UAD Pendidikan Program Doktor
p-ISSN: 3048-4324
e-ISSN: 3048-4316
CECE
https://journal1.uad.ac.id/index.php/CECE
Contemporary Education and Community Engagement

Earthquake Hazard Preparedness in Special Education: Case Studies of Special Needs Schools in Bantul, Indonesia

Lathief Viana Saryhaque Hadyyuwono [a, 1], Teuku Faisal Fathani [a, 1], Dina Ruslanjari [a, 1]
[a] Master Program of Disaster Management, The Graduate School, Universitas Gadjah Mada
[1] lathiefvianasmandubel@gmail.com, [2]tfathani@ugm.ac.id, [3]dienarus@ugm.ac.id

DOI: 10.12928/cece.v2i2.1470
Received: May 18, 2025. Revised: July 14, 2025. Accepted: July 16, 2025
Available Online: July 31, 2025. Published Regularly: July 31, 2025

ABSTRACT

Special needs school (*Sekolah Luar Biasa* or SLB) has a higher level of vulnerability compared to a regular school, due to the condition of their students, who are children with special needs. This study analyzes the physical condition and disaster management efforts of SLB Dharma Bhakti Piyungan and SLB Negeri 1 Bantul, Indonesia. Besides, this study also analyzes education, prevention, and disaster risk reduction efforts at those special schools. The mixed methods used in this study are the quantitative and qualitative approaches. Quantitative primary data related to the physical condition of school buildings was obtained from field survey results. In contrast, primary data on disaster management and education, prevention, and disaster risk reduction efforts were obtained from in-depth interviews with triangulation of sources. The data analysis technique used for quantitative data is analysis using rapid visual screening sheets (RVS), FEMA P-154 Level 1 SLB Building. The vulnerability value of buildings in SLB Dharma Bhakti Piyungan was calculated to be 42.85%, falling into the medium-high category and having a high likelihood of suffering earthquake-related damage. In contrast, the vulnerability value of buildings in SLB Negeri 1 Bantul was calculated to be 30.27%, falling into the moderate category and having a low likelihood of suffering earthquake-related damage. Then, SLB Dharma Bhakti Piyungan meets 6 of the 21 indicators for achieving the disaster management pillars, whereas SLB Negeri 1 Bantul meets 16. SLB Dharma Bhakti Piyungan meets four indicators in the disaster risk reduction and prevention education pillar, while SLB Negeri 1 Bantul meets 22.

Keywords: Comprehensive Safe School, Earthquake, Education, Preparedness, Special Needs School

Corresponding Author:
Hadyyuwono, Universitas Gadjah Mada
Email: lathiefvianasmandubel@gmail.com

INTRODUCTION

Natural disasters have become a primary global concern due to their increasing frequency and intensity [1]. Earthquakes, tsunamis, floods, and volcanic eruptions have caused significant casualties, property damage, and disruption of public services, including education [2]. The Sendai Framework for Disaster Risk Reduction 2015–2030 emphasizes four priorities for action: understanding disaster risk, strengthening disaster risk governance, investing in disaster reduction for resilience, and enhancing disaster preparedness for effective response and recovery [3], [4]. In the education sector, disasters can severely disrupt access to learning and threaten the safety of vulnerable groups such as children with disabilities.

In Indonesia, which is located in the Pacific Ring of Fire, disaster risk is exceptionally high. The country frequently experiences earthquakes, volcanic eruptions, floods, and landslides. Between 2009 and 2018, more than 62,687 educational institutions were affected by disasters, disrupting the education of over 12 million students [5]. To address these risks, the Indonesian government launched the Disaster-Safe Education Unit Program, which emphasizes the importance of structural safety, disaster management, and disaster risk reduction education in schools [6].

The Special Region of Yogyakarta is one of the most disaster-prone areas in Indonesia, mainly due to its proximity to the Opak Fault and active volcanoes like Mount Merapi. The 2006 Yogyakarta earthquake caused extensive damage, especially in Bantul Regency, which recorded over 900 educational facilities damaged or destroyed [7]. Among the most vulnerable educational institutions are special education schools that serve students with disabilities [8]. These schools require special attention because of their students' limited mobility and cognitive abilities, making evacuation and preparedness efforts more complex.

