Int. j. adv. multidisc. res. stud. 2026; 6(3):862-866

Received: 05-04-2026
Accepted: 15-05-2026

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Effectiveness of Structured School-Based Disaster Risk Reduction Education on Preparedness Outcomes Among Junior High School Students: A Systematic Literature Review

[1] Analia B Hipolito, [2] John Alfred V Sumoba, [3] Dr. Roel S Ang

[1, 2] Graduate School Student, Graduate School - Nueva Ecija University of Science and Technology, Nueva Ecija, Philippines

[3] Professor, Graduate School - Nueva Ecija University of Science and Technology, Nueva Ecija, Philippines

DOI: https://doi.org/10.62225/2583049X.2026.6.3.6366

Corresponding Author: **John Alfred V Sumoba**

Abstract

This systematic literature review examines the effectiveness of structured school-based disaster risk reduction (DRR) education in enhancing preparedness outcomes among junior high school students aged 11–15 years, based on studies published between 2021 and 2025. Following PRISMA guidelines, the review synthesizes empirical evidence on diverse instructional approaches, including curriculum integration, simulation-based learning, technology-supported instruction, and context-responsive models. The findings indicate that structured DRR interventions consistently improve students' disaster-related knowledge, risk perception, and self-efficacy, demonstrating strong effects on cognitive and affective dimensions of preparedness. However, a persistent knowledge–behavior gap is observed, where improvements in understanding do not consistently translate into actual preparedness actions. Variations in implementation quality, resource availability, and contextual factors further influence program effectiveness. Overall, the evidence suggests that while school-based DRR education is effective in strengthening foundational preparedness competencies, its impact is maximized when combined with experiential learning and sustained practice-oriented strategies that support behavioral application.

Keywords: Disaster Risk Reduction Education, School-Based Learning, Preparedness Outcomes, Junior High School Students, Systematic Literature Review

1. Introduction

Developing a structured school-based Disaster Risk Reduction (DRR) education is a strategic imperative for building a resilient generation capable of addressing escalating global environmental hazards such as natural disasters. Junior high school students are at a key developmental stage where they shift from concrete to more abstract thinking. This transition makes them well-suited to act as "change agents" who can promote safety within their communities.

Historically, children are especially susceptible to the impacts of disasters due to their still-developing psychological and social capacities, physical vulnerability, smaller stature, emotional needs, and reliance on adults for most aspects of life, including decision-making (Apronti *et al*., 2015; Yildiz *et al*., 2024) as cited by Mutanda & Ngcamu (2026) [3]. This vulnerability is further intensified by their limited knowledge, high energy, and natural curiosity (Widowati *et al*., 2023) [10]. However, current frameworks such as the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Comprehensive School Safety (CSS) Framework 2022–2030 emphasize their role as proactive assets (UNESCO, 2023).

Despite substantial literature, gaps remain in understanding the specific effectiveness of structured programs versus unstructured interventions for the junior high population. This study aims to address these gaps by systematically reviewing recent evidence (2021–2025) on how structured education influences knowledge, attitudes, and behaviors. This study explores the impact of innovative pedagogical methods, including virtual simulations and tabletop exercises, while assessing the influence of external factors like family dynamics and prior disaster experience. By identifying key successes and limitations, this review provides actionable recommendations for policy makers to institutionalize DRR within national curricula.

2. Methods and Procedures

This study employed the Systematic Literature Review (SLR) approach as the basis for reviewing and synthesizing existing research findings relevant to structured disaster risk reduction (DRR) education programs.

2.1 Search Strategy

A comprehensive literature review search was initially conducted using Google Scholar as the primary database which yielded 57 studies, of which 4 met the inclusion criteria after initial screening.

To ensure a transparent and unbiased retrieval of relevant literature, additional searches were conducted in ERIC and Open Alex, including accessible full-text and open-access journals. This multi-database approach was adopted to capture a wider range of peer-reviewed studies and grey literature published between 2021 and 2025.

A standardized set of keywords and Boolean operators was used across all databases, with slight modifications depending on each database's search interface. Sample search strings included: "school-based disaster risk reduction education" OR "disaster preparedness education," "junior high school students" OR "secondary students," disaster preparedness" OR "emergency preparedness effectiveness."

