

Disaster Resilience Education and Teacher Readiness for DRRM Integration

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ABSTRACT

This study investigated how disaster resilience education shaped teacher readiness for disaster risk reduction and management integration among secondary teachers in Las Piñas City. An explanatory-predictive cross-sectional design was employed involving 48 teachers engaged in DRRM-related instruction and preparedness activities. Data were gathered using a validated researcher-developed instrument and analyzed through descriptive statistics, partial least squares path modeling, bootstrapping, and importance-performance map analysis. Results showed high levels of disaster resilience education and teacher readiness, although school-community resilience engagement and adaptive capacity remained comparatively weaker. The structural model explained 61.2% of the variance in teacher readiness.

Instructional integration emerged as the strongest predictor, followed by preparedness learning activities and risk knowledge and awareness, while school-community resilience engagement did not demonstrate a significant direct effect. Importance-performance analysis further identified preparedness learning activities as the most immediate area for improvement. The findings indicate that teacher readiness is strengthened when disaster knowledge is translated into classroom integration, simulation exercises, preparedness activities, and practical response experiences. Strengthening scenario-based training, adaptive instructional practices, and sustained school-community coordination is therefore recommended to deepen teachers' capacity to integrate DRRM into secondary education and support a more resilient school environment.

Keywords: *adaptive capacity, disaster resilience education, DRRM integration, instructional integration, preparedness learning, teacher readiness*

INTRODUCTION

Schools carry a responsibility that extends beyond academic instruction when communities face hazards and emergencies. They are expected to protect learners, sustain educational continuity, and help develop the knowledge and behaviors needed to respond to risk. The Comprehensive School Safety Framework 2022–2030 places risk reduction and resilience education alongside safer learning facilities and school safety management, while emphasizing the need to strengthen teachers' capacities at the school level. This position makes teachers central actors in building a culture of preparedness rather than viewing disaster risk reduction as a set of occasional drills or compliance activities (Global Alliance for Disaster Risk Reduction and Resilience in the Education Sector [GADRRRES], 2022).

The presence of disaster risk reduction policies, however, does not automatically ensure that educators are ready to carry them into practice. A global assessment of comprehensive school safety policies found that although emergency management measures were present in many education systems, disaster management was included in teacher training in less than one fourth of the countries surveyed. The same assessment pointed to limited technical capacity as one of the barriers to effective implementation. These findings suggest that school

resilience depends not only on formal policies but also on the preparedness, competence, and confidence of teachers who are expected to apply them (Paci-Green et al., 2020).

Evidence from the Philippines further illustrates the value of developing teachers' disaster readiness. Salita et al. (2019) evaluated a disaster training package among school teachers in Angeles City and found significant improvements in knowledge, disaster-related behavior, and perceived threat following the intervention. The findings show that structured professional preparation can influence how teachers understand hazards and how they respond to disaster-related responsibilities. Teacher readiness, therefore, involves more than awareness of emergency procedures. It also reflects the ability to translate knowledge into appropriate action before, during, and after disruptive events.

Classroom integration is equally important because disaster resilience education becomes meaningful when teachers connect risk knowledge with learning activities and school practices. Astuti et al. (2021) found that teachers' disaster knowledge and experiences influenced their attitudes toward disaster risk reduction and contributed to stronger engagement with DRR activities and curriculum implementation. Such findings highlight the instructional dimension of preparedness. Teachers need sufficient knowledge, appropriate strategies, and confidence to embed disaster resilience concepts into lessons rather than treating DRRM as a separate school requirement.

The Philippine basic education system continues to strengthen this area. In 2026, the Department of Education partnered with the University of the Philippines to expand access to disaster preparedness training and science-based risk assessment tools for teachers, learners, and DRRM coordinators. The initiative specifically addressed continuing needs related to localized hazard information, clearer training, and stronger emergency protocols in schools (Department of Education, 2026).

Against this background, Disaster Resilience Education and Teacher Readiness for DRRM Integration focuses on secondary teachers involved in DRRM integration at Equitable Village National High School in Las Piñas City. The study seeks to determine how disaster resilience education is reflected in teaching and school practices and how ready teachers are to perform their instructional and operational responsibilities related to DRRM. Examining these areas may provide a clearer basis for strengthening professional development, instructional support, and school-based resilience measures that respond to the actual needs of secondary teachers.

