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From Policy to Practice: Investigating the Effectiveness of DRRM Implementation in Shaping Student Disaster Competence

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ABSTRACT

Disaster Risk Reduction is a critical component of basic education, mainly in disaster-prone countries like the Philippines, where schools contribute to fostering preparedness and resilience. This study examined the relationship between the implementation of the Disaster Risk Reduction and Management (DRRM) Program and students' disaster knowledge and readiness in public high schools in the SOX Region. Anchored in Bandura's Social Cognitive Theory, the Constructivist Learning Theory, and the Theory of Planned Behavior as supported by the Sendai Framework for Disaster Risk Reduction, this research looked at how school efforts shape learner competence. Using a descriptive-correlational design, the study involved 259 administrators, DRRM coordinators, and teachers, and 389 senior high school students from eight disaster-prone schools. DRRM implementation was assessed using seven Key Result Areas (KRAs), while students' knowledge was measured through a validated test and their readiness through performance-based tasks. Findings indicated a "very high" level of DRRM implementation across schools, yet students exhibited merely "average" knowledge but "very satisfactory" readiness. No significant correlation was noted between program implementation and either knowledge or readiness, indicative of a gap within institutional initiatives and student outcomes. The study implies the need to strengthen the instructional delivery of DRRM education, emphasizing experiential learning and active engagement. Limitations include purposive sampling and confidence on self-reported implementation data. Future research should adopt mixed methods and broader sampling to improve wider inference and explore mediating factors. Ultimately, effective DRRM in schools requires not just structured plans but meaningful student-centered learning.

INTRODUCTION

In recent decades, the increasing frequency and intensity of natural hazards—such as typhoons, floods, droughts, earthquakes, and pandemics—have posed escalating threats to human security, sustainable development, and the stability of educational systems. In response, Disaster Risk Reduction (DRR) has gained global urgency, especially following the adoption of the Sendai Framework for Disaster Risk Reduction 2015–2030 by the United Nations Office for Disaster Risk Reduction (UNDRR). This framework underscores the vital role of education in promoting preparedness, adaptive capacities, and risk-informed decision-making (Pearson & Pelling, 2015; Yamazaki-Honda, 2022).

Aligned with the Sustainable Development Goals (SDGs)—notably SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action)—the education sector is increasingly recognized as a catalyst for cultivating disaster-resilient communities. Schools are no longer viewed solely as vulnerable infrastructures but as strategic platforms for fostering risk awareness, proactive behavior, and community engagement.

In the Philippine context, where vulnerability to both climate-related and geophysical hazards is endemic, the institutionalization of DRR in education is mandated through Republic Act No. 10121, or the Philippine Disaster Risk Reduction and Management Act of 2010.

The law requires all public schools to appoint DRRM coordinators, conduct regular drills, incorporate DRR into curricula, and formulate a Comprehensive School Safety Plan (CSSP). Further, the Department of Education (DepEd) has issued policy guidelines promoting learner-centered, contextualized DRR strategies (Loquillano *et al.*, 2021; Agustin & Cabansag, 2023).

Despite these policies, substantial gaps remain in the actual implementation of DRRM programs, particularly in disaster-prone regions such as SOCCSKSARGEN (SOX), which comprises South Cotabato, Sultan Kudarat, and Sarangani. Prior studies have reported persistent issues, including limited DRR knowledge among students, varying levels of preparedness, inadequate contextual learning materials, and weak collaboration with local stakeholders (Epal *et al.*, 2024; Pandapatan, 2024).

This study addresses a critical gap by investigating the extent to which school-based DRRM programs are implemented and their impact on students' disaster preparedness knowledge and readiness. Focusing on selected public high schools in the SOX region, the study aims to provide empirical insights that can inform DRR education policies and contribute to the attainment of SDG 4 (Quality Education), alongside SDGs 11 and 13. Specifically, it sought to: (1) describe the extent of DRRM program implementation across key result areas; (2) determine the significant differences of the program

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implementation among schools divisions;

(3) assess students' levels of disaster preparedness knowledge and readiness; and (4) examine the relationships between DRRM implementation and students' preparedness knowledge, as well as readiness for disasters.

LITERATURE REVIEW

The increasing frequency and intensity of natural hazards have prompted a global paradigm shift toward proactive disaster risk management, positioning Disaster Risk Reduction and Management (DRRM) as an essential foundation for sustainable development and climate resilience. Within this global discussion, education has emerged as a critical platform for cultivating disaster awareness, resilience, and preparedness among youth. Schools are no longer viewed solely as learning institutions but as operational and strategic centers for fostering safety, promoting community engagement, and developing disaster competence.

At the international level, the Sendai Framework for Disaster Risk Reduction (2015–2030) defines education as a key pillar in achieving resilience and mitigating disaster risks. It promotes the shift from reactive response to proactive, knowledge-based interventions embedded within formal education systems (Pearson & Pelling, 2015). This framework aligns with the UNDRR's broader advocacy to integrate DRRM into multiple Sustainable Development Goals (SDGs), notably SDG 1 (No Poverty), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action), situating education at the intersection of risk reduction, equity, and sustainable development (Yamazaki-Honda, 2022). Recent scholarship has further highlighted the synergy between climate change adaptation and DRRM education, stressing the importance of intersectoral partnerships and the role of schools in promoting behavioral change (Valente *et al.*, 2022; Wen *et al.*, 2023).

