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Early Childhood Education Teachers' Readiness in Implementing the Disaster Safe School Guidelines for Disaster Mitigation Education Related to Mount Merapi Eruptions

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ABSTRACT

Early Childhood Education (ECE) institutions in disaster-prone areas face critical challenges in implementing the Disaster Safe School Guidelines (*Satuan Pendidikan Aman Bencana*/SPAB). While disaster education has been widely studied at primary and secondary levels, limited research explores teacher readiness in ECE contexts, particularly in high-risk volcanic regions such as Mount Merapi. This study employed a qualitative descriptive design to examine ECE teachers' readiness in implementing SPAB guidelines. Data were collected through in-depth interviews, observations, and document analysis involving six teachers and two principals from two ECE institutions located in high-risk zones. Data were analyzed using Miles and Huberman's interactive model, including data condensation, display, and verification, supported by thematic coding. The findings indicate that teacher readiness is a multidimensional construct shaped by the interaction between individual competence, institutional capacity, and socio-cultural context. Teachers demonstrated strong affective commitment and pedagogical creativity in integrating disaster education through play-based learning. However, their conceptual and technical understanding of SPAB remained fragmented due to limited formal training and weak policy support. Institutional readiness varied, influenced by leadership, infrastructure, and community engagement. Key barriers included insufficient resources, lack of structured training, and absence of formalized policies. This study conceptualizes teacher readiness as an ecosystem-based construct, emphasizing the dynamic interplay between experience, institutional systems, and community support. Strengthening SPAB implementation requires integrated efforts through continuous professional development, policy alignment, and cross-sector collaboration.

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1. INTRODUCTION

Indonesia is an archipelagic country with a high level of vulnerability to various natural disasters. Geographically, it lies at the convergence of three major tectonic plates—Eurasian, Indo-Australian, and Pacific—making it part of the Ring of Fire, a region characterized by intense volcanic and seismic activity (Rahayu et al., 2024; Setyaningrum et al., 2025). This geological condition has resulted in more than 127 active volcanoes across Indonesia, 19 of which are located on the island of Java (Novianti, 2022). Such volcanic activity not only poses risks to human life but also significantly affects the education sector, particularly institutions situated in disaster-prone areas (Syahwanes et al., 2025).

Mount Merapi is one of Indonesia's most active volcanoes, located on the border between Central Java Province and the Special Region of Yogyakarta. Data from the Geological Disaster Technology Research and Development Center (BPPTKG) show that Mount Merapi has been on Level III (Alert) status since November 2020 (Gelgel et al., 2024). Several areas in Sleman, Klaten, Boyolali, and Magelang Regencies are categorized as Disaster-Prone Area (KRB) III, which are not recommended for permanent settlement due to the high risk of pyroclastic flows, lava streams, and toxic gases. This condition demands stronger community preparedness through educational initiatives that enable residents to adapt sustainably to disaster risks (Haeril & Irfadat, 2022).

Disaster mitigation education plays a critical role in fostering resilient and risk-aware communities from an early age (Maharani, Siregar, & Batubara, 2024; Kamaruddin, 2025; Fatima et al., 2025; Putri & Muttaqin, 2025). Early childhood represents the golden period for learning and character formation; therefore, introducing awareness and knowledge about disaster preparedness during this stage is essential (Af'idah & Waluyo, 2024). Children in this age group are indeed vulnerable to disaster impacts but possess high learning potential and adaptability (Setyaningrum & FajriArianti, 2025; Hidayat et al., 2023; Purwani & Nurfadilah, 2021). Through contextual and enjoyable educational approaches, they can internalize preparedness values and basic self-rescue actions (Hia et al., 2022; Talango et al., 2025). Field observations indicate that disaster education implementation in Early Childhood Education (ECE) institutions remains limited. Outreach programs from agencies such as the Regional Disaster Management Agency (BPBD) mostly target elementary to secondary schools, leaving ECE institutions with minimal guidance and training on disaster response programs.