Literature Review

Disaster Resilience Education as a Foundation for Preparedness

Disaster resilience education goes beyond communicating facts about hazards because its value depends on whether learners and school personnel can translate knowledge into protective action. Nakano and Yamori (2021) argued that conventional disaster education may increase knowledge without necessarily producing proactive behavior, particularly when learners remain passive recipients of information. They proposed sustained participation and shared learning as stronger approaches for developing preparedness. Similarly, Garibay Rubio et al. (2024) found that effective disaster risk reduction education requires appropriate instructional frameworks, relevant learning materials, and delivery mechanisms suited to school realities. These findings support disaster resilience education as an active process that develops awareness, judgment, participation, and readiness rather than simple familiarity with disaster concepts.

Teacher Readiness for Disaster Preparedness and Response

Teachers occupy a critical position in school preparedness because they are expected to guide learners while also carrying responsibilities for safety, evacuation, communication, and continuity of learning. Kawasaki et al. (2022) found that teachers' awareness of disaster prevention was associated with their concerns and preparedness for disaster situations, indicating that readiness involves both knowledge and the capacity to anticipate actual emergency conditions. Fu and Zhang (2024), through a systematic review of 47 studies, further

showed that teacher resilience was associated with stronger disaster education and community preparedness outcomes. Their findings suggest that teacher readiness should include disaster knowledge, confidence, adaptive capacity, and sustained institutional support, especially when educators are expected to remain functional under stressful conditions.

Curriculum Integration and Instructional Practice

Integrating disaster risk reduction into teaching requires more than inserting disaster topics into existing lessons. Amri et al. (2022) found that sustained DRR education in schools depends on how well programs are adopted, institutionalized, and connected with families and communities. Their evaluation also revealed that schools may remain dependent on external initiatives when local institutional support is weak. At the secondary level, Magnaye (2025) reported that teachers used experiential learning, contextualized instruction, technology-supported activities, and community-based approaches when teaching disaster readiness and risk reduction. These practices indicate that effective DRRM integration relies on teachers who can connect curriculum content with realistic hazards, local experiences, and practical preparedness activities.

School-Level DRRM Implementation and Institutional Support

Teacher readiness operates within a wider school system, making institutional conditions important to the quality of DRRM implementation. Lavilles and Hordista (2024) found significant relationships between disaster awareness, preparation, and DRRM program implementation among teachers and administrators in Philippine schools. This indicates that preparedness can influence how consistently school-based DRRM activities are carried out. Abregana (2025) likewise identified gaps involving limited DRRM-specific training, insufficient instructional resources, and inconsistent school-community collaboration. Taken together, these findings show that teacher readiness and disaster resilience education must be supported by training, accessible resources, clear school procedures, and coordinated implementation if DRRM is to become a sustained part of educational practice.

METHODS

Research Design

The study employed an explanatory-predictive cross-sectional design to examine how disaster resilience education was associated with teachers' readiness to integrate disaster risk reduction and management into secondary instruction. Rather than limiting the analysis to descriptive ratings and simple correlations, the design treated disaster resilience education as a multidimensional explanatory construct and teacher readiness as an outcome construct. This approach allowed the study to determine both the strength of the relationship between the two constructs and the relative contribution of specific dimensions of disaster resilience education to DRRM readiness. Data were gathered at one point in time through a structured survey, making the design suitable for examining prevailing instructional practices and readiness conditions without manipulating the school environment.

Research Locale

The study was conducted in a public secondary school in Las Piñas City, National Capital Region. The research setting served learners at the junior high school level and operated under the Schools Division Office of Las Piñas City. The locale was appropriate because teachers were involved in school-based disaster preparedness activities and were expected to incorporate disaster risk reduction principles into instruction and related school programs. The Department of Education officially lists the research site among the public secondary schools of Las Piñas City. DepEd records also showed 83 classroom-instruction units allocated to the site under its 2026 classroom voice-amplifier program, which provided an external indicator of the scale of its instructional workforce.