In the Philippines, DRRM in education has been instituted through Republic Act 10121, mandating both public and private institutions to mainstream DRRM in their curriculum, planning, and operations. However, research suggests that implementation remains inconsistent across schools. According to (Manalo and Manalo, 2020), obstacles such as insufficient teacher training, lack of localized instructional materials, and unequal resource distribution continue to hinder effective DRRM integration, particularly in the Senior High School (SHS) curriculum. In response, several initiatives have introduced contextualized learning materials and innovative pedagogies. (Loquillano *et al.*, 2021) verified improvements in student disaster awareness following the use of localized modules, while (Ng, 2022) advocated for inquiry-based, experiential learning approaches and enhanced teacher capacity to deliver DRRM content effectively.

Schools play a dual role in DRRM, not merely as transmitters of knowledge but also as active

implementers of preparedness measures. Activities such as risk mapping, simulation drills, and DRRM-themed lessons contribute to institutional and community resilience. (Arao-Arao *et al.*, 2023) emphasized that comprehensive, school-based DRRM plans foster a culture of preparedness and strengthen stakeholder participation. Similarly, (Dipon, 2023) underlined the importance of school leadership in translating DRRM policy into concrete and sustainable programs. Yet, disparities persist. Leal and Zipagan (2024) observed significant variations in DRRM implementation, particularly in remote and underserved areas. Nadal (2024) proposed three essential pillars for effective DRRM curriculum integration, co-curricular activities, and community engagement denoting the need for systemic support and multi-stakeholder coordination.

A growing body of literature has also explored the link between school-based DRRM programs and students' disaster competence. Disaster preparedness, viewed through the lens of competence, includes cognitive (knowledge), affective (awareness), and behavioral (readiness) domains. E-Palli Publishers highlighted the positive impact of extracurricular disaster risk reduction and management (DRRM) programs on students' readiness and resilience. Garcia *et al.* (2023) emphasized that engaging students in hands-on simulations enhances their knowledge of disaster protocols but and strengthens their collaborative skills during emergencies. The study of (Orillo & Prudente, 2023), complemented their idea that community-based activities significantly enhance students' overall disaster competence while promoting a sense of civic responsibility. Likewise, (Pregoner *et al.* 2020) found that students exposed to DRRM content perceived themselves as more prepared and capable of responding during emergencies. Theoretical contributions from Kelman (2017) and Swaris *et al.* (2024) support this evidence, advocating for a resilience-based education framework that ties DRRM to broader goals of climate adaptation and sustainability.

At the school level, several studies point out the importance of localized, inclusive, and well-resourced implementation strategies. (Cruz and Ormilla, 2022) found that schools with high levels of DRRM implementation often characterized by regular drills, updated contingency plans, and teacher training demonstrated better overall preparedness. However, they also identified disparities in access to resources and administrative support. (Fale, 2022) noted that limited DRRM training among teachers weakens institutional readiness, recommending its integration into teacher development programs. Capacity-building through collaborative planning was similarly emphasized by (Mella *et al.*, 2021), who advocated for student-led hazard mapping and stronger community partnerships.

Addressing inclusivity, (Alarte, 2024) noted that students with special needs are often excluded from preparedness measures, prompting the need for differentiated DRRM strategies to ensure no learner is left behind.

Baluran (2023) further identified administrative and logistical gaps in DRRM implementation, proposing a holistic model “Our School, Our Safe Zone to engage stakeholders and institutionalize preparedness protocols. Likewise, (Aquino, Polintan, and Mones, 2020) argued for positioning DRRM not just as compliance but as integral to long-term school sustainability. Firmo Jr. (2022) admitted that vague policy direction and fragmented integration between academic and DRRM components continue to limit program effectiveness, particularly during emergencies. Meanwhile, (Abenoja *et al.*, 2023) showed that higher DRRM implementation levels correspond with greater hazard-readiness among school stakeholders, although systemic barriers such as limited funding and weak monitoring mechanisms remain challenges.

Collectively, the reviewed literature sustains that while the policy infrastructure for DRRM in schools is well-established, its practical implementation varies significantly. The success of school-based DRRM programs depends largely on teacher training, resource availability, inclusive practices, stakeholder engagement, and administrative leadership. Remarkably, the literature reveals a consistent pattern: when DRRM programs are effectively implemented, students demonstrate higher levels of disaster knowledge and readiness.

Premised on these findings and theoretical insights, this review moves on the hypothesis that effective implementation of school-based DRRM programs promotes enhanced disaster preparedness competence among students, particularly in terms of their knowledge and readiness to respond to emergencies.

MATERIALS AND METHODS

Research Design

This study employed descriptive and correlational research designs to examine the relationship between the implementation of the Disaster Risk Reduction and Management (DRRM) program and the disaster preparedness knowledge and readiness of senior high school students in public high schools within the SOX Region during the 2024–2025 school year. These designs facilitated the determination of links between variables in a natural setting without manipulating the environment, enhancing the ecological validity of the findings (Noah, 2021).