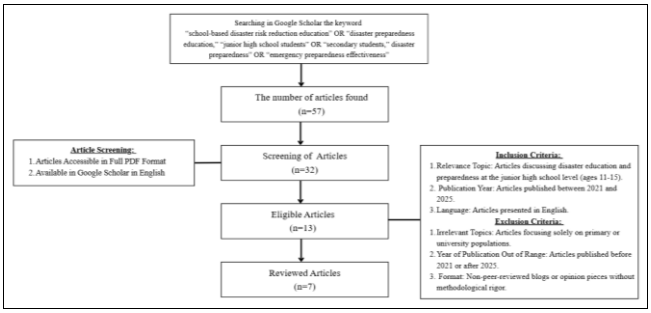
All retrieved records were compiled into a single dataset, and cross-referencing was performed to compare results across databases. Duplicate studies were checked manually based on title, authorship, and publication details; however, minimal to no duplicates were identified. The remaining studies were then subjected to screening based on predefined inclusion and exclusion criteria.

2.2 PRISMA Analysis

The review followed established guidelines from PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) Criteria across four stages: identification, screening, eligibility, and inclusion. A total of 7 primary studies including Random Controlled Trial (RCT) and quasi-experimental designs were selected for deep synthesis from a broader pool of identified records. The study limitations were determined through strict inclusion and exclusion criteria (Table 1) to ensure that the selected articles are relevant and of good quality in accordance with the study to be discussed with the following study limitations.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
a. Relevance Topic: Articles discussing disaster education and preparedness at the junior high school level (ages 11-15).	a. Irrelevant Topics: Articles focusing solely on primary or university populations.
b. Publication Year: Articles published between 2021 and 2025.	b. Year of Publication Out of Range: Articles published before 2021 or after 2025.
c. Language: Articles presented in English. [4]	c. Format: Non-peer-reviewed blogs or opinion pieces without methodological rigor.



3. Results and Discussion

In this study, a number of relevant articles have been analyzed to investigate educational approaches that integrate DRR into junior high school settings. The following table presents the titles of articles that discuss various effectiveness of structured school-based DRR education in preparedness outcomes of Junior High School students. The results of the key synthesized literature are presented in Table 2.

Table 2: Results of the 2021–2025 literature review

S. No	Author	Topic	Results
1	Baskoro Setioputro, Windi Rohmatun Nabilah, Nur Apriliani, Rismawan Adi Yunanto	School-Based Program for Improving Disaster Preparedness among Indonesian Adolescents in Earthquake Risk Area: A Randomized Control Trial [1]	The randomized controlled trial demonstrated that the school-based intervention (SBPIDP) produced statistically significant improvements in adolescents' disaster preparedness after 10 weeks. Specifically, participants in the intervention group showed higher levels of earthquake-related knowledge and self-efficacy (both p = 0.001) compared to baseline and to the control group. These findings indicate that structured, school-based disaster risk reduction programs are effective in enhancing both cognitive understanding and confidence in preparedness behaviors among adolescents in earthquake-prone areas.
2	Ayse Yildiz, Julie Dickinson, Jacqueline Priego-Hernández, Richard Teeuw, Rajib Shaw	Effects of disaster education on children's risk perception and preparedness: A quasi-experimental longitudinal study [2]	The findings of this study explained that disaster education had a significant and sustained positive impact on children's risk perception and preparedness over the 18-month period. Specifically, the intervention improved children's awareness and understanding of natural hazards, increased the perceived importance of preparedness, and enhanced the adoption of protective measures. These findings suggest that structured, child-centered disaster education programs are effective in strengthening both cognitive and behavioral dimensions of disaster preparedness among school-aged children across different geographic contexts.
3	Kiki Septaria, Atika Fatharani, Ahmad Baihaqi	Are Scrapbooks Able to Increase Tsunami Disaster Literacy? An Analytical Study of Junior High School Students Materials [3]	The study indicates that the use of Scrapbook-based learning media is an effective instructional tool for improving tsunami disaster literacy among junior high school students. The developed media was validated as highly feasible by experts (84% average validity score), and

