly dependent on external stakeholders (Desilia et al., 2023; Siregar et al., 2025). Previous research has focused primarily on community-based preparedness, large-scale disaster risk reduction policies, or post-disaster response (Putra et al., 2021; Maruddani et al., 2025), with limited emphasis on how teachers — particularly geography teachers — embed disaster-related content into routine classroom learning (Helmi et al., 2025). Studies exploring disaster education in Indonesian rural schools often overlook pedagogical practices, curriculum interpretation, and the contextual understanding of local hazards possessed by teachers (Yushardi et al., 2025; Desilia et al., 2023). Although several studies confirm that geography learning has strong potential for strengthening students' disaster literacy through spatial analysis, hazard mapping, and contextual learning (Tusam et al., 2025; Kurniawan et al., 2021),

implementation remains uneven and highly dependent on individual school initiatives and external support (Siregar et al., 2025; Alfianto et al., 2024). Therefore, empirical evidence on how geography lessons function as an internal, sustainable mechanism for disaster preparedness in disaster-prone areas remains insufficient, particularly in rural and high-risk regions of Indonesia (Maruddani et al., 2025; Pratiwi et al., 2023).This study offers a novel contribution by examining how geography teachers in a disaster-prone district independently incorporate disaster content into classroom instruction despite the absence of a formal national DRR curriculum. The study highlights the integration of local hazard knowledge, the synergy between formal and informal school activities, and the teacher-driven adaptation of geographical concepts to strengthen school-based disaster preparedness. Based on the background above, an in-depth effort is needed to explain how the school transmits disaster education through geography lessons so that it is hoped that it can become a clear example or model to be a reference in organizing a clear, structured and systematic disaster education system.

Disaster education is conceptualized as a systematic effort to equip individuals and communities with knowledge, skills, attitudes, and behaviors that are necessary to reduce disaster risks. The theoretical foundation relevant to this study is drawn from three major conceptual domains: disaster risk reduction theory**,** Geography education theory**,** and school-based preparedness frameworks. Disaster Risk Reduction theory emphasizes a proactive approach toward minimizing the impacts of hazards through preparedness, mitigation, adaptation, and community participation. DRR frameworks conceptualized by the United Nations Office for Disaster Risk Reduction (UNDRR) highlight that disaster risk is a function of hazard, exposure, and vulnerability. Education is positioned as one of the most effective, long-term strategies to reduce vulnerability by improving knowledge and awareness. In this study, DRR theory informs how individuals—particularly students—interpret risks and how educational interventions can shift perceptions, attitudes, and behaviors toward safer practices.

Several scholars argue that DRR education must move beyond memorizing hazard types and instead foster actionable competencies such as early response, situational awareness, and decision-making during emergencies. Wang et al. (2022) note that risk perception plays a crucial role in determining individual preparedness. Therefore, strengthening DRR education in geography classes contributes not only to cognitive understanding but also to behavioral transformation. Geography education emphasizes spatial thinking, environmental awareness, and human–environment interaction. These concepts are highly aligned with disaster studies because disasters are inherently spatial events. Spatial thinking skills, such as interpreting maps, analyzing distributions, recognizing patterns, and identifying hazard zones, are essential for understanding disaster dynamics.

According to National Geography Standards, geography enables learners to interpret the physical processes that shape the Earth's surface and understand how these processes influence human vulnerability. Spatial reasoning also helps students evaluate risk-prone areas and propose mitigation strategies. Therefore, geography is uniquely positioned to serve as a core subject in disaster education. Several international models outline how schools contribute to building disaster-resilient communities. The most influential is the Comprehensive School Safety Framework, which consists of safe learning facilities, school disaster management, and risk reduction and resilience education. This study aligns with the third pillar: risk reduction and resilience through curriculum-based learning. Geography subjects function as the learning gateway where DRR concepts are systematically embedded. Teachers act as mediators who interpret curriculum content and contextualize it to the local hazard landscape.

Teacher agency refers to teachers' autonomy, professional judgment, and initiative in shaping learning experiences. In contexts where policies are unclear or insufficient, teacher agency becomes the determining factor in how disaster education is implemented. This theoretical lens helps explain why some schools are more advanced in DRR integration despite similar national curriculum structures. In the case of Public Senior High School 1

Warung Kiara, strong teacher agency is reflected in their efforts to embed disaster materials without waiting for formal directives. Teachers draw from personal knowledge, local hazard experience, and community collaboration with BPBD or BNPB. This study integrates these theoretical perspectives to analyze how geography lessons shape students' disaster understanding. DRR theory explains why knowledge and awareness must be improved; geography education explains how spatial thinking supports preparedness; and school-based preparedness theory highlights institutional mechanisms that support DRR implementation. Combining these theories provides a holistic analytical lens to examine disaster education practices in schools.