Despite the existence of disaster-safe education frameworks, limited research explores explicitly how special education schools implement disaster risk reduction and preparedness, particularly in high-risk zones like Bantul. Most existing studies focus on general education settings, overlooking the unique needs of children with disabilities in emergencies. Therefore, this study aims to (1) assess the physical vulnerability of two special education schools in Bantul Regency, namely SLB Dharma Bhakti Piyungan and SLB Negeri 1 Bantul, and (2) analyze their disaster management practices and disaster education efforts, based on the SPAB framework. This research contributes to bridging the gap in inclusive disaster preparedness practices and promotes equitable resilience in education.

METHOD

Research Sites and Sampling

The study employed purposive sampling to select two schools in Bantul Regency, Yogyakarta: SLB Dharma Bhakti Piyungan and SLB Negeri 1 Bantul. The selection was based on contrasting characteristics. SLB Dharma Bhakti Piyungan is in a high-risk seismic area and has not been designated as a Disaster-Safe Education Unit (SPAB). At the same time, SLB Negeri 1 Bantul has experienced multiple disasters and holds official SPAB status.

Quantitative Data Collection and Analysis

Primary quantitative data were gathered through Rapid Visual Screening (RVS) using the FEMA P-154 Level 1 procedure. This technique assesses building vulnerability to earthquakes by evaluating visual and structural parameters, including seismicity level, building configuration, soil type, structural irregularities, and falling hazards. Data were recorded using standardized FEMA forms, where each element was scored and modified to generate a final seismic vulnerability index (SL1 score). A comparison between SL1 and S_{min} scores determined the likelihood of earthquake damage. In addition to FEMA scoring, the study

adopted assessment criteria from BNPB Regulation No. 04/2012 and PU Regulation No. 29/2006 to further classify building vulnerability into four categories: low, medium, high, and very high.

Qualitative Data Collection and Analysis

The qualitative data were obtained through semi-structured in-depth interviews with key informants, including school principals, Provincial Disaster Management Agency (BPBD DIY) representatives, and the Education, Youth, and Sports Office (Dikpora DIY). The interviews focused on implementing SPAB Pillars 2 and 3, namely disaster management systems and disaster risk reduction education. Source triangulation was applied to ensure the reliability of the data. The qualitative data were then coded and categorized according to the indicators in the Disaster-Safe Education Unit Guidelines. Each school's level of achievement was quantified based on how many indicators it fulfilled in each pillar.

Integration of Data

Quantitative and qualitative findings were analyzed separately and integrated to understand school preparedness comprehensively. This integrative process aimed to identify convergence and divergence across the data sets and generate contextual insights into the barriers and enablers of inclusive disaster preparedness at special schools.

RESULTS AND DISCUSSION

Special School (SLB) X, officially known as SLB Dharma Bhakti Piyungan, is located at Jalan Wonosari KM. 14, Srimartani, Piyungan District, Bantul Regency, DIY. It was founded on January 23, 2006, initiated by a social foundation to accommodate children with special needs who had not been served in inclusive schools. In May 2006, Yogyakarta experienced a significant earthquake that disrupted learning activities at the school for over a year. Classes resumed only in July 2007.

Special School (SLB) Y, or SLB Negeri 1 Bantul, is located at Jalan Wates KM 3, Ngestiharjo Village, Kasihan District, Bantul Regency, DIY. It is a state-run special education unit that serves students with various disabilities from kindergarten to high school levels, including students with visual impairments, hearing impairments (A and B), mild and moderate intellectual disabilities (C and C1), physical disabilities (D and D1), and autism. In 2022, the school had more than 300 students. SLB Negeri 1 Bantul has experienced multiple disasters, including the 2006 earthquake, the 2010 Mount Merapi eruption, the 2014 Kelud eruption, a tornado in 2018, the COVID-19 pandemic in 2020, and recurring floods during the rainy season.

Special needs school SLB X is at Jalan Wonosari KM. 14, Srimartani, Piyungan District, Bantul Regency, DIY. SLB Dharma Bhakti Piyungan was founded on January 23, 2006. The background to the establishment of SLB Dharma Bhakti Piyungan started from the presence of several children with special needs who had not been treated at inclusive schools. A social foundation initiated the construction of this school. Then, in May 2006, an earthquake occurred in Yogyakarta and its surroundings. Learning activities at SLB Dharma Bhakti Piyungan were stopped due to the incident, and learning activities only started again in July 2007.