			empirical testing using a paired sample t-test showed a statistically significant improvement in students' disaster literacy after implementation ($p = 0.000 < 0.005$). These results suggest that integrating interactive and visually engaging learning materials within disaster education can significantly enhance students' understanding of tsunami mitigation and preparedness, thereby supporting more effective school-based disaster risk reduction strategies.
4	Susi Wahyuning Asih1a*, Ahmad Yusuf2b, Sriyono3b Supriyadi4c, Luh Titi handayani5	Implementation of the Disaster-Safe School Disaster Program on Students' Preparedness Behavior in Schools [4]	The correlational cross-sectional study found a significant positive relationship between the implementation of the Safe School Disaster Preparedness Unit (SSDP) Program and students' disaster preparedness behavior. Results from Spearman's rho analysis ($r = 0.623$) indicate a moderate to strong association, suggesting that better implementation of the program is linked to higher levels of preparedness behavior among junior high school students. These findings highlight the importance of structured, school-based disaster preparedness programs in strengthening students' behavioral readiness for disasters.
5.	Apta Maulida Marlian, C. Asri Budianingsih	Digital Pocket Book as a Learning Medium for Disaster Preparedness in the Technological Era [5]	The results of this study indicated that the implementation of a digital pocket book as an instructional tool significantly enhanced students' disaster preparedness. In particular, learners exposed to the intervention showed a moderate improvement (gain score = 0.57), which was notably higher than the minimal progress observed in the control group (gain score = 0.17), and the difference was statistically significant. Furthermore, both students and teachers evaluated the material as highly practical, highlighting its effectiveness and usability in classroom settings. These findings imply that well-structured, technology-based disaster education, mainly that utilizing interactive and locally relevant content. This can successfully improve students' knowledge and application of preparedness strategies, ultimately promoting greater readiness in disaster-prone areas.
6.	Danilo Rogayan, Ryan Mar D. Cuarto, Mary Louise A. Ocsan	Are ninth-grade students aware and prepared when disaster strikes? [6]	The study found that ninth-grade students demonstrated high self-reported awareness of natural and man-made disasters and were often prepared for such events, with a significant moderate correlation between disaster awareness and preparedness. These findings suggest that increased exposure to disaster education and information campaigns can enhance students' preparedness behaviors and strengthen preventive practices.
7.	Benedicto J. Pelicano Jr. 1, MAEd	Disaster Risk Awareness and Preparedness of Junior High School Students: Basis for Capability Building [7]	The study revealed that junior high school students' disaster risk awareness and preparedness were significantly influenced by socioeconomic and location-based factors, with notable disparities across respondents. A significant relationship was found between disaster risk awareness and preparedness, indicating that higher awareness is associated with greater preparedness. Overall, the findings emphasize the need for integrated, school- and community-based disaster risk reduction education to address contextual inequalities and strengthen student preparedness outcomes.

3.1 Effectiveness of Structured School-Based Disaster Education

Across the seven studies, one clear thread keeps showing up: when disaster education is built into schools, students generally become more prepared, more aware, and more confident, but the way this happens isn't identical from one setting to another. It depends a lot on how the material is taught, what tools are used, and the environment students are in. In several cases, structured programs built into the school system made a noticeable difference. For example, the randomized trial by Baskoro and colleagues [1] demonstrates that a randomized controlled trial of a school-based disaster preparedness program significantly improved students' knowledge and self-efficacy related to earthquake preparedness ($p = 0.001$). This indicates that systematic and well-designed DRR programs can effectively strengthen both cognitive understanding and confidence in performing preparedness actions among adolescents.

On the other hand, the longitudinal study by Yildiz *et al.* [2] provides insight into the long-term impact of disaster education, showing that structured interventions can produce sustained improvements in students' risk perception and preparedness behaviors over an extended period of 18 months. This approach emphasizes that DRR education is not only effective in the short term but also contributes to lasting behavioral change, particularly in increasing students' awareness of hazards and their motivation to adopt protective measures.

Similarly, the Safe School Disaster Preparedness program [4] revealed a significant positive relationship ($r = 0.623$) between the implementation of structured disaster preparedness programs and students' preparedness behavior. This finding underscores the importance of institutionalizing DRR initiatives within school systems, as consistent exposure and practice can significantly enhance students' readiness to respond to disasters.