2. Methods

The purpose of this study is to explain in depth how schools can be a source of disaster education for their students. Specifically, this study aims to describe the urgency of geography subjects in instilling values, developing awareness, and implementing disaster education in school settings. The study was conducted at Public Senior High School 1 Warung Kiara, located in Sukabumi Regency, West Java, which is recognized as a disaster-prone region vulnerable to earthquakes, landslides, and hydrometeorological hazards. This research employed a qualitative approach to capture comprehensive and contextualized insights into school-based disaster education practices. Qualitative inquiry was considered appropriate because the research sought to understand meanings, perceptions, and pedagogical processes from the perspectives of teachers and the school community. Data were gathered through three primary methods: in-depth interviews**,** classroom and school observations**,** and document evaluations**.** The key informants in this study were geography teachers who played a central role in delivering disaster-related content in the classroom. Additional informants included the vice principal responsible for curriculum affairs and staff members involved in school preparedness activities. A purposive sampling strategy was applied to ensure that selected participants possessed relevant experience and knowledge regarding disaster education implementation. The involvement of multiple actors allowed the researcher to obtain diverse viewpoints and understand institutional practices more comprehensively.

Data collection was carried out over several weeks through continuous engagement with the school setting. In-depth interviews were conducted using semi-structured interview guides that allowed participants to elaborate on their experiences, instructional strategies, and perceptions of disaster education. Each interview lasted between 45 and 90 minutes and was audio-recorded with prior consent. Observations were conducted during geography lessons, disaster simulation activities, and teacher coordination meetings. These observations enabled the researcher to examine real teaching practices, student engagement, classroom dynamics, and the integration of disaster-related content into ongoing lessons. The researcher also observed how the school collaborated with external agencies, such as the Regional Disaster Management Agency.

Document evaluation included reviewing syllabi, lesson plans, learning modules, student worksheets, and school disaster preparedness documents. This step allowed triangulation between what teachers reported and what was formally planned or implemented. It also helped identify how disaster content was structured, sequenced, and contextualized within the geography curriculum. Data analysis was carried out through the process of data reduction**,** verification**,** and drawing conclusions**,** consistent with qualitative analysis principles. The study also applied material analysis techniques rooted in the social sciences, particularly those focusing on interpreting educational content and curriculum materials. Analysis of disaster education–based materials included examining how disaster concepts were represented, what values were emphasized, and how teachers adjusted these materials to suit local hazard contexts. The researcher recorded patterns, repeated statements, and propositions that emerged throughout the analysis.

To further support interpretation, the study used an analytical lens based on local wisdom, considering how traditional knowledge and community practices related to

disaster preparedness were included or excluded from formal learning materials. To ensure the credibility and trustworthiness of the qualitative data, triangulation of sources (teachers, school administrators, learning documents, and disaster preparedness programs) and methods (interviews, observations, and document review) was conducted. Member checking was implemented by returning summarized interpretations and thematic findings to key informants for verification, ensuring that interpretations accurately reflected their experiences. Prolonged engagement in the field strengthened the dependability of the findings by allowing the researcher to observe recurring patterns and confirm the consistency of participants' statements. Detailed note-taking and reflective memos contributed to confirmability by documenting analytic decisions and reducing researcher bias. Although no formal ethical review was required, all participants were informed about the research purpose, confidentiality principles, and voluntary participation. No personal data were disclosed, and all quotations used in the article were anonymized to protect participant identities.