Special School (SLB) Y is located at Jalan Wates 147, km 3, Ngestiharjo Village, Kasihan District, Bantul Regency, DIY. SLB Negeri 1 Bantul is a special education unit with state status that provides education services at the kindergarten to high school levels for students with visual impairments, deaf (A), deaf (B), mild mental retardation (C), moderate mental retardation (C1), quadriplegic, mildly quadriplegic (D1), and autistic. The

number of students at SLB Negeri 1 Bantul in the 2022 school year will reach 300 people, with various special needs. SLB Negeri 1 Bantul was affected by the earthquake disaster in 2006; besides that, SLB Negeri 1 Bantul was also affected by the eruption of Mount Merapi in 2010, the eruption of Kelud Volcano in 2014, the tornado in 2018, the 19th COVID pandemic in 2020, and floods every rainy season.

Physical Vulnerability of School Buildings

Results of RVS FEMA P-154 Analysis at SLB Dharma Bhakti Piyungan

The vulnerability assessment of the Dharma Bhakti Piyungan SLB building based on the RVS procedure was carried out by filling in the FEMA P-154 Level 1 form with direct observation, both on the exterior and interior sides. The results of filling out the FEMA P-154 Level 1 form at SLB Dharma Bhakti Piyungan are presented in Figure 1.

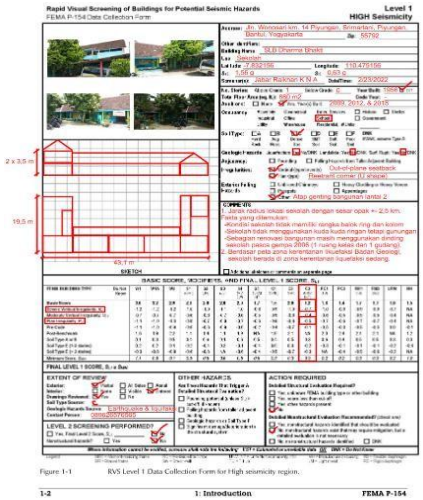

Figure 1. Results of Filling in the FEMA P-154 Form at SLB Dharma Bhakti Piyungan

1. The level of seismicity of the Dharma Bhakti Piyungan SLB building

The level of seismicity according to FEMA is classified into five levels: low, medium, medium to high, high, and very high. Each level of earthquake has a range of acceleration spectral response values on the surface, namely short periods or 0.2 seconds (Ss) and long periods or one second (S1). This spectral value is the reference in determining the RVS FEMA P-154 form used. Table 1 presents the results of analyzing the acceleration spectral response values on the surface using the website http://rsa.ciptakarya.pu.go.id/.

Table 1. The results of the analysis of the value of the spectral response to the acceleration of the earthquake on the surface.

Latitude	Longitudo	SA Value		PGA (gal)	Seismic Classification
		Ss (g)	S1 (g)		
7.832156	110.475156	1.56	0.63	0.61	**Very High**

Based on the analysis results in Table 2, the Dharma Bhakti Piyungan SLB location has a very high seismicity level value.

2. Building type

The Federal Emergency Management Agency (FEMA; https://www.fema.gov/about) classifies building types based on their basic characteristics: the configuration of the building structure and building materials. The Dharma Bhakti Piyungan SLB building type, based on

the FEMA P-154 classification, is included in Type C3, namely a concrete frame building with unreinforced brick infill walls.

3. Type of soil

Soil types according to FEMA P-154 are classified into five types, namely type A in the form of hard rock, type B in rock, type C in the form of very dense soil or soft rock, type D in the form of hard or dense soil, and type E in the form of soft soil derived from from sedimentation of materials such as loose sand and river deposits [9]. The Dharma Bhakti Piyungan SLB building stands on Type C land. The Type C soil type does not affect the final assessment score.

4. Vertical Irregularities

Vertical irregularity is the appearance of an irregular vertical building. Vertical irregularities are divided into six classifications: sloping site, soft story, out-of-plane seatback, in-plane seatback, short columns, and split levels. The Dharma Bhakti Piyungan SLB building has a vertical irregularity in the form of an in-plane seatback, which is a condition of the building where the seismic force resisting system on one floor is not aligned vertically with the seismic force resisting system on the floor above or below it.

5. Threat of falling from the outside of the building

The threat of collapse from the outside of the building is a non-structural hazard that exists in the building, namely: chimneys, parapets, architectural details, and heavy decoration. The existence of non-structural hazards can be a threat to occupants and other people around the building. The type of fall threat from the outside of the Dharma Bhakti Piyungan SLB building is in the form of tiled roofs on the 2nd floor of the building, due to the absence of roof tiles.