Locale and Population of the Study

The study was carried out across eight secondary schools in high-risk areas of SOX Region, including provinces and cities such as Cotabato, Sarangani, South Cotabato, Sultan Kudarat, General Santos, Kidapawan, Koronadal, and Tacurong. The selected schools were validated by the Mines and Geosciences Bureau (MGB) as disaster-prone due to recurring hazards like floods, earthquakes, and landslides.

Respondents included a total of 259 school administrators, DRRM coordinators, and teachers, as well as 389 senior

high school students who were directly involved in or affected by DRRM program implementation. Their participation provided multi-level understandings into school practices and student preparedness in disaster-prone environments.

Sampling Technique

A combination of purposive and random sampling was used. Schools were purposively chosen according to geographic risk and DRRM engagement. Total enumeration was applied to administrators and DRRM coordinators due to their limited numbers and critical roles, while stratified random sampling was opted to select teachers and students, making sure representativeness. Sample sizes were calculated using Yamane’s formula and proportional allocation.

Research Instruments

To collect the needed data for the study, three research instruments were utilized: a survey questionnaire, a multiple-choice test (MCQ), and a practical assessment tool. These instruments were developed to align with the study’s objectives, particularly in evaluating how the school DRRM program is being implemented and how knowledgeable and prepared students are for disasters. All tools went through content validation and reliability testing to ensure accuracy and consistency.

The first instrument was a survey questionnaire used to measure the extent of DRRM program implementation in schools. It was grounded on DepEd’s DRRMS Strategic Plan (2020–2022) and prepared around seven Key Result Areas (KRAs): Risk-Informed Plans and Policies, Partnerships for Resilience, DRRM Information System and Research, Resilience Education, IEC and Advocacy, Learning Continuity and Resilience, and Monitoring and Evaluation. Responses were rated on a 5-point Likert scale. Experts reviewed the tool, and all items got a Content Validity Index (CVI) higher than 0.83 threshold (Yusoff, 2029). A Cronbach’s alpha of 0.92 indicated excellent reliability.

The second instrument was a 50-item multiple-choice questionnaire (MCQ) that tested students’ knowledge of disaster preparedness. It was based on the SHS competencies in Disaster Readiness and Risk Reduction course. Topics included hazard types and risks, risk assessment, preparedness strategies, early warning systems, and emergency plans and protocols. Expert validation gave the test a scaled CVI of 0.88, and the KR-21 reliability coefficient was 0.78, showing acceptable internal consistency.

The third instrument was a practical assessment tool designed to evaluate students’ actual readiness through simulated activities. The tasks under assessment included evacuation procedures, basic first aid and life support, crisis communication, resource coordination, and participation in preparedness drills. Each activity was rated on a 5-point scale based on specific performance indicators. The tool was also validated by six DRRM

and test experts, and reliability was confirmed through Cronbach’s alpha, showing it was suitable for performance assessment.

Statistical Treatment

Descriptive statistics such as mean and standard deviation were used to describe the levels of DRRM implementation, students’ preparedness knowledge, and readiness. Besides, inferential statistics like one-way ANOVA and Pearson’s correlation analysis, were applied to test the difference of DRRM implementation across divisions, and the relationship between DRRM implementation and student outcomes, respectively. All hypothesis were tested at .05 alpha level.

Ethical Considerations

This study was guided by stringent ethical standards to warrant the safeguard of respondents and the veracity of the research. Informed consent was secured from all participants to include school administrators, DRRM coordinators, teachers, and students, with additional parental consent required for involved minors. Participants were fully informed of the study’s purpose,

procedures, and their voluntary involvement, including the right to withdraw at any time without penalty. Confidentiality and anonymity were strictly observed. Personal identifiers were removed, and data was presented in aggregate form. All physical and digital records were securely stored following institutional data management protocols. Participants benefited from the process through better awareness of DRRM issues, access to research findings, and the opportunity to help notify future practices and policies. Their contributions were respectfully acknowledged in presentations and reports. The principle of non-maleficence was upheld, ensuring no harm whether physical, emotional, or psychological came to any participant. All procedures conformed to ethical guidelines of the university, DepEd, and relevant national and international standards for human subject research, ensuring academic integrity and respect for respondent rights throughout the study.

RESULTS AND DISCUSSIONS

Table 1 presents the extent of implementation of the School Disaster Risk Reduction Management (DRRM) Program in the SOX Region.

Table 1: Implementation of School DRRM Program (n=259)

Key Result Areas		Means	SD
1.	Risk-Informed Plans, Policies, and Standards	4.33	0.51
2.	Partnership in Strengthening Resilience	4.34	0.52
3.	DRRM Information System (DRRMIS) and Research	4.17	0.54
4.	Resilience Education	4.19	0.56
5.	Information, Education, Communication (IEC) and Advocacy for Resilience	4.03	0.65
6.	Learning Continuity and Resilience Interventions	4.23	0.52
7.	Monitoring and Evaluation on DRRMS Comprehensive School Safety Initiatives	4.24	0.54
Overall Mean		4.22	0.47

Legend: 1.00-1.79 (*Very Low*), 1.80-2.59 (*Low*), 2.60-3.39 (*Moderate*), 3.40-4.19 (*High*), 4.20-5.00 (*Very High*)

As indicated, the overall extent of Disaster Risk Reduction and Management (DRRM) Program implementation across all key result areas (KRAs) is very high (M= 4.22, SD=.47). This signifies that public schools in the region have largely embraced the mandates of the Department of Education (DepEd) in institutionalizing DRRM structures and practices within the educational system. The strong implementation is particularly notable in areas such as Partnership in Strengthening Resilience (M=4.34), Risk-Informed Plans, Policies, and Standards (M=4.33), Monitoring and Evaluation on DRRMS Comprehensive School Safety Initiatives (M=4.24), and Learning Continuity and Resilience Interventions (M=4.23), all of which obtained “very high” qualitative descriptions.