Participants and Sampling Technique

The study involved 48 secondary teachers who were directly engaged in DRRM-related instruction, preparedness activities, school safety initiatives, emergency drills, curriculum integration, or related responsibilities. The sample size was established through an a priori power approach using an anticipated medium-to-large predictive effect of ($f^2 = .25$), a significance level of .05, statistical power of .80, and three principal predictor domains. A criterion-based purposive sampling technique was applied because participation required direct experience with DRRM integration rather than general membership in the teaching workforce. Teachers were included when they had participated in disaster preparedness activities or had incorporated disaster risk reduction concepts into classroom or school-based learning activities. This procedure kept the respondent group focused and manageable while ensuring that responses came from educators with direct knowledge of the phenomenon being examined.

Research Instrument

The study utilized the researcher-developed Disaster Resilience Education and Teacher Readiness for DRRM Integration Scale as the primary data-gathering instrument. It was structured into two major components. The first measured disaster resilience education in terms of risk knowledge and awareness, instructional integration, preparedness learning activities, and school-community resilience engagement. The second assessed teacher readiness through preparedness competence, instructional capability, response confidence, and adaptive capacity for DRRM implementation. All statements were rated on a five-point agreement scale.

To establish content validity, the instrument was subjected to evaluation by five experts in disaster risk reduction and management, secondary education, educational research, and instrument development. The reviewers assessed the items according to relevance, clarity, coherence, and alignment with the intended constructs. The validation process yielded an overall S-CVI/Ave of .94, while the I-CVI values ranged from .80 to 1.00. Items obtaining the minimum acceptable I-CVI were refined in accordance with the experts' recommendations before the instrument proceeded to pilot testing.

The revised scale was pilot tested with 30 secondary school teachers who were excluded from the main sample. Reliability analysis showed a Cronbach's alpha of .91 for the Disaster Resilience Education Scale and .89 for the Teacher Readiness Scale. The complete instrument obtained an overall Cronbach's alpha of .93, demonstrating strong internal consistency. Corrected item-total correlations ranged from .43 to .78, indicating that the individual statements were adequately aligned with their corresponding constructs. Based on the validation and pilot-testing results, the finalized instrument demonstrated sufficient content validity and reliability for use in the main data collection.

Data Gathering Procedure

Permission to conduct the study was secured from the appropriate education authorities and school administration before data collection. After approval, eligible teachers were identified according to the established inclusion criteria. The purpose of the research, voluntary nature of participation, confidentiality provisions, and procedures for completing the instrument were explained before informed consent was obtained. The questionnaires were administered during an agreed period that did not interfere with instructional responsibilities. Completed responses were checked for completeness, coded without personal identifiers, and transferred to a secured data file. Entries were screened for missing responses and improbable response patterns before statistical analysis.

Data Analysis

The data were analyzed through a combination of descriptive and predictive procedures. Mean and standard deviation were used to summarize the observed levels of disaster resilience education and teacher readiness across their respective dimensions. Rather than relying solely on Pearson correlation and conventional multiple regression, the principal inferential analysis used partial least squares path modeling with bootstrapped

estimation. Disaster resilience education dimensions were entered as explanatory components predicting teacher readiness for DRRM integration. Path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2) were examined to determine both statistical association and practical explanatory contribution. Bootstrapping with 5,000 resamples was employed to generate confidence intervals for the structural paths. An importance-performance map analysis was subsequently used to identify which disaster resilience education dimensions combined high influence on teacher readiness with comparatively lower performance, thereby producing a more actionable basis for professional development and school-level DRRM planning. Statistical decisions were evaluated at the .05 significance level.

Ethical Considerations

The study observed voluntary participation, informed consent, confidentiality, anonymity, and the right to withdraw without penalty. No personally identifying information was included in the analytical dataset, and responses were used solely for research purposes. Electronic records were password-protected and accessible only to the researcher. Findings were reported collectively to prevent the identification of individual teachers, and all research procedures respected applicable institutional requirements and the principles of the Data Privacy Act of 2012.

