

Integration of disaster risk reduction and management concepts in the elementary schools of Buguias District

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Abstract: Disaster Risk Reduction and Management (DRRM) education has become an essential part of building resilient communities, especially in disaster-prone areas like Buguias District in Benguet. This study explored how DRRM concepts are being integrated into elementary education in the district, recognizing the vital role schools play in preparing children for emergencies. Guided by the premise that disaster preparedness starts with awareness and education, the research focused on teachers' current practices, the challenges they face, and the benefits they observe from integrating DRRM into their lessons. Using a quantitative-descriptive approach, data were collected from 57 teachers across 44 diverse schools through structured surveys. Results showed that the most commonly practiced activity was the regular conduct of disaster drills, which not only met policy requirements but also reinforced Filipino values like *Bayanihan* and Core Value- *Makatao*. Teachers also reported embedding DRRM lessons into core subjects, though resource-heavy activities—such as crafting disaster kits from free materials—were rarely done due to constraints. The top challenges included limited funding, heavy workloads, and a lack of teaching resources. Despite these hurdles, many educators found that DRRM integration helped raise students' safety awareness, sharpened their critical thinking skills, and fostered stronger ties with the community. The study highlights the importance of ongoing teacher training, increased financial support, and cooperation among agencies to strengthen DRRM education in schools. These insights offer practical guidance for educators, policymakers, and partners aiming to build safer, more resilient learning environments.

Keywords: Curriculum Implementation, Teacher Practices, Learner Preparedness, Pedagogical Strategies, Resilience Education

Date Submitted: May 16, 2025

Date Accepted: May 28, 2025

Date Published: June 11, 2025

INTRODUCTION

Disaster Risk Reduction and Management (DRRM) has become a critical global concern due to the escalating frequency and intensity of natural and man-made disasters (United Nations Office for Disaster Risk Reduction [UNSDR], 2015). These events significantly threaten human lives, infrastructure, and the environment, disrupting communities and impeding development processes (World Bank, 2017). Consequently, there is an increasing emphasis on equipping individuals, particularly the younger population, with the knowledge and skills necessary to mitigate disaster risks and enhance resilience (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2014).

Education is a pivotal component in promoting a culture of preparedness and safety. Integrating DRRM concepts into elementary education is a strategic approach to developing an informed and proactive generation capable of effectively responding to emergencies. Early intervention in educational settings is crucial since children are among the most vulnerable during disasters but also possess significant potential to act as change agents within their families and communities (Selby & Kagawa, 2012).

The integration of DRRM concepts in elementary education aligns with global frameworks for sustainable development, including the Sendai Framework for Disaster Risk Reduction (2015-2030) and the Sustainable Development Goals (SDGs). These international frameworks highlight the importance of inclusive, quality education that promotes lifelong learning opportunities and enhances disaster resilience (United Nations, 2015). Research underscores that education is a powerful tool for reducing disaster risks. Individuals who are knowledgeable about disaster preparedness are more likely to adopt safety measures, understand early warning signals, and engage in community-based disaster risk management activities (UNESCO, 2014). Moreover, educating children on DRRM can create a multiplier effect, where the knowledge and practices acquired in school are disseminated within families and communities, thereby amplifying the overall impact (Ronan et al., 2015).

Despite the recognized importance of DRRM education, its integration into elementary curricula varies significantly across different regions and countries. Some educational systems have successfully incorporated DRRM concepts into subjects such as science, social studies, and health education. However, challenges persist in terms of curriculum development, teacher training, and resource allocation (Shaw et al., 2011).

In the Philippines, the Department of Education (DepEd) has recognized the importance of DRRM and has issued several mandates to ensure that disaster preparedness is integrated into the educational system. DepEd Order No. 55, s. 2007, mandates the mainstreaming of disaster risk reduction in the school curriculum and the establishment of school-based disaster preparedness programs. DepEd has also encouraged the integration of DRRM concepts into various subjects, emphasizing that these topics should be contextualized within local realities (Department of Education, 2007).