A thorough examination at these results shows the success of inter-agency collaboration and community partnerships in promoting resilience. Epe (2023) emphasized the importance of local government units and school partnerships in building child-centered disaster resilience. The high rating for Partnership in Strengthening

Resilience aligns with this finding, indicating that schools in the region are effectively engaging stakeholders such as LGUs, NGOs, and parent associations in DRRM planning and execution.

Moreover, the implementation of Risk-Informed Plans, Policies, and Standards being rated very high demonstrates the schools’ proactive orientation toward disaster preparedness. This supports the assertion of de la Cruz (2023) that institutionalizing policies and integrating risk reduction in school development plans is critical in minimizing vulnerabilities. The high scores also reflect the alignment of schools’ efforts with the DepEd’s Comprehensive School Safety (CSS) Framework and the global priorities set forth in the Sendai Framework and the Sustainable Development Goals (SDGs), as discussed by Navarro (2020).

In addition, the implementation of Monitoring and Evaluation (M=4.24) and Learning Continuity and Resilience Interventions (M=4.23) as very high implies that schools are not only prepared for disasters but

are also continuously assessing and improving their strategies. According to Firmo (2022), regular evaluation mechanisms ensure that DRRM practices are responsive to emerging hazards and the evolving needs of learners. Such emphasis on sustainability and improvement is a positive indicator of adaptive school systems.

However, while Resilience Education (M=4.19), DRRM Information System and Research (M=4.17), and Information, Education, Communication (IEC) and Advocacy (M=4.03) were also rated high, they did not reach the “very high” threshold. This slight gap suggests areas for enhancement. For example, Alarte (2024) highlighted that while most schools are structurally compliant with DRRM frameworks, gaps remain in the integration of DRRM concepts into the curriculum and the use of technology-driven information systems. Similarly, Javier and Diliman (2019) underscored the need for disaster literacy among students, especially those in vulnerable communities, noting that education remains the most powerful tool for behavioral change and risk awareness.

Furthermore, Cruz and Ormilla (2022) found that DRRM implementation in Philippine schools, though generally high, is impeded by a lack of sustained capacity-building efforts, limited access to DRRM materials, and fragmented advocacy initiatives. These constraints may explain the relatively lower scores in research, advocacy, and education-related KRAs.

The consistently high ratings across most DRRM implementation areas in SOX Region affirm that schools are transitioning from reactive disaster response to

proactive resilience-building. However, the relatively lower ratings in education, research, and advocacy dimensions suggest a need for rebalancing efforts toward deeper curricular integration, systemic innovation, and behavioral transformation.

The findings imply that for DRRM efforts to be truly transformative and sustainable, education must be leveraged not only as a medium for awareness but as a core strategy for behavioral change and risk-conscious citizenship. This calls for the professional development of teachers as DRRM educators, the utilization of technology for real-time data and predictive analytics, and the expansion of localized and research-driven IEC materials tailored to the cultural and geographical contexts of learners.

Moreover, to further concretize the gains of DRRM implementation, schools must evolve into knowledge hubs for disaster resilience, where students are empowered not merely as passive recipients of safety information, but as active change agents within their communities. As Canlas and Karpudewan (2023) argued, embedding disaster literacy in science and social studies curricula enhances not only cognitive competencies but also students’ sense of civic responsibility and environmental stewardship.

Finally, policy reforms that encourage schools to document, publish, and share best practices in DRRM implementation may contribute to a more equitable and standardized approach across the region. The integration of DRRM-related performance indicators into school evaluation tools may also incentivize long-term commitment among school leaders and stakeholders.

Table 2: Implementation of School DRRM Program (n=259)

Divisions	N	Mean	SD	F	P
Tacurong City	13	4.64a	0.355	11.0	<.001
Kidapawan City	18	4.58ab	0.556		
Cotabato	72	4.37ab	0.379		
Sultan Kudarat	49	4.25b	0.409		
Sarangani	18	4.08bc	0.462		
General Santos City	52	4.01c	0.392		
South Cotabato	16	3.96c	0.591		
Koronadal City	21	3.88c	0.313		

Notes: Means sharing the same superscript letter are not significantly different at the 0.05 level according to Tukey’s HSD test.

As presented in Table 2, a one-way ANOVA was undertaken to test whether there are statistically significant differences in Disaster Risk Reduction and Management (DRRM) mean scores among eight school divisions in SOX. The analysis yields a significant result, $F(7, 66.7) = 11.0, p < .001$, indicative that DRRM implementation varies across the divisions.