6. The final vulnerability score

The final vulnerability score of the building is obtained by circling the parameter score on the RVS FEMA P-154 form, which is adjusted to the results of direct observation of the building, and then the score is added up. These scores are the final score of level 1 (SL1). The final score is level 1, which indicates the safety limit of the building is equal to 2 (SL1=2). The following results are based on calculating and analyzing the total final score of level 1 RVS FEMA P-154 at the Dharma Bhakti Piyungan SLB building (Table 2).

Table 2. Total final score of level 1 RVS FEMA P-154

S:	1.2
VL1:	(-0.7)
PL1:	(-0.5)
S_{Min}:	**0.3**
SL1:	S + VL1 + PL1 1,2 + (-0,7) + (-0,5) **0**
SL1	**0 < 0.3**

The Final Level Score requirement for a building to be damaged by an earthquake is low, namely SL1 ≥ Smin. The calculation results show that the SL1 value is smaller than the SMin value, meaning that the Dharma Bhakti Piyungan SLB building has a high value for experiencing damage due to an earthquake.

SLB Dharma/ Bhakti Piyungan Vulnerability Conditions

SLB Dharma Bhakti Piyungan has the highest earthquake acceleration value among the 20

SLB, both public and private, in Bantul Regency, which is 1.25g. This school has no disaster-safe education unit (SPAB) status. Table 1 presents the results of calculating the vulnerability of the Dharma Bhakti Piyungan SLB building.

Table 3. Results of the Calculation of the Vulnerability of the Dharma Bhakti Piyungan SLB Building

Building Parameter Assessment	Total Score	Weight (%)	Assessment Score	Weighted Score (%)
Location	100	5	84	4.20
Building Structure	300	55	168	27.65
Architectural	200	30	120	18.00
Supporting Facilities and Infrastructure	100	10	73	7.30
Location	100	5	84	4.20
Total				57.15

The parameters used to assess the level of vulnerability of a building are the location of the building, the building structure, architectural, and supporting facilities and infrastructure [10]. Each parameter has a different rating weight. The difference in the rating weights shows the priority scale for essential aspects to complementary aspects, with the highest rating weight to the lowest weight [11]. The weighting value on the architectural aspects of the building in the rapid visual screen (RVS) has the most significant total weighting, which is 55%. The total weighting shows that structural strength is the main priority in determining the vulnerability of school buildings to disasters. The percentage of the vulnerability weight of the Dharma Bhakti Piyungan SLB building is 30.28%; this value falls into the medium-high category.

Analysis Results of RVS FEMA P-154 at SLB Negeri 1 Bantul

The vulnerability assessment of the Bantul 1 State SLB building based on the RVS procedure was carried out by filling in the FEMA P-154 Level 1 form with direct observation, both on the exterior and interior sides. The results of filling out the FEMA P-154 Level 1 form at SLB Negeri 1 Bantul are presented in Figure 2.

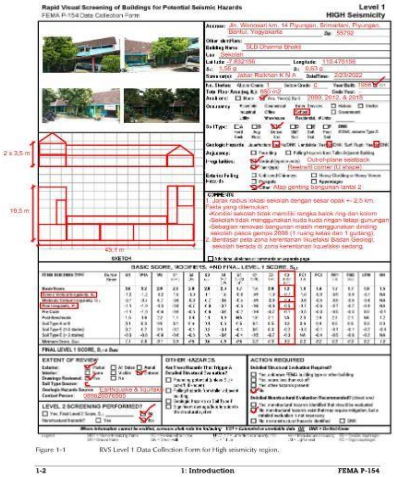

Figure 2. Results of Filling in the FEMA P-154 Form at SLB Negeri 1 Bantul

1. The level of seismicity of the Bantul 1 State SLB building

According to FEMA (2015), the seismicity level is classified into five levels: low, medium, medium to high, high, and very high. Each level of earthquake has a range of acceleration spectral response values on the surface, namely short periods or 0.2 seconds (Ss) and long periods or 1 second (S1) [12]. This spectral value is the reference in determining the RVS FEMA P-154 form used. Table 4 presents the results of analyzing the acceleration spectral response values on the surface, using the spectral design application through the website http://rsa.ciptakarya.pu.go.id/.

Table 4. The results of the analysis of the value of the spectral response to the acceleration of the earthquake on the surface.

Latitude	Longitude	SA Value		PGA (gal)	Seismic Classification
		Ss (g)	S1 (g)		
-7.800975	110.339462	1.14	0.51	0.49	**Very high**

Based on the analysis results in Table 2, the location of SLB Negeri 1 Bantul has a high level of seismicity.