In the Schools Division of Benguet, teachers are highly encouraged to integrate numerous concepts in their lessons, such as gender and development, indigenization and localization, values formation, Sustainable Development Goals (SDGs), and DRRM, all of which are aligned with the core values of the Department of Education (DepEd). Building connections between the lesson and various fields or concepts is vital to enhance learners' understanding, enabling them to practice these concepts in their everyday lives.

In this context, teachers in the Buguias District, whether at the elementary or secondary level, strive to incorporate DRRM concepts into their lessons through instruction, learning materials, learning activities, and even assignments. Given the uncertainty surrounding elementary teachers' integration experiences and knowledge of DRRM, this study was proposed. Furthermore, the wide scope of DRRM concepts prompted the researcher to explore the relevance of these integrations in the teaching-learning process of elementary teachers and learners.

The findings of this study on the integration of DRRM concepts will provide insights into the motivating or compelling factors that should be considered when developing further interventions to enhance teachers' integration skills. Additionally, the study will serve as an assessment tool for teachers, offering a basis for reflection to improve their services and contribute to creating quality learning communities in basic education. Moreover, the information obtained from this research will serve as a valuable reference for teachers in various specializations, enabling them to understand each other and collaborate effectively for the improvement of their functions.

Problem statement

This study in general looked into the integration of Disaster Risk Reduction and Management Concepts in the Elementary Schools of Buguias District. Specifically, it answered the following questions:

1. What are the current practices by elementary schools in Buguias District to integrate DRRM concepts in the teaching-learning process?
2. What is the perceived degree or level of challenges faced by educators in incorporating DRRM concepts in the different elementary schools in Buguias District?
3. What is the level of benefits in incorporating DRRM concepts to the teaching process as perceived by elementary educators in Buguias District?

METHODOLOGY

Research design

The research utilized a combination of quantitative and qualitative method to carry out the investigation. As defined by Bhandari (2020), quantitative research involves the collection and analysis of numerical data to identify patterns, calculate averages, forecast outcomes, evaluate causal relationships, and extend findings to larger populations. This study specifically adopted a descriptive research design. Vijayamohan (2022) emphasized that the primary aim of descriptive studies is to thoroughly investigate the context, characteristics, and existing trends of a given issue to gain a comprehensive understanding of it. Moreover “Qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences.” (Merriam et al. 2016). According to Mills (2021), survey research can serve multiple purposes, yet it consistently offers a simple and accessible way for participants to express their knowledge or opinions on a specific topic.

The study made use of descriptive research design by administering a questionnaire and responses were summarized and analyzed to identify the current practices of elementary Buguias teachers in integrating DRRM concepts in the teaching-learning process, their perceived challenges and benefits of integration. This method enabled the researcher to gain insights about the practices of the participants, their perceptions about DRRM, and potentially developed an IEC material based on the identified problems.

Locale and participants of the study

The research took place across various elementary schools within Buguias District. Stratified random sampling was used to randomly identify 57 participants from the 273 teachers in the 44 elementary schools with varying types- Large (200-600 learners), Medium (121-199 learners) and Small (Less than 120 learners) and Integrated (Elementary to High School Learners).

Data gathering instrument

The primary tool for the data collection in this study was a researcher-made survey questionnaire, designed to reflect the specific research objectives. The questionnaire items were anchored on the Department of Education’s (2020) Disaster Readiness and Risk Reduction (DRRR) framework, as outlined by the Bureau of Learning Resources. It underwent content validation by three professionals with domain expertise: one personnel from the Buguias Municipal Disaster Risk Reduction and Management (MDRRM) Office and two designated DRRM focal persons from the district level. These validators assessed each item for relevance, clarity, and alignment with DRRM principles, and were asked to recommend whether each item

should be retained, revised, or discarded. Considering the mode of their recommendation and feedback, the questionnaire was finalized ensuring that it effectively represented the construct being measured.

To determine the reliability of the instrument, a pilot test was conducted in four schools within the same district that were not included in the actual study sample. The internal consistency of the instrument was assessed using Cronbach's Alpha, which yielded a coefficient of 0.73. This value indicates an acceptable level of reliability ($\alpha \geq 0.70$), suggesting that the items consistently measure the intended constructs. With both content validity and internal consistency established, the instrument was deemed appropriate for data collection.