Previous studies (Ayu & Sari, 2022; Bahagia et al., 2023; Muzani et al., 2022; Bashir & Akbar, 2021; Nuraeni, 2021) have highlighted the significance of disaster education in schools, yet most have focused on primary and secondary education levels. Research examining the readiness of ECE teachers in implementing the Disaster Safe School Guidelines (Satuan Pendidikan Aman Bencana / SPAB) remains limited (Fandayati et al., 2024; Lilianti et al., 2023). Teachers play a central role in introducing preparedness values through play-based learning aligned with children's developmental characteristics (Liza, 2025; Febriantini & Salsabila, 2025). Limited teacher knowledge, inadequate training, insufficient facilities, and weak institutional policies pose major challenges to SPAB implementation at the ECE level (Septikasari et al., 2024; Harfiani & Mavianti, 2024). This gap underscores the need for a deeper analysis of ECE teachers' readiness, particularly in regions vulnerable to Mount Merapi eruptions.

The urgency of this study lies in strengthening ECE teachers' capacity to understand, interpret, and apply the SPAB Guidelines as a foundation for disaster mitigation education. These guidelines, stipulated in the Ministry of Education and Culture Regulation (Permendikbud) No. 33 of 2019, emphasize three pillars: safe educational facilities, disaster management within educational units, and education on disaster prevention and risk reduction. The effectiveness of these pillars depends on teachers' competence, encompassing adequate knowledge, skills, and attitudes toward disaster education. This study was conducted at TK Pertiwi Tegalmulyo and TK ABA Balong, both located in high-risk zones on the slopes of Mount Merapi, representing ECE institutions directly exposed to volcanic hazards yet actively operating in the community. The selection of these schools aims to illustrate the real challenges faced by educators in disaster-prone contexts.

This research employs a descriptive qualitative approach to gain a comprehensive understanding of ECE teachers' readiness in implementing the SPAB Guidelines. The analysis focuses on infrastructure

conditions, teachers' understanding and skills, and the supporting and inhibiting factors influencing field implementation. The findings are expected to provide an in-depth empirical depiction of teachers' actual readiness and generate strategic recommendations for developing disaster-resilient education at the early childhood level.

Based on this framework, the objectives of this study are to (1) Analyze the conditions of facilities, infrastructure, and learning environments in ECE institutions that support the implementation of the Disaster Safe School Guidelines (SPAB); (2) Describe ECE teachers' readiness in understanding and implementing the SPAB Guidelines as a reference for disaster mitigation education related to Mount Merapi eruptions; (3) Identify supporting and inhibiting factors in implementing the SPAB Guidelines at the ECE level; and (4) Formulate strategies and recommendations to enhance teacher readiness and strengthen SPAB implementation in realizing safe and disaster-resilient educational institutions. This study contributes to the existing literature by addressing a critical gap in disaster education research, which has predominantly focused on primary and secondary education levels. In contrast, this study specifically examines the implementation of the Disaster Safe School Guidelines (SPAB) within early childhood education settings located in high-risk volcanic areas.

The novelty of this study lies in its conceptualization of teacher readiness as a multidimensional and ecosystem-based construct, shaped by the dynamic interaction between experiential knowledge, institutional capacity, and socio-cultural context. Unlike previous studies that tend to emphasize individual competence or policy frameworks separately, this research integrates both perspectives to provide a more holistic understanding of how disaster education is enacted in resource-constrained environments. Furthermore, this study offers empirical insights into how early childhood educators adapt disaster mitigation concepts into developmentally appropriate learning practices, highlighting the role of pedagogical creativity and affective readiness in contexts where formal training and institutional support remain limited.

2. METHODS

This study employed a qualitative descriptive design to explore the readiness of Early Childhood Education (ECE) teachers in implementing the Disaster Safe School Guidelines (Satuan Pendidikan Aman Bencana/SPAB) within disaster-prone areas surrounding Mount Merapi. A qualitative approach was selected to enable an in-depth and contextualized understanding of teachers' experiences, perceptions, and practices in disaster mitigation education (Sugiyono, 2021).