2. Building Type

FEMA P-154 is based on its basic characteristics, namely: the configuration of building structures and building materials [9]. Based on the FEMA P-154 classification, the SLB Negeri 1 Bantul building type is included in Type C3, namely a concrete frame building with unreinforced brick infill walls.

3. Type of soil

According to FEMA P-154, soil types are classified into five categories: Type A (hard rock), Type B (rock), Type C (very dense soil or soft rock), Type D (stiff or dense soil), and Type E (soft soil resulting from sedimentation of materials such as loose sand and river deposits) [13]. The SLB Negeri 1 Bantul building is situated on Type D soil, which consists of stiff or dense soil. This type of soil does not influence the final assessment score.

4. Horizontal irregularity (plan irregularity)

Horizontal irregularities are the appearance of an asymmetrical floor plan. This irregularity occurs in all types of buildings, but is more common in buildings with timber frame, tilt-up, pre-cast, reinforced masonry, and unreinforced masonry construction. Plan irregularity can be divided into several forms, namely torsion, non-parallel structures, re-entrant angles, openings in diaphragms, and beams not parallel to columns [14], [15]. The shape of the horizontal irregularities in the Bantul 1 SLB Negeri 1 building is included in the torsion group; this can occur if the building has a lateral load resistance only in one direction. This condition can also happen if the seismic force resisting system has a large rigidity eccentricity, which causes rotation (torque) around the vertical axis.

5. Threat of falling from the outside of the building

The threat of collapse from the outside of the building is a non-structural hazard that exists in the building, namely: chimneys, parapets, architectural details, and heavy decoration. The existence of non-structural hazards can be a threat to occupants and other people around the building. The type of fall threat from outside the Bantul 1 State SLB building is in the form of tiled roofs on the new building, which has two direct observation points of the building, and then the score is added up. These scores are the final score of level 1 (SL1). The final score is level 1, which indicates the safety limit of the building is equal to 2 (SL1=2). The following results from calculating and analyzing the total final score of level 1 RVS FEMA P-154 at the Bantul 1 SLB State Building (Table 4).

Table 4. The total final score of level 1 RVS FEMA P-154

S :	1.2
PL1 :	(-0.5)
SMin :	**0.3**
SL1 :	S + PL1 1.2 + (-0,5) **0.7**
SL1	**0.7 > 0.3**

The requirement for the Final Level Score to indicate a low likelihood of earthquake-induced damage is SL1 ≥ Smin. The calculation results show that the SL1 value is greater than the Smin value, which means that the SLB Negeri 1 Bantul building has a low probability of experiencing damage in the event of an earthquake.

SLB Negeri 1Bantul Vulnerability Conditions

SLB Negeri 1 Bantul has an acceleration value of 0.79 g. Assessment of school buildings is carried out by comparing the total assessment to the percentage of vulnerabilities. Based on the results of a field survey and rapid visual inspection (RVS) conducted by comparing the total assessment to the percentage of vulnerabilities, it shows that the vulnerability value of the Bantul 1 Public SLB building is 69.73%, which means that the vulnerability of school buildings is in the medium category. The results of building vulnerability calculations are presented in Table 5.

Table 5. Results of the Vulnerability Calculation of the Bantul 1 State SLB Building

Building Assessment Parameter	Total Score	Weight (%)	Assessment Score	Weighted Score (%)
Location	100	5	80	4.00
Building Structure	300	55	178	31.70
Architectural	200	30	163.5	24.53
Supporting Facilities and Infrastructure	100	10	95	9.50
Total				**69.73**

The parameters used to assess the level of vulnerability of a building are the location of the building, the building structure, architectural, and supporting facilities and infrastructure. Each parameter has a different rating weight. The difference in the rating weights shows the priority scale for essential aspects to complementary aspects, with the highest rating weight to the lowest weight. The weighting value on the architectural elements of the building in the rapid visual screen (RVS) has the most significant total weighting, which is 55%. The total weighting shows that structural strength is the main priority in determining the vulnerability of school buildings to disasters. The percentage of building vulnerability of SLB Negeri 1 Bantul is 42.85%, which is included in the medium category.

Disaster Management Efforts in SLB

Disaster Management Efforts at SLB Dharma Bhakti Piyungan

SLB Dharma Bhakti Piyungan has not yet conducted a disaster risk assessment or developed a disaster preparedness plan to address potential earthquake threats in the school environment. According to BNPB Regulation No. 02 of 2012 on General Guidelines for Disaster Risk Assessment, a disaster risk assessment is defined as an integrated mechanism

designed to provide a comprehensive overview of disaster risks in a particular area by analyzing the levels of hazard, potential losses, and local capacity [16], [17].