Tukey’s post hoc comparisons indicates three general performance levels. Cotabato Division (M = 4.50^a) has the highest mean score and is significantly higher than General Santos City, Tacurong City, and Kidapawan, placing it as the top-performing division. This finding

may suggest aggressive adoption of DRRM in Cotabato, consistent with Cruz and Ormilla’s (2022) observation that successful implementation depends on firm adherence to DepEd Order No. 21, s. 2015 and active stakeholder engagement. Koronadal (M = 4.35^a) and South Cotabato (M = 4.30^a) were statistically similar to Cotabato and appear to have similarly orderly DRRM structures and practices in place.

Sarangani (M = 4.25^b) and Sultan Kudarat (M = 4.20^b) followed, representing a middle-performing tier. Although they did not significantly differ from the top group in some comparisons, they fell short of reaching

why some divisions fall slightly behind despite structural readiness.

General Santos City (M = 4.10^e), Tacurong City (M = 4.00^e), and Kidapawan (M = 3.90^e) were identified as the lowest-performing divisions. These divisions shared common statistical subscripts, implying no significant difference among them, but they were consistently lower compared to Cotabato and Koronadal. This aligns with the findings of Tabilon-Tizon and Comighud (2020), who reported disparities in DRRRM capabilities among public schools due to inconsistent training, limited participation in drills, and underdeveloped school-based DRRRM plans.

De la Cruz (2022) cited that effective DRRRM implementation requires not only structural preparedness but also capability-building activities and active community involvement, which may be lacking in lower-performing divisions. Moreover, Epe (2023) pointed out that child-led school watching programs and inter-agency coordination are often absent in schools with low

DRRRM scores, thereby weakening their preparedness profile.

The variation in DRRRM implementation observed in this study signifies the need for a differentiated approach to capacity development. High-performing divisions may serve as benchmarks for best practices, while those lagging should be provided with targeted technical assistance, sufficient funding, and policy support. As Alarte (2024) emphasized, inclusive and localized DRRRM strategies, rooted in school culture and led by empowered SDRRM teams, are key to improving outcomes at the grassroots level.

Concisely, the results reveal a meaningful gap in DRRRM implementation across school divisions. The top-tier divisions like Cotabato, Koronadal, and South Cotabato, demonstrate strong performance, while divisions like GSC, Tacurong, and Kidapawan would benefit from priority-focused initiatives to strengthen their DRRRM systems and align with DepEd’s strategic vision for safe and resilient schools.

Table 3: High School Students’ Disaster Preparedness Knowledge in SOX Region (n=389)

Contents	MPS	SD
1. Understanding Hazard Types and Risks	81	14.60
2. Disaster Risk Assessment	57	23.20
3. Prepared Strategies and Mitigation Measures	58	18.80
4. Early Warning Systems	64	18.70
5. Emergency Plans and Protocols	54	19.60
Overall Mean	58	14.70

Legend: 96%-100% (Mastered), 86%-95% (Closely Approximating Mastery), (66%-85%), Moving Towards Mastery, 35%-65% (Average), 15%-34% (Low), 5%-14% (Very Low), 0-4% (Absolutely No Mastery)

In Table 3, the findings on high school students’ disaster preparedness knowledge in the SOX region reveal a mixed but generally moderate level of understanding and readiness, based on the content standards specified in the Senior High School Disaster Risk Reduction and Management (DRRM) curriculum. The general mean percentage score of (MPS) is on average level (M=58, SD=14.70). Such index of students’ knowledge about disaster preparedness implies that while DRRM education has been integrated into the K–12 curriculum, its effectiveness remains uneven across different themes or domains.

The highest MPS is in the domain “Understanding Hazard Types and Risks” (M = 81, SD = 14.60), rated as “Moving towards Mastery.” This signifies that the basic knowledge regarding types of natural and man-made hazards and their associated risks is relatively well understood. This outcome aligns with the findings of Mamon, Suba, and Son (2017), who reported that students generally exhibit a good grasp of disaster types, likely due to exposure to recent catastrophic events and growing public awareness. Furthermore, the Filipino context—being one of the most disaster-prone countries globally—inevitably conditions youth to be familiar with such hazards (Javier

& Diliman, 2019).

However, other course contents such as “Disaster Risk Assessment” (M = 57), “Prepared Strategies and Mitigation Measures” (M = 58), “Early Warning Systems” (M = 64), and “Emergency Plans and Protocols” (M = 54) all fall under the “Average” category. These scores indicate significant gaps in students’ applied and procedural knowledge, particularly in risk assessment and operational planning. This finding echoes those of Lavilles and Hordista (2024), who stressed that while DRRM is taught, the transfer of knowledge into actionable understanding mainly in strategic planning, is still limited. Manalo and Manalo (2020) also noted that despite the legal mandate under Republic Act 10121 to institutionalize DRRM education, the actual implementation is often superficial and lacks integration in critical thinking and decision-making exercises.

The variability in students’ performance, indicated by relatively high standard deviations (ranging from 18.70 to 23.20), also implies inconsistencies in the delivery and reception of DRRM content across schools in the region. These disparities may be attributed to factors such as the availability of qualified DRRM teachers, the use of localized materials, and institutional support (Cruz

& Ormilla, 2022; Reyes, 2019). Fale (2022) adds that the absence of a uniform standard in implementing DRRM lessons contributes to an uneven level of resiliency and preparedness among students.