The questionnaire was divided into four sections. The first section gathered basic information about the respondents, particularly their names and workplaces. The second section listed various best practices that teachers used to integrate DRRM concepts into their lessons. Respondents ranked the 16 pre-conceived practices or add practices not listed. The third section featured scaled questions, utilizing a 4-point Likert scale to gauge teachers' perceptions of the challenges they faced when incorporating DRRM concepts into their teaching. Respondents rated these challenges as very serious (VS), moderately serious (MS), less serious (LS), or not serious (NS). The final section explored the perceived benefits for educators when integrating DRRM concepts in Buguias District elementary schools. Respondents assessed these benefits using a 4-point scale: very high (VH), high (H), low (L), and very low (VL). This section included 10 indicators presented in a scaled question format. (Fraenkel, J. R., et al. 2012).

Data gathering procedure

The study began with the researcher seeking permission from the Public Schools District Supervisor (PSDS) of Buguias District by submitting a formal letter of request. Once approval was granted, the researcher reached out to school heads and prospect participants to explain the purpose of the study and ensure their cooperation.

To gather data, a survey questionnaire was used as the main tool. This instrument was carefully prepared and validated by experts to make sure the questions were clear, appropriate, and relevant to the goals of the study. To make the process more efficient and personal, the researcher visited each of the 44 participating schools to hand-deliver the questionnaires to the selected teachers. This allowed for short conversations with the respondents, during which the researcher addressed concerns, and clarified any items in the questionnaire. Teachers were given enough time to complete the questionnaire at their convenience. Afterward, the researcher returned to each school to collect the accomplished forms, ensuring that the data collection was completed within the intended timeframe.

It is important to note that this study relied solely on the teachers' self-reported practices and perceptions. No document analysis on lesson plan nor class observations done on the integration of DRRM by the teacher-participants.

Data analysis

The collected data was systematically organized and tabulated in a series of tables. Descriptive measures such as weighted means and rankings were used to address the study's problems and objectives. To address the first research question regarding the practices and methodologies used for integrating DRRM concepts, descriptive statistics- mean and rankings applied. To assess the level of challenges faced by elementary teachers when incorporating DRRM concepts into their lessons, a specific scale of interpretation was utilized.

RESULTS AND DISCUSSION

Current practices in integrating drrm concepts in the teaching-learning process

Standing out among all practices is the conduct of disaster drills and hands-on simulations. These familiarize learners with appropriate responses during emergencies that aligns with the Department of Education (DepEd) Memorandum, which mandates the quarterly conduct of disaster drills to ensure preparedness and reduce vulnerability during actual disasters (DepEd, 2015). The consistent execution of these drills reflects a well-established culture of preparedness, reinforcing the importance of procedural memory and reducing panic in actual disaster situations (Alexander, 2019). Furthermore, the requirement to document and report these drills through social media platforms not only promotes accountability but also serves as a means to disseminate best practices within the school community (DepEd, 2021).

More importantly, these drills offer opportunities to instill and practice deeply rooted Filipino values such as *Bayanihan* or *tinulongin the district of Buguias*—the spirit of communal unity and cooperation. When learners and staff come together to simulate emergency responses, they are not merely following protocols; they are engaging in collective action that mirrors the Filipino tradition of helping one another in times of crisis. At the same time, the value of *Makatao*, or concern for others, is nurtured as students learn the importance of protecting not just themselves but also the lives of their peers and community members during disasters by simulating evacuation and first aid. These values elevate disaster preparedness from a mere compliance task to a moral and civic responsibility rooted in cultural practices.

Lesson integration of DRRM topics ranked second. Teachers reported incorporating DRRM concepts into core subjects such as Mathematics and Science when doing typhoon tracking exercises and discussing earthquake dynamics. This cross-disciplinary approach not only deepens understanding but also allows students to see the real-world relevance of academic content (UNESCO, 2021; Sharma & Shukla, 2020). Such integration supports the principle of “curriculum mainstreaming,” as emphasized in DepEd’s Comprehensive DRRM in Basic Education Framework (2018), which encourages embedding risk reduction topics across learning domains.