RESULTS AND DISCUSSION

Table 1. *Levels of Disaster Resilience Education and Teacher Readiness for DRRM Integration*

Construct and dimension	Mean	SD	Interpretation
Disaster Resilience Education			
Risk Knowledge and Awareness	4.01	0.48	High
Instructional Integration	3.78	0.55	High
Preparedness Learning Activities	3.61	0.63	High
School-Community Resilience Engagement	3.34	0.69	Moderate
Overall Disaster Resilience Education	3.69	0.49	High
Teacher Readiness			
Preparedness Competence	3.78	0.56	High
Instructional Capability	3.73	0.52	High
Response Confidence	3.44	0.61	High
Adaptive Capacity	3.39	0.66	Moderate
Overall, Teacher Readiness	3.59	0.51	High

Scale: 4.21–5.00 = *Very High*; 3.41–4.20 = *High*; 2.61–3.40 = *Moderate*; 1.81–2.60 = *Low*; 1.00–1.80 = *Very Low*.

Table 1 presents a generally favorable condition for disaster resilience education, with an overall mean of 3.69. Risk knowledge and awareness obtained the highest mean of 4.01, indicating that teachers possessed a strong understanding of hazards, preparedness measures, and basic disaster risk reduction principles. The result became less favorable when disaster education required wider participation beyond individual classroom practice. School-community resilience engagement registered the lowest mean of 3.34, showing that coordination with families, community organizations, and other local partners was not as firmly established as teachers' personal knowledge. A similar pattern emerged in teacher readiness. Preparedness competence and instructional capability were rated high, but adaptive capacity reached only a moderate level at 3.39. This indicates that teachers were knowledgeable and generally capable of teaching DRRM concepts, yet adjusting instruction and responding confidently when disaster conditions changed remained an area that required strengthening. Philippine evidence has likewise shown

that school-level disaster preparedness can be satisfactory while weaknesses remain in monitoring, organizational arrangements, resources, and stakeholder participation (Galvizo, 2022).

Table 2. *Reliability and Convergent Validity of the Measurement Model*

Construct	Loading Range	Cronbach's α	Composite Reliability	AVE
Risk Knowledge and Awareness	.72–.84	.82	.87	.63
Instructional Integration	.75–.88	.86	.90	.68
Preparedness Learning Activities	.73–.87	.84	.89	.66
School-Community Resilience Engagement	.70–.83	.79	.86	.60
Teacher Readiness	.75–.89	.91	.93	.65

Maximum HTMT ratio = .84.

Table 2 shows that the measurement model demonstrated satisfactory reliability and construct validity. Cronbach's alpha coefficients ranged from .79 to .91, while composite reliability values ranged from .86 to .93. The average variance extracted values ranged from .60 to .68, indicating that each construct explained more than half of the variance in its indicators. Indicator loadings were also acceptable, ranging from .70 to .89. The highest heterotrait-monotrait ratio was .84, indicating adequate distinction among the constructs. Taken together, the results established that the measures represented their intended dimensions with sufficient internal consistency and convergent and discriminant validity. These values satisfied commonly accepted PLS-SEM assessment criteria for construct reliability and validity (Hair et al., 2022).

Table 3. *PLS Structural Model Predicting Teacher Readiness for DRRM Integration*

Predictive Path	β	SE	t	p	95% Bootstrap CI	f ²	Decision
Risk Knowledge and Awareness → Teacher Readiness	.247	.112	2.21	.027	[.041, .469]	.081	Significant
Instructional Integration → Teacher Readiness	.341	.110	3.10	.002	[.127, .535]	.153	Significant
Preparedness Learning Activities → Teacher Readiness	.302	.119	2.54	.011	[.081, .512]	.118	Significant
School-Community Resilience Engagement → Teacher Readiness	.126	.096	1.31	.189	[-.058, .317]	.031	Not Significant
Structural Model Indicator Value							
R ² for Teacher Readiness	.612						
Adjusted R ²	.576						
Q ² Predictive Relevance	.382						
SRMR	.067						
Maximum Inner VIF	1.92						
Bootstrap Resamples	5,000						

Table 3 presents the predictive contribution of the four dimensions of disaster resilience education to teacher readiness. The model explained 61.2% of the variance in teacher readiness, demonstrating substantial explanatory capacity for the conditions examined. Instructional integration emerged as the strongest predictor ($\beta = .341$, $p = .002$), followed by preparedness learning activities ($\beta = .302$, $p = .011$) and risk knowledge and awareness ($\beta = .247$, $p = .027$). This pattern indicates that knowing about disasters was important, but readiness became stronger when teachers were able to translate that knowledge into lessons, simulations, exercises, and other instructional experiences. The finding strengthens the argument that preparedness is behavioral and practice-oriented rather than purely informational. Wang and Tsai (2022) similarly found that perceived behavioral control

and attitudes influenced teachers' disaster preparedness intentions and actual involvement, emphasizing the importance of conditions that enable teachers to move from awareness toward action.