Conducting such an assessment is especially important for schools in disaster-prone areas, as it provides a basis for informed planning and equips school stakeholders with the tools to evaluate specific risks, particularly earthquakes. Moreover, risk assessment is the foundation for implementing disaster management strategies effectively and aligning disaster-related policies across central, provincial, and district/city levels toward a unified goal.

The school lacks the skills and equipment to respond effectively to earthquake emergencies because it has never conducted any earthquake simulation or drill. Simulation exercises are vital for fostering a culture of preparedness, safety, and disaster risk reduction. They build resilience among school stakeholders by ensuring a coordinated, integrated, and planned response that best uses available resources. Furthermore, simulations help disseminate disaster awareness to the broader community through education and offer practical recommendations concerning school building safety (BPBD Bogor City, 2018).

The absence of regular simulation activities at SLB Dharma Bhakti Piyungan strongly suggests that the school is still unprepared to respond to potential earthquake threats. The school principal admitted that simulation activities involving all components had not been comprehensively conducted. As the principal stated:

"Kami ini belum Mbak, memang belum… itu simulasinya hanya kemarin waktu misalnya ada guru ya latihan, nanti diulang dijelaskan ke anak-anak baru semacam itu, jadi belum…"

("We haven't done it yet, Ma'am, really... the simulation was only done when a teacher happened to practice, and later it was just briefly explained to the students, so it hasn't been done.")

Moreover, the school has not appointed a disaster management committee representative, nor does it have an education continuity plan. There are also no established standard operating procedures (SOPs) for responding to earthquake threats due to the absence of a school-level disaster risk assessment document. A contingency plan, which ideally should be developed collaboratively by all school stakeholders, is also lacking.

According to Dewi (2020), several internal factors hinder the implementation of school-based disaster preparedness programs (SSB). These include the lack of formal documentation, such as decrees (SK) for establishing school disaster management groups, the absence of evacuation procedures, documentation of evacuation implementation, emergency drills, and internal monitoring or evaluation processes. This lack of understanding regarding school disaster preparedness stems from multiple internal causes.

Externally, the implementation of disaster preparedness programs is further hindered by insufficient government support regarding operational funding and a lack of monitoring and evaluation from relevant authorities, such as the Regional Disaster Management Agency (BPBD) and the Department of Education.

Disaster Management Efforts at SLB Negeri 1 Bantul

Disaster management in schools is a review process that is then carried out by planning for physical protection, planning for capacity building in response to emergencies, and planning for continuity of education at every school level up to the education authorities at all levels, starting from districts/cities, provinces, to national (Seeknas SPAB, 2018). SLB Negeri Y has conducted a risk assessment and planning in dealing with the threat of an earthquake. This is shown by a contingency plan document owned by the school. A contingency plan is a document prepared and agreed upon that will be used to better deal with a disaster threat during the emergency response period (Bencanapedia, 2020). The document contains an

assessment of school disaster risk, school community action plans, school disaster preparedness teams, standard disaster emergency response procedures, strategies for integrating disaster risk reduction in schools, and school follow-up plans. Schools already have the skills and equipment to respond to an earthquake threat because they have conducted regular simulations. Figure 3 shows the activities of an earthquake disaster management simulation at SLB Negeri 1 Bantul.

(a) (b)

Figure 3 (a) simulation of evacuating students with disabilities, (b) all simulation participants gathered at the school gathering point

The school has appointed a disaster management committee representative. The school does not yet have an education continuity plan. The school already has standard procedures (PROTAP/SOP) for dealing with the threat of an earthquake, which are written in the school's contingency plan document. The school already has a contingency plan prepared in a participatory manner by teachers, principals, and school staff.

Disaster Risk Reduction and Prevention Education in SLB

Disaster Prevention and Risk Reduction Education at SLB Dharma Bhakti Piyungan

Disaster risk reduction (DRR) education is an interactive shared learning process within communities and existing institutions. Its scope extends beyond formal education in schools and universities, encompassing the recognition and application of traditional wisdom and local knowledge to protect against natural disasters (Seknas SPAB, 2018). Based on the analysis results, disaster-related content is included in the Educational Unit Operational Curriculum (KOSP) document; however, it has not been effectively integrated into classroom instruction. This indicates a lack of consistency in curriculum planning and implementation. As noted by an educational quality analyst from Dikpora DIY, “The school only includes disaster material in the KOSP document, but not all subjects incorporate it into their teaching. There is an inconsistency when translating it into other curriculum documents. While it appears in the KOSP, it is missing in the syllabus document.” This suggests that no training has been provided to SLB Dharma Bhakti Piyungan teachers on integrating disaster-related topics into the curriculum. Furthermore, there has been no capacity-building or professional development for teachers and staff in disaster preparedness. Nonetheless, scout extracurricular activities at the school incorporate disaster risk reduction education.