The study focused on three interrelated dimensions of teacher readiness: (1) conceptual understanding of SPAB principles, (2) pedagogical readiness in implementing disaster mitigation learning, and (3) institutional readiness in terms of facilities, policies, and support systems. These dimensions align with the SPAB framework developed by the National Disaster Management Agency (BNPB, 2021), which emphasizes safe facilities, disaster management, and disaster risk reduction education.

The research was conducted in two ECE institutions, TK Pertiwi Tegalmulyo and TK ABA Balong, located in Kemalang Subdistrict, Klaten Regency, Central Java. These institutions were purposively selected because they are situated within Disaster-Prone Area (KRB) III of Mount Merapi, representing high-risk environments with direct exposure to volcanic hazards.

Participants consisted of six ECE teachers and two principals with teaching experience ranging from 5 to 39 years. Data were collected over a three-month period (February–April 2024) through in-depth interviews, observations, and document analysis. The researcher acted as the primary instrument, supported by interview guides and observation checklists (Moleong, 2021).

Data analysis followed Miles and Huberman's interactive model, including data condensation, data display, and conclusion drawing and verification (Sugiyono, 2021). To strengthen analytical depth, the researcher conducted open coding to identify initial categories, followed by axial coding to explore relationships among categories, and selective coding to construct broader themes related to teacher readiness.

The validity of the data was ensured through triangulation of sources and techniques, as well as iterative data collection until saturation was reached. Ethical considerations were addressed by obtaining informed consent and maintaining participant confidentiality throughout the research process.

3. FINDINGS AND DISCUSSION

This study reveals four main findings aligned with the research objectives: the condition of facilities and infrastructure in early childhood education (ECE) institutions, teachers' readiness in understanding the Disaster Safe School Guidelines (SPAB), teachers' readiness in implementing the guidelines, and the supporting and inhibiting factors that influence SPAB implementation in ECE institutions located in Mount Merapi's eruption-prone areas.

3.1 Findings

3.1.1 Conditions of Facilities, Infrastructure, and Learning Environment

The findings indicate that the readiness of Early Childhood Education (ECE) institutions located in the Mount Merapi hazard zone to provide adequate facilities and infrastructure supporting the implementation of the Disaster Safe School Guidelines (Satuan Pendidikan Aman Bencana/SPAB) remains suboptimal. The two observed institutions exhibit noticeable contrasts. TK Pertiwi Tegalmulyo demonstrates a relatively organized building layout, clearly marked evacuation routes, and child-accessible assembly points. The physical environment is arranged to facilitate children's movement during emergencies, supporting a child-centered safety design that enables young learners to recognize safe spaces intuitively. The institution also maintains active collaboration with local village officials and communities in conducting evacuation drills, strengthening its preparedness practices.

In comparison, TK ABA Balong experiences greater limitations in fulfilling the infrastructural requirements for SPAB implementation. Some facilities do not yet meet child safety and ergonomic standards, and the school has not yet developed a formal SPAB Action Plan (Rencana Aksi Sekolah/RAS) as an operational reference for disaster preparedness. This indicates that infrastructure readiness is influenced not only by the availability of physical structures but also by the institutional governance and policy integration of disaster safety principles into school management systems.

From a regulatory standpoint, the first pillar of the SPAB Guidelines (BNPB, 2021) defines a "safe facility" as one that ensures protection from potential hazards, provides accessible evacuation routes, and accommodates the developmental characteristics of children. Psychologically, a safe environment in ECE settings should promote a sense of security, predictability, and calm—factors that are crucial for reducing fear and confusion during emergencies. When children feel physically and emotionally secure within their learning environment, their ability to respond appropriately to evacuation instructions increases.