School-community resilience engagement did not produce a statistically significant direct effect on teacher readiness ($\beta = .126$, $p = .189$). This result reveals an important weakness in the model. Although community engagement contributed conceptually to resilience education, variations in external coordination did not translate directly into stronger individual teacher readiness. The finding may reflect limited teacher control over partnerships, resource mobilization, interagency coordination, and community-level preparedness activities. The positive Q^2 value of .382 nevertheless confirmed that the model possessed meaningful predictive relevance. Thus, the strongest route toward teacher readiness appeared to operate through what teachers could directly perform within instructional and preparedness activities rather than through external coordination alone.

Table 4. *Importance-Performance Map for Teacher Readiness*

Disaster Resilience Education Dimension	Importance	Performance Index	Priority Interpretation
Risk Knowledge and Awareness	.247	79.1	Maintain strength
Instructional Integration	.341	70.8	High priority
Preparedness Learning Activities	.302	67.4	Highest improvement priority
School-Community Resilience Engagement	.126	61.9	Supportive improvement area

Table 4 presents the importance-performance map analysis used to identify areas where improvement could yield greater gains in teacher readiness. Instructional integration recorded the highest importance value of .341, although its performance index was only 70.8. Preparedness learning activities showed a similarly strong contribution at .302 but had a lower performance score of 67.4. This combination made preparedness learning activities the most practical improvement priority. Teachers therefore appeared to benefit most from stronger simulation exercises, scenario-based instruction, hazard mapping, evacuation practice, preparedness demonstrations, and other opportunities that required active application of DRRM knowledge. School-based disaster education programs have shown that structured teacher training can improve knowledge, attitudes, behavior, and practical preparedness skills, particularly when instruction combines conceptual learning with experiential activities (Gokmenoglu et al., 2021).

Risk knowledge and awareness showed the strongest performance score at 79.1 but lower additional importance than instructional integration and preparedness activities. This means that further gains in knowledge alone were less likely to produce the greatest improvement in readiness. School-community resilience engagement recorded the lowest performance index of 61.9, but its comparatively small total effect indicated that improving this dimension alone would not address the principal readiness gap. The pattern supports a targeted approach in which professional development first strengthens teachers' capacity to convert disaster concepts into actual classroom and preparedness practices while institutional efforts simultaneously improve community coordination. Importance-performance analysis is particularly useful for this purpose because it considers both the effect of a construct and its observed performance rather than relying only on statistical significance (Ringle & Sarstedt, 2016).

Overall, the findings showed that disaster resilience education was strongly connected with teacher readiness for DRRM integration, but the relationship was driven mainly by instructional integration and active preparedness learning. Teachers demonstrated sound disaster knowledge and generally favorable readiness, yet weaker adaptive capacity and school-community engagement revealed that preparedness had not reached the same strength across all areas. The results point to a practical gap between knowing what should be done and being consistently prepared to apply, adjust, and coordinate those actions under changing disaster conditions.

CONCLUSION

Disaster resilience education contributed substantially to teacher readiness for DRRM integration, particularly through instructional integration, preparedness learning activities, and risk knowledge and awareness. Although teachers demonstrated generally high levels of preparedness competence and instructional capability, weaker results in adaptive capacity and school-community resilience engagement indicated that readiness was not equally developed across all areas. Instructional integration emerged as the strongest predictor of teacher readiness, while preparedness learning activities represented the most practical area for improvement. These results suggest that teacher readiness is strengthened when disaster knowledge is consistently translated into classroom activities, simulations, preparedness exercises, and context-responsive teaching practices. It is therefore recommended that the school intensify DRRM-focused professional development through scenario-based training, simulation exercises, hazard mapping, emergency response drills, and lesson integration workshops. Greater support should also be provided for adaptive teaching strategies during disruptions and for stronger coordination among teachers, families, local authorities, and community partners. Periodic assessment of teacher readiness should likewise be institutionalized to identify emerging training needs and ensure that DRRM integration remains responsive, practical, and sustainable.

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