3. Results and Discussion

Disaster education is very possible to be implemented in schools, so according to informants, schools must be one of the sources of knowledge about disasters in their surroundings. Schools are committed to improving students' preparedness in facing disasters. This school is also a medium for the Regional Disaster Management Agency in increasing awareness by holding socialization, disaster alert roll calls and disaster mitigation simulations for students. In addition, as a follow-up, geography teachers at this school insert disaster material into the learning process. It is hoped that disaster knowledge and preparedness are formed through learning output and these students can expand their knowledge in the realm of their families and their residential environments. According to informants from Warung Kiara District, Sukabumi Regency is at an altitude of between 100-320 meters above sea level with a dominant area in the form of plains and hilly slopes so that it has a fairly high potential for disasters. The potential for disasters includes earthquakes, landslides, and landslides. The local government routinely holds disaster alert rolls in an effort to build preparedness with regional stakeholders to deal with potential disasters as early as possible. Education is one part of the process. Preparedness is one of the disaster management mechanisms as well as an effort to anticipate and reduce the consequences of disaster risks. Activities carried out to increase preparedness are by increasing knowledge and attitudes carried out by the community. Efforts to increase disaster preparedness in the school setting are an important agenda that must be the focus of attention. The responsibility to strive for this lies with the school community and policy makers who are directly related to the world of education. In general, the disaster education model that exists in the school environment can be described on Figure 1.

In daily geography learning activities in class, teachers do not add time allocation to deliver disaster material, but all disaster material content is delivered explicitly in chapters related to certain types of disasters, for example earthquakes and landslides which are predominantly delivered in the chapters on the lithosphere and hydrosphere. In addition to knowledge, aspects of attitudes and skills are also implicitly included in the learning process through material on disaster mitigation. Through Geography, students can learn about various types of natural disasters, their causes, and their impacts on human life and the environment. By understanding disaster distribution patterns and triggers, students can be better prepared to face and reduce the risks posed. In addition, geography teaches spatial analysis skills that are useful in identifying disaster-prone areas. The use of geospatial technology, such as geographic information systems and disaster risk mapping, allows students to develop mitigation strategies based on data and facts. Practice-based learning, such as disaster simulations and environmental studies, also helps improve community preparedness in dealing with emergencies.

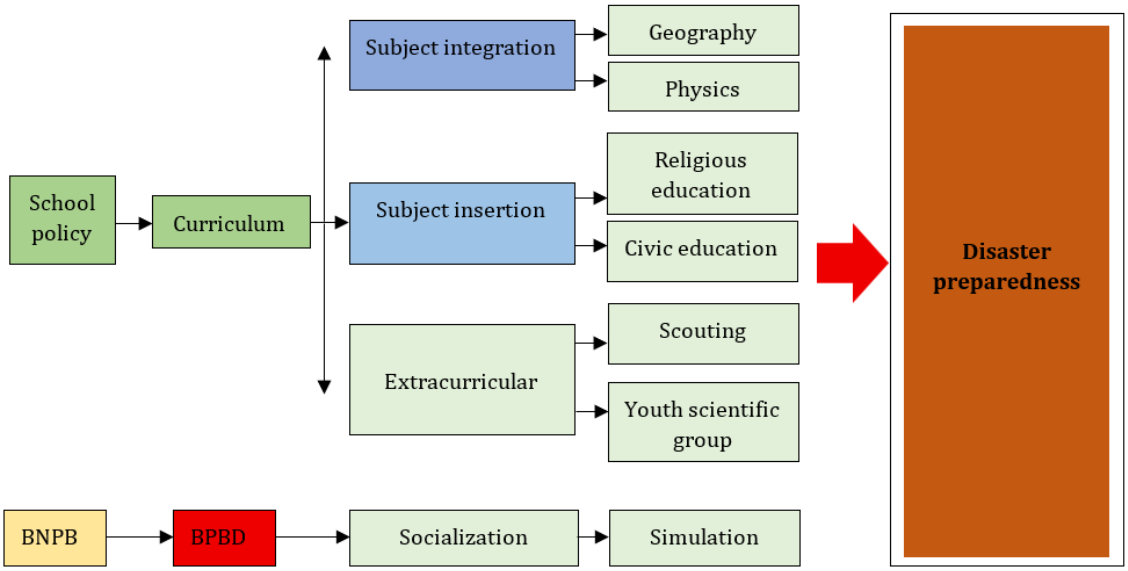

Fig. 1. Disaster education flow in schools

Geography not only builds awareness of the importance of disaster mitigation, but also encourages proactive behavior in maintaining environmental balance. With the integration of disaster education in this subject, it is hoped that students can become agents of change in building a society that is more resilient to disasters. Therefore, strengthening disaster education in the geography curriculum is very necessary to create a generation that is better prepared to face environmental challenges in the future. According to informants, disaster mitigation is very important as an effort to strengthen the knowledge previously possessed by students. This is in line with Rizaldy's research (2021) which states that disaster mitigation and adaptation materials are some of the main subjects in geography subjects. In this study, the application of disaster mitigation education for students has several shortcomings that need to be fixed in order to improve the quality of education in Indonesia. According to informants, the lack of delivery of material on disaster mitigation and adaptation will affect students' understanding in class. Disaster mitigation and adaptation materials must be understood by students from the abstract to the concrete. The material understood by students can be applied in real life. Meanwhile, according to Fitriana's research (2021), disaster mitigation education needs to be introduced at the school level in Indonesia. As an effort to prepare the Indonesian people for disaster preparedness. Disaster mitigation education must be included in the education curriculum, especially in subjects that are related to disasters.