The Ministry of Education, Culture, Research, and Technology (Kemendikbudristek, 2023) further emphasizes that school safety extends beyond physical resilience, encompassing the capacity of the institution to build a culture of safety and resilience among its community members. In the context of ECE institutions on the slopes of Mount Merapi, community participation—rooted in local values of gotong royong (mutual cooperation)—plays an essential role in sustaining SPAB implementation. This collective engagement reinforces adaptability and ensures that safety education becomes an integral part of children's daily learning experiences.

3.1.2 ECE Teachers' Readiness in Understanding the SPAB Guidelines

The findings reveal variations in the level of Early Childhood Education (ECE) teachers' understanding of the Disaster Safe School Guidelines (Satuan Pendidikan Aman Bencana / SPAB). Most teachers demonstrate only basic conceptual knowledge, which tends to focus on general disaster definitions and procedures. Direct training or technical guidance from agencies such as the Regional Disaster Management Agency (BPBD) or the Education Office has not yet been received by the majority

of participants. Their understanding is largely shaped by personal experiences rather than structured training, which aligns with previous studies emphasizing limited institutionalization of disaster education in schools (Lilianti et al., 2023; Septikasari et al., 2024). This limitation is reflected in the following statement:

> *"Teachers' understanding is still insufficient… we really need more training and knowledge about disaster mitigation because we live in a disaster-prone area."*

In addition, teachers acknowledge the lack of training and professional support:

> "*Facilities are still very limited… and teachers' knowledge and experience are still low, so we need more training*."

These findings indicate that teachers' knowledge is primarily experiential, which supports the argument that disaster education in ECE contexts is often developed through lived experiences rather than formal learning systems (Hidayat et al., 2023; Talango et al., 2025). Teachers at TK Pertiwi Tegalmulyo show a more comprehensive understanding due to repeated exposure to disaster events and active collaboration with local officials during preparedness initiatives. Conversely, teachers at TK ABA Balong display a positive attitude and willingness to learn but have limited access to updated references and formal training. This suggests disparities across the three readiness dimensions: conceptual knowledge, practical ability, and attitudinal commitment.

Teachers understand the importance of disaster preparedness but tend to hold fragmented or superficial interpretations of the SPAB framework. For instance, several teachers equate "safe facilities" solely with physical structures, overlooking psychosocial and emotional safety for children. In terms of practical ability, they are capable of conducting simple evacuation simulations but often lack systematic lesson planning that integrates SPAB principles into play-based learning. Attitudinally, most teachers express strong concern and responsibility toward children's safety, indicating a foundation for further capacity development. According to the SPAB Guidelines (BNPB, 2021), teacher readiness should encompass three core elements: knowledge, skills, and attitudes. These elements align with situated learning theory (Lave & Wenger, 1991) and constructivist perspectives, which emphasize that knowledge is best developed through authentic, context-based experiences. ECE teachers' current level of understanding reflects experiential learning—shaped by their lived experiences rather than formal instruction. This explains why their knowledge remains practical but lacks theoretical depth and integration into pedagogical practice.

Similar findings were reported by Amri et al. (2022) and Rahmat et al. (2024), who noted that the limited institutionalization of SPAB in Indonesia has led to disaster education practices relying heavily on individual teacher commitment. The present study supports this observation: ECE teachers demonstrate initiative and enthusiasm to include disaster themes in classroom activities, yet face structural barriers such as limited resources and institutional support. Therefore, practice-based training and continuous mentoring are essential to strengthen teachers' comprehensive understanding of SPAB and enable sustainable disaster education at the early childhood level.

3.1.3 Teachers' Readiness in Implementing the SPAB Guidelines

The implementation of the SPAB Guidelines exhibits distinct characteristics across the two institutions. Teachers at TK ABA Balong have initiated the integration of preparedness values through simple yet meaningful learning activities, including storytelling about volcanic eruptions, singing evacuation-themed songs, and conducting role-play evacuation drills. These activities effectively introduce disaster response concepts in a way that is age-appropriate and emotionally safe for children. Teachers at TK Pertiwi Tegalmulyo demonstrate more advanced practices by conducting regular simulations in collaboration with local disaster volunteers and by creating environmental-based learning media, such as illustrated evacuation maps and miniature volcano models that reflect the local context.