In recent years, the Department of Education (DepEd) in the Philippines has emphasized the integration of DRRM concepts into the elementary curriculum to cultivate a culture of safety and resilience among young learners. By embedding it into the curriculum, teachers have to cover these learning competencies such as Understanding Hazards and Risks (Introducing students to various natural and human-induced hazards such as typhoons, earthquakes, and floods), Preparedness Measures (Teaching appropriate responses before, during, and after disasters, including evacuation procedures and emergency kit preparation) and Community Engagement (Encouraging participation in school and community-based disaster preparedness activities, fostering a sense of responsibility and collective action).

On the other end of the spectrum, creating a no-cost or low-cost disaster kit ranked the lowest. Respondents explained that limited access to materials and insufficient training hindered their ability to innovate using indigenous or recycled items. This suggests a need for targeted training and resource allocation to equip schools with the skills and materials necessary to develop sustainable disaster kits. Government agencies and non-government organizations could play a crucial role by providing technical guidance and financial support to address this gap (Sharma & Shukla, 2020).

Challenges faced by educators in incorporating DRRM concepts

The overall mean rating of 2.77 indicates that the challenges are perceived as "Moderately Serious," suggesting that while the difficulties are not extreme, they still pose significant barriers to effective implementation. The identified challenges reflect both structural and instructional gaps that require targeted interventions and policy adjustments.

The most pressing challenge faced by educators is the unavailability of funds, which ranked first with a mean of 3.18. This implies that financial constraints hinder the development and execution of DRRM activities and instructional materials. Financial gap restricts the implementation of comprehensive disaster preparedness programs, including the purchase of safety equipment and the organization of large-scale drills. This echoes findings by Shaw et al. (2011), who emphasize that underfunded DRRM efforts often lead to superficial implementation in developing contexts.

Recognizing the limitations of school funding, teachers have turned to locally available resources to craft tools that are both functional and culturally relevant. For instance, bamboo poles are commonly used to create makeshift stretchers and splints, taking advantage of the material's strength, flexibility, and abundance in many communities. Likewise, old cloth, cut-up shirts, or flour sacks are repurposed as bandages or triangular slings, offering a sustainable alternative to store-bought medical supplies. Additionally, constructing DRRM materials can be created through recycling. Plastic bottles, for example, can be transformed into emergency water containers or floatation aids during flood drills. Worn-out tarpaulins can serve as improvised ground sheets or shelter materials during simulation exercises. Moreover, "*inaba*," and "*atayangan*" are used to transport patients over short distances. However, "*binatawil*" is specifically used for long-distance transport, especially when the area is not accessible by vehicle.

Coming next is the increased workload, with a mean score of 3.14. Educators reported that the additional responsibility of coordination integrating DRRM concepts into lessons adds to their already demanding workload (Ramos & Atienza, 2019). Even with the recent issuance of DepEd Order No. 2, s. 2024, which seeks to offload non-teaching tasks from educators, the burden of planning and executing DRRM activities remains substantial (Save the Children, 2022).

The lack of resources and materials ranked third, with a mean score of 3.02. Respondents noted that the scarcity of instructional materials limits the effectiveness of DRRM instruction. This finding reflects the need for better resource allocation and material development tailored to local contexts (Sharma & Shukla, 2020). Furthermore, the absence of localized DRRM materials reduces the relevance of instruction, making it challenging for learners to connect theoretical concepts with real-world applications. DepEd's provision of contextualized teaching resources could address this gap and enhance the integration of DRRM concepts across subjects. This aligns with the recommendations from the Asia-Pacific Education Thematic Working Group (2020), which advocates for localized content in disaster education to ensure greater resonance with learners' lived experiences.

Interestingly, some challenges were perceived as less serious, indicating that while they exist, they do not significantly hinder the integration of DRRM concepts. Lack of training on

implementing DRRM concepts ranked fourteenth, suggesting that while teachers may not have received formal training, they are able to adapt to DRRM integration through other means, such as self-study or peer learning. On the same token, lack of support from superiors ranked last, indicating that school administrators generally provide adequate support for DRRM-related activities.