3.2 Enhancement of Disaster Literacy and Cognitive Understanding

Beyond formal programs, a lot of the improvement seems tied to how well students actually understand disasters in the first place. Studies on scrapbooks [3] and digital pocket books [5] show that when learning materials are more visual, interactive, and easy to engage with, students tend to grasp

concepts like tsunami risks and preparedness steps more effectively. Even broader disaster education efforts [2, 6] point in the same direction, when students are actively engaged and can relate the material to real situations, their awareness and understanding deepen in a meaningful way.

3.3 Behavioral Preparedness and Self-Efficacy Development

Several studies highlight a gradual but important shift from simply knowing about disasters to actually being prepared to respond. What's interesting is that this increase in knowledge doesn't stay theoretical for long. Across multiple studies, there's a clear shift toward behavior, students start not just knowing what to do, but actually feeling capable of doing it. The RCT [1] highlighted gains in self-efficacy, while others [5, 6] reported that students were more likely to take real preparedness actions after exposure to disaster education. This suggests that effective programs manage to connect understanding with confidence, turning information into something actionable rather than abstract. Similarly, studies [2] and [4] suggest that exposure to structured DRR programs increases the likelihood of adopting preparedness behaviors. This transition from awareness to action suggests that effective disaster education does more than inform—it builds confidence and readiness to act under pressure.

3.4 Instructional Tools and Pedagogical Innovation in Structured DRR Programs

A big part of that success seems to come from the learning tools themselves. Whether it's scrapbooks that make concepts more tangible [3], digital pocket books that are easier to access and use [5], or child-centered teaching approaches [2], these methods make the content less distant and more engaging. In practice, they act like a bridge between the curriculum and the student, helping the message actually land instead of getting lost in technical explanations.

Still, not everything is determined by teaching methods alone. Two of the studies [6, 7] remind us that awareness doesn't automatically translate into preparedness in the same way for everyone. Students with higher awareness tend to be more prepared, but factors like socioeconomic background and where they live can shape how much they benefit from disaster education. In other words, even the best school program can run into limits if students don't have equal access to resources or supportive environments.

3.5 Challenges in Disaster Risk Reduction Education Program in Junior High Schools

Despite the consistently positive findings on the effectiveness of disaster risk reduction (DRR) education, the reviewed literature reveals several structural and implementation-related challenges that hinder its full integration into junior high school systems. A primary concern identified in [7] is the presence of socioeconomic and geographic disparities, which significantly influence students' access to DRR learning opportunities and resources. Learners in low-income or high-risk communities often experience limited exposure to quality instructional materials and preparedness training, resulting in uneven development of disaster awareness and preparedness competencies. This inequality underscores the challenge of ensuring equitable DRR education across diverse school contexts.

In addition, studies such as [3] and [5] demonstrate the pedagogical value of innovative instructional tools. It includes scrapbook-based learning materials and digital pocket books, their implementation remains constrained by infrastructural limitations, unequal access to digital technologies, and varying levels of teacher readiness. In many settings, the effective use of technology-enhanced DRR instruction depends on the availability of devices, internet connectivity, and professional development opportunities for educators, all of which may be insufficient or inconsistently distributed.

Another critical challenge is the sustainability of DRR interventions over time. As highlighted in [2], meaningful improvements in risk perception and preparedness require sustained and continuous educational exposure; however, many school-based DRR initiatives are implemented as short-term projects or externally funded programs that lack long-term institutionalization. This results in difficulties in maintaining consistent reinforcement of knowledge and behavioral practices among students.

Furthermore, while structured school-based programs such as those examined in [1] and [4] demonstrate strong effectiveness in improving knowledge, self-efficacy, and preparedness behaviors, their impact is highly contingent upon effective implementation fidelity. Variations in administrative support, teacher engagement, and curriculum integration often affect the consistency and quality of program delivery. In some cases, DRR content remains peripheral rather than fully embedded within the core curriculum, limiting its instructional priority.

Overall, these findings suggest that although DRR education has demonstrated substantial effectiveness in improving preparedness outcomes, its integration within junior high schools is constrained by systemic inequities, resource limitations, implementation gaps, and sustainability concerns. Addressing these challenges requires a comprehensive and multi-level approach involving policy support, capacity building for educators, equitable resource allocation, and the institutionalization of DRR within the formal curriculum to ensure long-term and inclusive impact.