The observed practices indicate that teachers possess the capacity to innovate and adapt pedagogical strategies in alignment with the developmental characteristics of early childhood learners. This aligns with the SPAB implementation framework (BNPB, 2021), which emphasizes participatory, contextual, and child-centered approaches as core elements of disaster-safe education. The experiences from both schools highlight that teacher creativity functions as a critical determinant of successful SPAB integration, particularly under resource-limited conditions. The use of experiential and play-based learning allows children to internalize safety procedures naturally, thereby transforming abstract disaster concepts into tangible understanding.

Septikasari et al. (2024) assert that adaptive pedagogy is crucial in embedding disaster education within early childhood curricula, while Ismaura et al. (2024) emphasize the significance of play and exploration as pathways for developing resilience and emotional regulation. The present findings affirm these views by demonstrating how teachers' locally adapted strategies foster both cognitive understanding and socio-emotional readiness among children.

The implementation process also reveals an evolving teacher awareness that disaster education extends beyond knowledge transmission toward character formation, particularly in cultivating empathy, discipline, and resilience. Teachers act as agents of change who translate national SPAB policies into culturally and developmentally appropriate school practices. A notable policy gap remains at the local level, as schools are not yet formally required to implement SPAB, leading to variations in practice and reliance on teacher initiative. Strengthening regulatory mandates and structured support from local education authorities would therefore enhance consistency and sustainability in SPAB-based learning implementation.

3.1.4 Supporting and Inhibiting Factors in SPAB Implementation

The implementation of the Disaster Safe School Guidelines (SPAB) in Early Childhood Education (ECE) institutions is influenced by a dynamic interaction between supporting and inhibiting factors, which can be analyzed through the lens of Force Field Analysis. The supporting forces include visionary school leadership, teacher motivation, and community participation. Principals in both institutions function as safety leaders who coordinate preparedness activities, integrate SPAB values into school programs, and build collective awareness among staff and parents. Teacher commitment further strengthens the implementation process, particularly when aligned with community involvement.

Residents living near Mount Merapi, who possess long-standing disaster management experience, play an essential role in supporting educational preparedness activities. Collaboration among schools, communities, and village governments reflects the whole-community approach to disaster education that enhances institutional resilience. The implementation of SPAB is influenced by both enabling and constraining factors. Strong community support emerges as a key enabling factor:

"Parents, the village, and the school committee strongly support disaster mitigation programs."

This finding reflects the importance of community participation in disaster education, as highlighted by Harfiani and Mavianti (2024) and Kamaruddin (2025).

On the other hand, major barriers include limited infrastructure, insufficient training, and financial constraints:

"Facilities are still very limited, we only have masks and a loudspeaker."

These constraints are consistent with previous findings indicating that inadequate resources and lack of institutional support hinder disaster preparedness in schools (Bahagia et al., 2023; Rahmat et al., 2024). Structural and resource-related barriers represent the main inhibiting forces. The lack of continuous teacher training programs results in a gap between theoretical understanding and practical implementation of SPAB. Inadequate facilities, limited funding, and the absence of consistent policy directives from education authorities reduce institutional capacity to sustain disaster-related programs.

Teachers face heavy administrative workloads that restrict their time to design and conduct innovative learning activities related to disaster preparedness. These findings are consistent with Bahagia et al. (2023) and Rahmat et al. (2024), who emphasize that sustainable SPAB implementation requires policy reinforcement, sufficient facilities, and multi-stakeholder collaboration. Governance and funding structures are therefore crucial to bridging the gap between teacher commitment and systemic institutional readiness.