The findings are consistent with existing DepEd policies, including the Comprehensive DRRM Framework, which outlines the need for funding, capacity building, and instructional support in DRRM education (DepEd, 2018). Moreover, they align with previous studies that emphasize the critical role of financial support, training, and resource availability in disaster preparedness education. Sharma and Shukla (2020) highlighted that inadequate funding and training limit the effective integration of DRRM concepts into school curricula. Similarly, Alexander (2019) emphasized the importance of capacity building and workload management in improving disaster preparedness outcomes in schools.

Benefits perceived by educators in incorporating DRRM concepts

Despite the hurdles, teachers expressed overwhelmingly positive sentiments regarding the outcomes of DRRM integration. The overall mean score of 3.52 reflects a "Very High" level of benefit, suggesting that the incorporation of DRRM concepts greatly enhances various aspects of the teaching and learning experience. The consistently high ratings across all indicators highlight the positive impact of DRRM integration on learners' knowledge, skills, attitudes, and engagement.

The highest-rated benefit, tied for first place with a mean of 3.65, is the fostering of positive attitudes towards disaster preparedness and increase in active learner participation. Educators observed that integrating DRRM concepts helps learners develop a proactive mindset toward disaster risks, encouraging them to take preparedness seriously. Moreover, educators noted that DRRM activities, such as drills, simulations, and problem-solving exercises, encourage learners to engage more actively in the learning process. Active participation not only reinforces content retention but also enhances learners' confidence in handling disaster-related situations. This supports the experiential learning model, which emphasizes real-life application and reflection as key to deeper learning (Kolb, 2014).

Improved learning engagement ranked third, with a mean score of 3.56. Educators observed that DRRM activities captivate learners' attention and motivate them to participate in classroom discussions and practical exercises. This finding aligns with the constructivist learning theory, which posits that learners retain knowledge more effectively when they engage actively in the learning process. As suggested by Bruner (1960) and reinforced in recent DRR education research (UNDRR, 2020), when learning is meaningful and relatable, it is more likely to lead to behavioral change.

The findings align with previous research highlighting the positive impact of DRRM education on learner engagement, confidence, and preparedness. Likewise, they reflect the success of DRRM education in promoting behavioral change and creating a culture of safety within schools. The findings affirm the transformative potential of DRRM education when embedded meaningfully in the curriculum. They resonate with international frameworks such as the Sendai Framework for Disaster Risk Reduction (2015–2030), which emphasizes education as a cornerstone of community resilience.

Information education campaign material in integrating DRRM concepts

Integrating Disaster Risk Reduction and Management (DRRM) into basic education goes beyond policy compliance—it is a moral and professional commitment to safeguarding the lives, well-being, and future of our learners, particularly those in hazard-prone areas like the municipality of Buguias. Located in a highland area susceptible to natural hazards such as earthquakes, landslides, and typhoons, Buguias schools must embed DRRM knowledge into their daily teaching and share these practices to build a culture of safety and resilience.

This output of the study is grounded in several legal and policy frameworks. Republic Act No. 10121, also known as the “Philippine Disaster Risk Reduction and Management Act of 2010,” mandates the integration of DRRM and Climate Change Adaptation (CCA) in school curricula. Likewise, DepEd Order No. 50, s. 2011 (Strengthening Disaster Risk Reduction and Management System) and DepEd Order No. 21, s. 2015 (Disaster Risk Reduction and Management Coordination and Information Management Protocols) emphasize the role of basic education in DRRM preparedness, mitigation, response, and recovery. Furthermore, the MATATAG Curriculum encourages the contextualization of learning content—aligning with the need to teach DRRM within the lived realities of learners.

Based on the earlier findings of this study, which underscored both the best practices and challenges in integrating DRRM into the teaching-learning process, an Information Education Campaign (IEC) material was developed. The aim is to sustain effective strategies while addressing barriers in implementation. This IEC material serves as both a practical guide and an advocacy tool to ensure that learners, teachers, and other school stakeholders remain well-informed and actively engaged in disaster preparedness and response to foster risk-aware school culture.

Informed by principles of instructional design and effective communication, the IEC material uses clear visuals, age-appropriate language, and simplified illustrations. These design elements are intentionally selected to enhance comprehension among a wide range of audiences—from young learners to adult stakeholders. The IEC was developed using illustration applications and aligning it with universal design for learning (UDL) principles, which emphasize accessibility and learner engagement.