Education on Disaster Prevention and Risk Reduction in SLB Negeri 1 Bantul

Disaster-related material is not explicitly included in the curriculum but is integrated into specific subjects. The Deputy Head of Curriculum explained this at the school:

"We don't have a specific syllabus for disaster education because, in the Merdeka Curriculum, disaster-related content is not assigned to any particular subject. Unlike the 2013 Curriculum, which included insertions or additional content on disasters, health, etc. The Merdeka Curriculum embeds topics within P5 (Pancasila Student Profile Projects), such as faith, piety, global-mindedness, collaboration, and morality."

SLB Negeri 1 Bantul has also provided training and professional development in disaster preparedness for teachers, staff, and students. Figure 4 presents documentation of disaster preparedness training for teachers and staff at SLB Negeri 1 Bantul. Figure 5 shows disaster risk reduction (DRR) training activities for students with hearing impairments, while Figure 6 documents DRR training for students with autism, accompanied by their parents. Figure 7 depicts DRR training for students with visual impairments. Additionally, the school organizes scout extracurricular activities integrating disaster risk reduction education.

(a) *(b)*

Figure 4. Documentation of training activities, teacher and school staff, disaster (a) first day (b) second day. Source: School documentation, 2022

Figure 5. DRR training activities for students with people who are deaf or hard of hearing (Source: School documentation, 2022)

Figure 6. DRR training activities for students with autism accompanied by their parents (Source: School documentation, 2022)

Figure 7. DRR training activities for students with visual impairments. Source: School documentation, 2022

CONCLUSION

Based on the analysis of the study "Study of Special School Readiness for Earthquake Disaster Threats in Bantul Regency", it can be concluded that SLB Dharma Bhakti Piyungan shows a medium-high vulnerability to earthquake damage (42.85%) compared to SLB Negeri 1 Bantul (30.28%), which falls into the medium category. SLB Negeri 1 Bantul demonstrates significantly greater preparedness, meeting 16 21 disaster management indicators and 22 25 disaster prevention and risk reduction education indicators. In contrast, SLB Dharma Bhakti

Piyungan only meets 6 and 4 indicators. These differences are primarily due to the interventions received by SLB Negeri 1 Bantul, including its designation as a post-disaster pilot school and support from the Regional Disaster Management Agency (BPBD) and the Education Office of D.I. Yogyakarta. In contrast, SLB Dharma Bhakti Piyungan has not received similar support. This finding implies the urgent need for equitable disaster risk reduction interventions and capacity-building programs across all special schools to ensure inclusive and resilient disaster preparedness.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] G. Berz *et al.*, "World Map of Natural Hazards – A Global View of the Distribution and Intensity of Significant Exposures," *Nat. Hazards*, vol. 23, no. 2, pp. 443–465, 2001, doi: 10.1023/A:1011193724026.

[2] V. Spiridonov, M. Ćurić, and N. Novkovski, "Exploring Natural Hazards: From Earthquakes, Floods, and Beyond BT - Atmospheric Perspectives: Unveiling Earth's Environmental Challenges," V. Spiridonov, M. Ćurić, and N. Novkovski, Eds., Cham: Springer Nature Switzerland, 2025, pp. 271–306. doi: 10.1007/978-3-031-86757-6_11.

[3] M. Mizutori, "Reflections on the Sendai Framework for Disaster Risk Reduction: Five Years Since Its Adoption," *Int. J. Disaster Risk Sci.*, vol. 11, no. 2, pp. 147–151, 2020, doi: 10.1007/s13753-020-00261-2.

[4] I. Kelman, "Climate Change and the Sendai Framework for Disaster Risk Reduction," *Int. J. Disaster Risk Sci.*, vol. 6, no. 2, pp. 117–127, 2015, doi: 10.1007/s13753-015-0046-5.

[5] L. Ronggowulan, Y. A. Wibowo, and H. D. Saputro, "A policy review: are disaster safe schools in Pekalongan Regency necessary?" *IOP Conf. Ser. Earth Environ. Sci.*, vol. 1190, no. 1, p. 12029, 2023, doi: 10.1088/1755-1315/1190/1/012029.