One form of geographic literacy used as teaching material contains aspects of disaster knowledge which includes disaster material related to high school geography subjects (Kamil et al., 2019). Teaching materials contain a geographic perspective to strengthen disaster knowledge in students. Teachers are expected to be able to use teaching materials with a geographic perspective to support disaster risk reduction learning. So that students have good disaster response skills and find solutions to natural damage and reduce its negative side effects. Based on research by Muñoz et al. (2020) the three-pillar model of how disaster education can be an aspect of disaster-safe schools is by preparing safe learning facilities, having school disaster management, and implementing risk reduction and resilience education. Meanwhile, according to Gokmenoglu et al. (2021) school-based disaster education aims to increase positive attitudes towards preparedness, provide basic knowledge about disaster risk reduction, and improve practical skills of teachers. The program made tremendous changes in the level of knowledge, attitudes, and behavior.

Through the curriculum, teachers have the opportunity to transfer knowledge and skills on disaster risk reduction to their students and parents, and thereby contribute to improving the disaster resilience of the community. In this case, schools with their various partners, stakeholders, and information sharing networks play a key role in building a

disaster-resilient community. School disaster education programs help teachers and students develop a safety culture in their immediate environment and play a direct role in achieving the necessary knowledge and skills. These include: increasing awareness, more realistic risk perception, more information on risk reduction, and making arrangements to prevent potential hazards in the daily living environment. In addition, with the increasing level of teachers' disaster preparedness knowledge, it positively affects students' awareness and knowledge; and, the development and integration of disaster preparedness programs with current policies and services prepare schools for potential disasters. In addition, according to informants, strengthening disaster education should be expanded through extracurricular activities such as scouts and juvenile red cross. Students have a place to apply knowledge and develop preparedness with more concrete and programmed activities.

Schools play a vital role in instilling disaster resilience education, which helps students develop the knowledge and skills needed to take protective actions before, during, and after disasters. Integrating disaster education into the curriculum ensures that students are consistently exposed to essential knowledge and skills (Little, 2020; Ridha et al., 2022). For example, in Australia, curriculum mapping is used to identify opportunities and gaps in disaster resilience learning (Dufty, 2014). In China, post-Wenchuan earthquake efforts indicate that school-based disaster education generally produces positive outcomes, although some students remain unaware of the existence of disaster-related curricula. Teachers also emphasize the importance of having dedicated disaster education curricula and specialized textbooks to enhance the effectiveness of disaster education (Lin et al., 2022; Zhu & Zhang, 2017). Meanwhile, in Indonesia, disaster education is integrated into various subjects such as social sciences and geography, thereby improving students' disaster literacy and preparedness. Taiwan has also made disaster prevention education a compulsory component of the grade 1–9 curriculum guidelines, with a focus on basic disaster prevention concepts and disaster response skills (Ridha et al., 2022).

Innovative approaches in disaster education have demonstrated significant results, such as the use of interactive platforms like Kahoot!. in Taiwan, which has proven effective in enhancing students' disaster awareness and response capabilities (Rashid & Qixiang, 2025). In Indonesia, the integration of disaster mitigation content into physics education has also been shown to significantly improve students' disaster literacy skills. However, effective disaster education requires strong collaboration among schools, teachers, and government agencies to address existing gaps and improve facilities for disaster learning. Programs such as Innovative Tsunami Hazard Education in Indonesia have likewise shown substantial improvements in both students' and teachers' understanding of tsunami disasters. From a global perspective, a review of disaster education in Pakistan highlights the need for comprehensive and sustainable disaster risk reduction approaches within the curriculum to enhance preparedness and resilience (Aldous & Ismail, 2025; Kristyanto et al., 2025; Pratiwi et al., 2023). Furthermore, the integration of disaster education into teacher training programs is essential for fostering safe and effective learning environments, as demonstrated in the Gulf Cooperation Council region.