4. Conclusion

This study demonstrates that structured school-based disaster risk reduction (DRR) education significantly improves preparedness outcomes among junior high school students. The reviewed literature shows that a range of complementary approaches, including structured intervention programs, learner-centered strategies, and the use of interactive and technology-based materials, contribute to meaningful improvements in students' disaster-related knowledge, risk perception, and self-efficacy. These outcomes highlight the importance of schools as key settings for developing awareness and fostering a culture of preparedness among learners. At the same time, the findings indicate that gains in knowledge and awareness do not always lead to consistent preparedness behaviors. Many students exhibit only moderate levels of actual readiness, suggesting that understanding alone is not sufficient to ensure effective response during disaster situations. This points to the need for more practice-oriented, contextually relevant learning experiences that enable students to apply what they have learned in realistic settings. Strengthening school-community linkages and incorporating continuous,

skills-based activities may help address this gap and support more sustained behavioral outcomes.

Despite these contributions, several limitations should be acknowledged. The review was limited to studies published between 2021 and 2025, which may have excluded earlier relevant work. Differences in study design, context, and measurement of preparedness outcomes also pose challenges for direct comparison across studies. In addition, the possibility of publication bias cannot be overlooked, as studies with positive findings are more likely to be reported. Future research should therefore examine the long-term effects of DRR education on actual behavior, as well as the factors that influence the translation of knowledge into practice. There is also a need to expand research across diverse contexts, particularly in developing regions, to better understand how school-based DRR programs can be adapted and implemented effectively in different settings.

5. References

1. Asih SW, Yusuf A, Sriyono Supriyadi, Handayani LT. Implementation of the disaster-safe school disaster program on students' preparedness behavior in schools. Gaceta Médica de Caracas. 2026; 134(Suppl. 1):S6-S12. Doi: https://doi.org/10.47307/GMC.2026.134.S1.2
2. Marlian AM, Budianingsih CA. Digital Pocket Book as learning Medium for Disaster Preparedness in the technological era. International Journal of Community Engagement Payungi. 2025; 5(2):237-254. Doi: https://doi.org/10.58879/ijcep.v5i2.75
3. Mutanda G, Ngcamu B. Disaster risk reduction in schools: A systematic review of the implementation strategies and challenges. Frontiers in Sustainability. Advance Online Publication, 2026. Doi: https://doi.org/10.3389/frsus.2026.1795059
4. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al*. PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. BMJ. 2021; 372:n160. Doi: https://doi.org/10.1136/bmj.n160
5. Pelicano J Jr. Disaster risk awareness and preparedness of junior high school students: Basis for capability building. American Journal of Humanities and Social Sciences Research. 2025; 9(9):77-87. https://www.ajhssr.com/wp-content/uploads/2025/09/J259097787.pdf
6. Rogayan D, Cuarto RMD, Ocsan MLA. Are ninth-grade students aware and prepared when disaster strikes? Journal of Science and Education (JSE). 2022; 2(2):65-80. Doi: https://doi.org/10.56003/jse.v2i2.96
7. Septaria K, Fatharani A, Baihaqi A. Are Scrapbooks Able to Increase Tsunami Disaster Literacy? An Analytical Study of Junior High School Students. Science Education Journal (SEJ), 2025. Doi: https://doi.org/10.21070/sej.v9i2.1656
8. Setioputro B, Nabilah WR, Apriliani N, Yunanto RA, Haristiani R. School-based program for improving disaster preparedness among Indonesian adolescents in earthquake risk area: A randomized controlled trial. Iranian Journal of Public Health. 2025; 54(5). Doi: https://doi.org/10.18502/ijph.v54i5.18632
9. UNESCO. What you need to know about the Comprehensive School Safety Framework 2022-2030, 2022. https://www.unesco.org/en/articles/what-you-need-know-about-comprehensive-school-safety-framework-2022-2030
10. Widowati E, Koesyanto H, Istiono W, Sutomo AH, Sugiharto. Disaster preparedness and safety school as a conceptual framework of comprehensive school safety. SAGE Open. 2023; 13(4). Doi: https://doi.org/10.1177/21582440231211209
11. Yildiz A, Dickinson J, Priego J, Teeuw RM, Shaw R. Effects of disaster education on children's risk perception and preparedness: A quasi-experimental longitudinal study. The Geographical Journal. 2023; 190(4). Doi: https://doi.org/10.1111/geoj.12556