Furthermore, the results suggest the need to move afar theoretical instruction towards more experiential, competency-based disaster education. As Baluran (2023) disputes, the mere presence of DRRM modules does not suffice unless these are coupled with drills, simulations, and reflective activities that engage students in real-world applications. Dollentas and Gamba (n.d.) support this by pointing out that the average performance of DRRM coordinators themselves affects the overall effectiveness of school preparedness programs.

The knowledge gap in domains such as emergency planning and protocols is especially critical, as this component directly affects response during actual disaster events. Alarte (2024) emphasized that inclusive, participatory DRRM education programs are more successful when students understand the procedural steps needed during emergencies. This highlights the necessity for integrating DRRM into both curricular and extra-curricular activities, promoting student-led initiatives, and leveraging community-based disaster learning approaches.

Overall, as some progress is evident in students' conceptual understanding of hazards, the relatively lower scores in application-driven areas reveal a systemic issue in the translation of DRRM policies into effective pedagogical practice. The results affirm the call for strengthened DRRM education through enhanced teacher training, curriculum contextualization, and school-wide implementation that goes beyond compliance to truly empower learners with life-saving competencies.

These findings collectively point out that actual implementation at the school level is uneven and in need of systemic support despite the existence of a legal mandate for DRRM education. Educational leaders and policymakers must invest in sustained teacher capacity-building, contextualized learning resources, and inclusive program designs. The evidence also suggests that integrating DRRM across curricular and extracurricular programs, combined with child-centered approaches and local community engagement, can foster a culture of safety and resilience among learners. Moreover, consistent monitoring and evaluation of DRRM implementation across regions could help bridge existing disparities and ensure that all students, regardless of their context, are adequately prepared for disaster risks.

Table 4: Students' Disaster Readiness in SOX Region (n=389)

Competencies		Mean	SD
1.	Practical Application of Evacuation Procedure	4.14	0.83
2.	First Aid and basic life support	3.96	1.16
3.	Crisis Communication Skills	4.25	0.79
4.	Resource Management and Coordination	4.29	0.76
5.	Participation in Preparedness Drills	4.48	0.68
Overall Mean		4.22	0.64

Legend: 1.00-1.79 (Very Low), 1.80-2.59 (Low), 2.60-3.39 (Moderate), 3.40-4.19 (Satisfactory), 4.20-5.00 (Very Satisfactory)

As shown in Table 4, the level of disaster readiness among high school students tested through practical demonstration of common competencies is very satisfactory (M = 4.22, SD = 0.64). This virtually means that students possess commendable competencies in preparing for and responding to disaster situations. This further indicates the ongoing integration of Disaster Risk Reduction and Management (DRRM) skills in basic education, as defined in DepEd Order No. 21, s. 2015, which obliges the institutionalization of DRRM education in public schools. This finding is consistent with Cruz and Ormilla (2022), who emphasized that schools serve as critical venues for nurturing the life skills essential to disaster preparedness and resilience.

In terms of specific competencies, Participation in Preparedness Drills appeared with the highest rating of very satisfactory (M = 4.48, SD = 0.68). Clearly, students are highly engaged in simulation exercises and school-initiated disaster preparedness activities. These drills help internalize procedures and instill automatic response behaviors during real emergencies. Tanaka (2005) asserted

that habitual participation in drills significantly enhances behavioral readiness, while Tabilon-Tizon and Comighud (2020) stressed the importance of practical exposure in building student capabilities, arguing that knowledge and skills gained during drills are more impactful than policy alone.

Meanwhile, Resource Management and Coordination was also rated very satisfactory (M = 4.29, SD = 0.76), demonstrating that students understand how to organize and mobilize essential resources in times of disaster. This is consistent with the principles of community-based disaster risk reduction and management (DRRM), which regard learners as active participants rather than passive recipients of disaster education. In this context, Dipon (2023) discloses the prominence of equipping students with resource management competencies as a key component of strategic DRRM planning in the school setting.

Following this, Crisis Communication Skills also got a very satisfactory rating (M = 4.25, SD = 0.79). This denotes that students can relay accurate information

and remain composed in crisis situations—skills that are essential in reducing confusion and coordinating responses. Anchored in Bandura’s (1986) Social Cognitive Theory, these behaviors can be linked to effective role modeling and structured communication training in schools. Similarly, Javier and Diliman (2019) cited that child-centered DRRM initiatives enable learners with the confidence and accuracy necessary to convey during emergencies.

On the other hand, Practical Application of Evacuation Procedures received a slightly lower but still very satisfactory rating ($M = 4.14, SD = 0.83$). The relatively high standard deviation suggests that while many students understand evacuation protocols in school, application at home or in the community remains inconsistent. Manalo and Manalo (2020) noted that implementation gaps in DRRM are often rooted in limited collaboration between home and school. Reinforcing this concern, Alarte (2024) argued that DRRM efforts must transcend institutional boundaries and engage households to ensure full preparedness.

However, the domain of First Aid and Basic Life Support was rated only satisfactory ($M = 3.96, SD = 1.16$), the

lowest among the five. This reflects inadequate hands-on training in administering life-saving procedures, as supported by the wide variation in student responses. Loquillano *et al.* (2021) highlighted the importance of contextualized DRRM modules that offer practical, step-by-step training in basic life support. Moreover, Baluran (2023) concluded that inconsistencies in funding and trainer availability contribute to disparities in the implementation of this crucial component.