[6] P. H. Pratiwi, S. I. A. Dwiningrum, and D. R. S. Sumunar, "Integrated Disaster Risk Management in the Education Process in Schools," *J. Integr. Disaster Risk Manag.*, vol. 13, no. 1, pp. 172–192, 2023, doi: 10.5595/001C.91284.

[7] B. Kusumasari, "Natural Hazards Governance in Indonesia." Oxford University Press, 2019. doi: 10.1093/acrefore/9780199389407.013.234.

[8] Lorna Idol, "Toward Inclusion of Special Education Students in General Education: A Program Evaluation of Eight Schools," *Remedial Spec. Educ.*, vol. 27, no. 2, pp. 77–94, Mar. 2006, doi: 10.1177/07419325060270020601.

[9] B. Lizundia *et al.*, "Third Edition Update of FEMA P-154: Rapid Visual Screening for Potential Seismic Hazards," in *Improving the Seismic Performance of Existing Buildings and Other Structures 2015*, in Proceedings. 2015, pp. 775–786. doi: doi:10.1061/9780784479728.064.

[10] Y. Yang *et al.*, "BIM-GIS-DCEs enabled vulnerability assessment of interdependent infrastructures – A case of stormwater drainage-building-road transport Nexus in urban flooding," *Autom. Constr.*, vol. 125, p. 103626, 2021, doi: https://doi.org/10.1016/j.autcon.2021.103626.

[11] Z. Chen, X. Zhang, and J. Lee, "Combining PCA-AHP Combination Weighting to Prioritize Design Elements of Intelligent Wearable Masks," *Sustainability*, vol. 15, no. 3. 2023. doi: 10.3390/su15031888.

[12] M. Roi, D. Asriwiyanti, W. Hendry, S. Deni, and H. Ginardy, "Assessment of Seismic Vulnerability of School Buildings: A case study in Bandung, West Java, Indonesia," *Disaster Adv.*, vol. 16, no. 9, pp. 49–59, 2023, doi: 10.25303/1609da049059.
[13] S. U. Khan, M. I. Qureshi, I. A. Rana, and A. Maqsoom, "Seismic vulnerability assessment of building stock of Malakand (Pakistan) using FEMA P-154 method," *SN Appl. Sci.*, vol. 1, no. 12, p. 1625, 2019, doi: 10.1007/s42452-019-1681-z.
[14] N. Kattimani, "Response of RCC asymmetric building subjected to earthquake ground," *J. Eng. Technol. Manag.*, vol. 75, pp. 539–560, 2025, [Online]. Available: https://jet-m.com/wp-content/uploads/49-JETM8844.pdf
[15] A. Masi, M. Dolce, and F. Caterina, "Seismic Response of Irregular Multi-Storey," vol. 6, no. July 1996, pp. 99–124, 1997, doi: 10.34218/IJARET.12.5.2021.017.
[16] K. Poljansek *et al.*, *Recommendations for National Risk Assessment for Disaster Risk Management in the EU, EUR 29557 EN*. 2019. doi: 10.2760/084707.
[17] L. Lin, "Integrating a national risk assessment into a disaster risk management system: Process and practice," *Int. J. Disaster Risk Reduct.*, vol. 27, pp. 625–631, 2018, doi: https://doi.org/10.1016/j.ijdrr.2017.08.004.

AUTHORS

Lathief Viana Saryhaque Hadyyuwono is a graduate student at the Master Program of Disaster Management, The Graduate School, Universitas Gadjah Mada. Besides, she also a facilitator of Satuan Pendidikan Aman Bencana (SPAB) and a teacher at SMA Negeri 12 Pontianak. Her research interests include disaster risk reduction, inclusive education, and community resilience. For further inquiries, she can be reached at lathiefvianasmandubel@gmail.com.

Teuku Faisal Fathani is a lecturer and researcher at the Master Program of Disaster Management, The Graduate School, Universitas Gadjah Mada. His research interests focus on earthquake engineering, early warning systems, and disaster mitigation policy. For further inquiries, he can be reached at tfathani@ugm.ac.id.

Dina Ruslanjari is a faculty member of the Master Program of Disaster Management, The Graduate School, Universitas Gadjah Mada. Her research interests include educational disaster preparedness, participatory disaster management, and curriculum development for risk reduction. For further inquiries, she can be reached at dienarus@ugm.ac.id.