Disaster risk reduction and prevention education or more commonly referred to as disaster risk reduction education is a long-term activity and is part of sustainable development. Through education, it is expected that disaster risk reduction efforts can reach a wider target and can be introduced earlier to all students, which in turn can contribute to individual and community preparedness for disasters. The establishment of a school disaster management committee will be stronger and more meaningful if it is supported by school policies or regulations that support DRR efforts in schools. Parents of learners or students can also make this agreement after receiving an explanation from the school. Another agreement that should be made is an agreement with the surrounding community regarding DRR efforts, so that efforts made by the school, parents of learners or walisiswa, and also by learners of the school can be coordinated with efforts made by the community around the school.

One important finding is that disaster-related concepts in geography were not only aligned with national curriculum content but also localized to reflect the specific hazards in Sukabumi, such as tectonic earthquakes and landslides. This contextualization strengthened students' understanding and made disaster risk reduction more relevant to their lived experiences. Such contextual approaches are widely recommended in international DRR frameworks and have been shown to increase students' risk perception and preparedness levels. Compared to developed countries, where DRR education is systematically integrated at all levels of schooling, Indonesian schools such as Public Senior High School 1 Warung Kiara still rely heavily on teacher initiative and external collaborations. However, this study demonstrates that even in resource-limited contexts, local adaptations and teacher engagement can play a decisive role in embedding disaster knowledge. This aligns with findings from Japan, Iran, and South America, where school-based DRR is most effective when combined with community involvement and localized curriculum interpretation.

Schools must prepare human resources, facilities and infrastructure, as well as financial resources in management to ensure disaster preparedness in schools. Resource mobilization is based on the capabilities of the school and school stakeholders. This mobilization is also open to opportunities for participation from other stakeholders. Community involvement in planning and implementing interventions, implementing programs and policies is critical to the success of emergency preparedness and response. The role of the school committee and parents of students - the school committee is a school component that is very necessary to provide full and direct support to schools in implementing mainstream disaster risk reduction in schools. School committees, as independent institutions, are formed and play a role in improving the quality of services by providing consideration, direction and support for personnel, facilities and infrastructure, as well as supervision in the implementation of disaster risk reduction in the school concerned.

This study is limited by its focus on a single school, which may not fully represent the diversity of disaster education practices across Indonesia. The perspectives included are primarily from geography teachers; therefore, insights from students, parents, and school managers remain underexplored. In addition, the qualitative nature of the study does not allow for measuring learning outcomes or quantifying preparedness levels. Future research could expand to multiple schools, incorporate mixed-method approaches, and assess the effectiveness of specific teaching strategies on disaster preparedness. The findings indicate that geography teachers can serve as key actors in advancing disaster education where official curricular guidelines remain limited. Schools may consider formalizing DRR-related lesson plans, strengthening partnerships with local disaster management agencies, and integrating simulation-based learning within existing subjects and extracurricular programs. At the policy level, the Ministry of Education could adopt a more explicit DRR framework within the national curriculum and develop teacher training modules that emphasize contextual hazard analysis and geospatial skills.

4. Conclusions

Geography subjects can study human knowledge and attitudes about the surrounding environment that is prone to disasters. The field of geography is the spearhead in the disaster education process as long as disaster education has not been officially introduced in schools. Geography subjects have a strategic role in increasing students' awareness and preparedness for disaster risks. As a country prone to disasters, Indonesia needs a systematic educational approach to build understanding and disaster mitigation skills from an early age. In addition, disaster education in geography is not only theoretical, but also practical. Activities such as disaster simulations, mapping disaster-prone areas, and the use of geospatial technology such as geographic information systems help students analyze risks and develop effective mitigation strategies. Thus, Geography contributes to forming a

generation that is more responsive and prepared to face disasters, and is able to actively participate in disaster risk reduction efforts in the community.

However, with various multidisciplinary approaches, it is not impossible that disaster education is provided with other subject approaches, so that the school-based disaster preparedness process is achieved optimally. Overall, this study reinforces that disaster education delivered through geography lessons is both feasible and impactful, even without formal DRR policies. Geography teachers have the potential to act as catalysts for disaster preparedness by contextualizing lessons, embedding mitigation concepts, and integrating classroom learning with school-wide preparedness activities. Strengthening these efforts at the policy and institutional levels will be essential for building disaster-resilient future generations in Indonesia.

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Author Contribution
The first author conceptualized and designed the study; the second author conducted data collection and interviews; the third author performed data analysis and drafted the manuscript. All authors reviewed and approved the final version.

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