Teachers also encounter significant emotional labor when teaching disaster-related topics to young children. They are challenged to balance the importance of developing awareness with the need to preserve emotional security in learners. Several teachers expressed concern that discussing disasters too frequently might trigger anxiety or fear in children, indicating the need for trauma-sensitive and psycho-pedagogical approaches. Strengthening teacher capacity in emotional management and age-appropriate communication is thus essential for ensuring that disaster education fosters resilience rather than distress. The presence of structured mentoring and supportive supervision can help teachers transform emotional strain into professional growth, thereby sustaining effective SPAB implementation in early childhood contexts..

3.2 Discussion

The findings of this study indicate that teacher readiness in implementing SPAB is a multidimensional construct shaped by the interaction between individual competence, institutional capacity, and socio-cultural context. This supports previous research emphasizing that disaster education effectiveness depends not only on teacher knowledge but also on systemic factors (Rahmat et al., 2024; Septikasari et al., 2024).

From a theoretical perspective, the findings align with constructivist learning theory and situated learning (Lave & Wenger, 1991), which suggest that knowledge is constructed through experience. In this study, teachers' proximity to disaster-prone environments contributes to experiential learning; however, without structured training, this knowledge remains fragmented. The findings also resonate with ecological perspectives, where teacher readiness is influenced by interactions between individuals and their environment. Community involvement, as observed in this study, reflects the importance of social capital in supporting disaster education (Harfiani & Mavianti, 2024; Kamaruddin, 2025).

Furthermore, this study confirms previous findings that disaster education in Indonesia is still unevenly implemented, particularly at the early childhood level (Lilianti et al., 2023; Fandayati et al., 2024). While teachers demonstrate strong commitment and creativity, their efforts are often constrained by limited resources and lack of policy enforcement. The study also highlights that in early childhood contexts, affective readiness and pedagogical creativity often precede formal competence. Teachers act as adaptive agents who translate disaster concepts into child-friendly learning experiences, consistent with findings by Febriantini and Salsabila (2025).

Therefore, strengthening SPAB implementation requires an integrated approach that includes continuous teacher training, policy reinforcement, and multi-stakeholder collaboration. This aligns with broader efforts to develop disaster-resilient education systems (Fatima et al., 2025; Maharani et al., 2024). Overall, this study contributes to the literature by demonstrating that teacher readiness in disaster education is not solely an individual attribute but an ecosystem-based phenomenon shaped by dynamic interactions between experience, institutional structures, and community engagement.

4. CONCLUSION

This study concludes that the readiness of Early Childhood Education (ECE) teachers in understanding and implementing the Disaster Safe School Guidelines (Satuan Pendidikan Aman Bencana/SPAB) remains in a developmental phase characterized by strong affective commitment but uneven cognitive and technical competence. Teachers have shown commendable initiative in integrating disaster preparedness values through play-based learning and thematic activities; however,

these efforts have yet to be fully institutionalized due to the absence of structured training programs and operational guidelines. The principal's leadership emerges as a central factor that fosters coordination, promotes safety-oriented culture, and sustains SPAB implementation within ECE institutions.

From a broader perspective, this research underscores the importance of positioning ECE teachers as transformative agents in disaster mitigation education. Their readiness reflects an interplay of experiential learning, motivation, and institutional support—indicating that sustainable capacity development must extend beyond individual competence toward systemic reinforcement. Based on these findings, several policy and practical recommendations can be proposed.

First, localized teacher training modules tailored to the disaster characteristics of each region should be developed to strengthen context-relevant pedagogical competence. Second, integration of SPAB principles into the national ECE curriculum should be mandated to ensure consistency in disaster education across institutions.Third, illustrated and child-friendly disaster preparedness books should be produced collaboratively by educational authorities and local communities to facilitate children's understanding of safety concepts through age-appropriate media. Finally, inter-sectoral collaboration among the Ministry of Education, BPBD, and community stakeholders is essential to institutionalize disaster-resilient school practices. These recommendations provide a practical pathway for transforming SPAB from a policy framework into an operational and culturally grounded model of early childhood disaster education.

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