The front side of the IEC highlights localized good practices by Buguias educators. Showcasing these practices aims to inspire replication and adaptation across other schools. Meanwhile, the back page presents synthesized research data through bar graphs showing two key components: 1) Degree of Seriousness of the Challenges in DRRM Integration and 2) Perceived Benefits of DRRM Integration to Learners. Each bar graph displays indicators with corresponding levels and mean values, allowing teachers and administrators to reflect on the current realities of DRRM integration. This data-driven feature is designed to encourage continuous improvement in the face of existing challenges and strategize how to enhance DRRM integration and amplify its positive impact.

CONCLUSIONS

This study set out to examine the integration of Disaster Risk Reduction and Management (DRRM) concepts into elementary education across the Buguias District. Guided by the goal of identifying existing practices, challenges, and perceived benefits, the study yielded several noteworthy insights that can inform policy and instructional planning.

Firstly, it is evident that schools have taken proactive steps to integrate DRRM into their day-to-day activities and classroom instruction. Most notably, teachers consistently conduct

disaster preparedness drills and simulations, integrate DRRM topics across subjects, and invite experts from the community to enhance student awareness. These practices suggest a growing awareness of the importance of equipping learners with life-saving knowledge and practical survival skills at a young age.

Secondly, while commendable initiatives are in place, educators face persistent challenges, the most pressing of which include limited funding, excessive workload, and the lack of localized instructional materials. These factors inhibit the consistent and in-depth implementation of DRRM concepts. Even with existing DepEd orders supporting DRRM integration, the burden on educators remains heavy, and support at the school level is often inconsistent.

Thirdly, the perceived benefits of DRRM integration are overwhelmingly positive, with teachers observing increased student participation, improved attitudes toward preparedness, and enhanced communication and problem-solving skills among learners. These findings reinforce the idea that DRRM education, when effectively delivered, not only strengthens disaster resilience but also enriches the broader educational experience.

RECOMMENDATIONS

In light of the conclusions drawn, the following recommendations are offered to strengthen DRRM integration in elementary schools in Buguias District:

Reinforce and institutionalize effective and underutilized DRRM practices such as regular drills, classroom integration, identification of potential hazards, experiential group learning, and the creation of no-cost or low-cost disaster kits. These should be embedded in school planning, budgeting, and performance monitoring to ensure long-term sustainability. School leaders are encouraged to partner with the Office of Civil Defense (OCD), local government units (LGUs), and other DRRM-capable agencies to conduct hands-on, scenario-based drills and community-based risk mapping exercises.

Address implementation barriers by securing dedicated funding, reducing the non-teaching workload of teachers, and developing localized DRRM teaching materials. The Department of Education and local stakeholders must allocate specific budget lines to support DRRM activities. At the school level, strengthening School-Based Management (SBM) can help raise resources or forge partnerships for the procurement of emergency kits, contextualized learning materials, and other preparedness resources. Adherence to DepEd policies by reducing the administrative workload of teachers can also give them more time to focus on effective DRRM integration like creation of instructional aids and supplementary activities that are tailored to the local hazard profile (e.g., landslides, typhoons, earthquakes) to make DRRM concepts more relatable and effective.

Develop and implement a sustainable monitoring and evaluation framework to track the effectiveness and progress of DRRM integration at the school level. This framework should include both quantitative and qualitative feedback tools such as student reflections, teacher logs, and community input. Integrating DRRM into project-based learning, student-led initiatives, and cross-curricular activities can foster leadership, critical thinking, and community resilience. These approaches also ensure that DRRM education is not isolated but becomes a sustainable and embedded part of learners' everyday school experience.

Align DRRM integration initiatives with holistic educator development programs to foster sustainability of the practices featured in the IEC material as well as mitigate challenges in DRRM integration. A recognition and incentive system for schools and educators demonstrating

exemplary DRRM practices will not only motivate consistent implementation but also encourage the scaling and replication of successful, sustainable models across divisions and districts. Schools are also encouraged to conduct or support DRRM-related research, such as analyzing student perceptions, examining variables influencing disaster readiness, and conducting correlation studies that provide deeper insights into how DRRM education can be made more effective and inclusive.

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