Overall, these findings convey important implications. While students are palpably developing disaster-related competencies within the school setting, the lower score in first aid signals a pressing need for enhanced capacity-building initiatives. Schools must partner with local health units, NGOs, or Red Cross chapters to provide structured training programs that provide students with necessary emergency response skills. Furthermore, DRRM must become a whole-community effort, integrating households and local stakeholders in order to strengthen school-based learning and foster a culture of readiness. As Epe (2023) pointed out, enabling children through inclusive, sustained, and well-supported DRRM education is key to building resilient communities.

Table 5: Correlation Analysis between the DRRM Program Implementation and the HS Students’ Disaster Preparedness Knowledge

Key Result Areas (KRAs)		Disaster Preparedness Knowledge	
		Spearman's rho	p-value
1.	Risk-Informed Plans, Policies,		
2.	and Standards	-0.26	0.528
3.	Partnerships for Strengthening Resilience	-0.29	0.501
4.	DRRM Information System and (DRRMIS)	-0.48	0.230
5.	Resilience Education	-0.19	0.665
6.	Information, Education, Communication (IEC) and Advocacy for Resilience	-0.21	0.619
7.	Learning Continuity and Resilience Interventions	-0.62	0.115
8.	Monitoring and Evaluation on DRRMS Comprehensive School Safety Initiative	-0.33	0.428
Overall DRRM Program		-0.38	0.360

Notes: $df=6; p < .05$, significant

Table 5 presents the results of the Spearman’s rho correlation analysis performed to test the relationship between the implementation of the Disaster Risk Reduction and Management (DRRM) Program measured through its Key Result Areas (KRAs), and high school students’ knowledge on disaster preparedness. The general results divulged a weak and statistically non-significant negative correlation amid DRRM program implementation and students’ disaster preparedness knowledge ($\rho = -0.38, p = 0.360$). This means that, even if there is a tendency for higher DRRM program implementation to be associated with slightly lower preparedness knowledge, such a relationship is not strong enough to be deemed statistically meaningful.

Transitioning to the specific key result areas, all seven KRAs also displayed negative but non-significant correlations with disaster preparedness knowledge. The strongest negative association was observed in the implementation of Learning Continuity and Resilience Interventions ($\rho = -0.62, p = 0.115$), followed by the DRRM Information System ($\rho = -0.48, p = 0.230$). However, these associations, though moderately strong in direction, failed to reach significance at the 0.05 level, suggesting variability and inconsistencies in the extent to which these interventions influence or correspond to students’ knowledge levels. Similar patterns are noted in the other KRAs, including Partnerships for Strengthening Resilience ($\rho = -0.29, p = 0.501$), Monitoring and

Evaluation on DRRMS Comprehensive School Safety Initiative ($\rho = -0.33, p = 0.428$), and Resilience Education ($\rho = -0.19, p = 0.665$), all of which show weak inverse associations that are not statistically significant.

To support these findings, Galvizo (2022) stressed that DRRM integration into the school curriculum customarily needs consistent follow-through, particularly in ensuring comprehension and retention among students. Besides, Panes *et al.* (2020) stated that mere presence of DRRM policies and partnerships does not result into enhanced disaster knowledge except these efforts are strategically communicated and adopted by learners. Arcegoni *et al.* (2024) likewise disputed that while student-led DRRM activities and budgetary provisions improve institutional readiness, their direct influence on individual students' knowledge remains reliant on pedagogical engagement and continuous instructional strategies.

Moreover, Lavilles and Hordista (2024) cited that while schools in Region XII showed relatively high levels of DRRM program implementation, this did not guarantee intensified awareness or preparedness among students unless there was connection between program delivery and students' lived experiences and classroom realities. This confirms the present finding that implementation alone does not amount to knowledge acquisition. Additionally, Cruz and Ormilla (2022) revealed that schools sometimes adopt a compliance-based approach to DRRM, focusing more on documentation rather than student-centered outcomes—possibly explaining the disconnection observed between program implementation and student learning outcomes.

Given these explanations, it becomes apparent that the quality and delivery of DRRM education, rather than the quantity of activities or formal implementation, pointedly influence student preparedness. It is also worth considering that some students may not fully grasp the content of DRRM interventions due to lack of contextualization, especially when these are administered as one-time seminars or activities with minimal integration into core curricular areas. Rico (2022) stressed the importance of embedded and participatory DRRM instruction within regular school activities, which enhances students' readiness through experiential learning.

The non-significant negative correlations across all key result areas suggest a critical disconnect between program undertaking and student learning outcomes in disaster preparedness. This denotes that the current implementation model of the DRRM Program may be administrative or compliance-driven rather than student-centered. If not acted upon, this gap may hinder the very objective of the DRRM initiative, which is to empower learners with the knowledge, skills, and values necessary to respond effectively during disasters. Thus, there is an urgent need to reassess the pedagogical strategies and learner engagement mechanisms embedded in DRRM program delivery. Schools should integrate DRRM education directly into classroom instruction through participatory, locally relevant, and context-specific approaches. Such integration is important to boost students' long-term knowledge retention and nurture practical preparedness behaviors.

Table 6: Correlation Analysis between the DRRM Program Implementation and the High School Students' Disaster Readiness

Key Result Areas (KRAs)		Disaster Readiness	
		Spearman's rho	p-value
1.	Risk-Informed Plans, Policies, and Standards	0.30	0.471
2.	Partnerships for Strengthening Resilience	0.33	0.428
3.	DRRM Information System and (DRRMIS)	0.14	0.734
4.	Resilience Education	0.17	0.703
5.	Information, Education, Communication (IEC) and Advocacy for Resilience	0.29	0.501
6.	Learning Continuity and Resilience Interventions	0.02	0.977
7.	Monitoring and Evaluation on DRRMS Comprehensive School Safety Initiative	0.31	0.462
Overall DRRM Program		0.19	0.665

Notes: $df=6; p < .05$, significant

The correlation analysis presented in Table 5 reveals a weak and statistically non-significant relationship between the implementation of the Disaster Risk Reduction and Management (DRRM) Program and high school students' disaster readiness. Among the seven key result areas (KRAs) evaluated, the coefficients of Spearman's rho range from as low as 0.02 to as high as 0.33, with all p-values exceeding the 0.05 level of significance. The

strongest correlation is observed between “Partnerships for Strengthening Resilience” and disaster readiness ($\rho = 0.33, p = 0.428$), followed closely by “Monitoring and Evaluation on DRRMS Comprehensive School Safety Initiative” ($\rho = 0.31, p = 0.462$) and “Risk-Informed Plans, Policies, and Standards” ($\rho = 0.30, p = 0.471$). However, these values still denote weak relationships and lack statistical significance, suggesting that variations

in DRRM program implementation across these KRAs do not meaningfully correspond with students' levels of disaster readiness in the sample studied.

The relatively low correlation values and insignificant p-values may imply several possibilities. One key insight is that while the DRRM program is being implemented, it may not be translating into tangible increases in students' actual preparedness, possibly due to issues in delivery, integration, or contextual relevance. For example, Cruz and Ormilla (2022) emphasized that while schools do conduct student-led disaster preparedness activities, these are often isolated efforts that lack systematic integration with curricular content or broader school safety frameworks. Similarly, the work of Abenoja *et al.* (2023) revealed that although schools may show a high level of DRRM implementation, there is still a disconnect in equipping students with practical knowledge and response capabilities during disasters.

Another influencing factor may be the limited attention on students' experiential engagement and ownership of DRRM processes. Tabilon-Tizon and Comighud (2020) found that students' preparedness improves significantly when they are exposed to hands-on drills and localized, context-specific training, rather than passive forms of instruction. However, in many cases, DRRM activities tend to be administrative in nature or are reduced to mere compliance, with limited involvement from students as active stakeholders. This may explain the negligible correlation between components like "Learning Continuity and Resilience Interventions" and disaster readiness ($\rho = 0.02$, $p = 0.977$).

Moreover, Lavilles and Hordista (2024) affirmed that the success of DRRM programs in building resilience relies on how intensely the concepts, values, and practical skills of disaster preparedness are embedded in the school culture and daily practices. If DRRM efforts remain superficial or are only occasionally implemented without sustained engagement, their impression on student readiness is expected to remain minimal. The modest correlation values for "Resilience Education" ($\rho = 0.17$, $p = 0.703$) and "Information, Education, Communication (IEC) and Advocacy for Resilience" ($\rho = 0.29$, $p = 0.501$) further confirm that exposure alone does not suffice; effectiveness counts on heavily on the quality, relevance, and student-centeredness of the interventions.

From a systems perspective, Galvizo (2022) asserted that partnerships and community linkages can enhance the delivery and contextualization of DRRM initiatives. However, if such partnerships are not localized or tailored to the students' environment, their relevance diminishes. This could explain why even the relatively higher correlations for partnership-related KRAs did not bear significance. Besides, Alarte (2024) emphasized the significance of inclusive and differentiated DRRM education, mostly in multicultural and geographically diverse regions of the Philippines. When implementation fails to consider such variability, its effect on readiness is weakened.

CONCLUSION

This study explored the implementation of the Disaster Risk Reduction and Management (DRRM) Program in public high schools across the SOX Region and its association with students' disaster preparedness knowledge and readiness. It was revealed that though the DRRM program is being implemented at a very high level, there are noted gaps across divisions, indicating uneven prioritization or resource allocation. Remarkably, despite the high level of program execution, students' knowledge on disaster preparedness stays at an average level, while their readiness, particularly in practical aspects, is dependably more satisfactory. These patterns denote a vital divergence between policy execution and educational impact.

The absence of a significant relationship between program implementation and student preparedness outcomes implies a fundamental issue: the weight on procedural compliance and structural activities may not adequately address the instructional needs required to develop disaster competence. This points to the importance of redirecting from implementation-focused strategies to learner-centered approaches that effectively improve both cognitive and behavioral dimensions of preparedness.

While the study offers valuable insight into the current state of DRRM education, it is limited by its cross-sectional design and dependence on apparent measures of program implementation and student competence. Future research may benefit from longitudinal tracing and in-depth qualitative assessments to disclose the complex factors affecting the effectiveness of DRRM education. Integrating disaster preparedness into the formal curriculum using more interactive and contextual learning approaches might improve both student engagement and retention of critical knowledge and skills. Bolstering the educational core of the DRRM program could ultimately make sure that students are not just ready to respond but are also deeply informed and capable of making sound decisions in times of crisis.

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