

# Participatory Action Research to Strengthen Community Early-Warning Facilitators in Nonformal Education: An Indonesian Case

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## Abstract

**Background** - Facilitator capacity is essential for the effectiveness of community-based early warning systems (CBEWS) in disaster risk reduction. Facilitators act as intermediaries who translate hazard information into actionable insights for communities. In disaster-prone Indonesia, their role is critical in protecting lives and livelihoods.

**Urgency of Research** - Existing capacity-building approaches are often top-down and do not actively engage facilitators as learners. These approaches neglect facilitators' contextual knowledge, reducing program relevance and sustainability. Therefore, participatory approaches that position facilitators as co-creators of knowledge are urgently needed.

**Research Objectives** - This study aimed to describe the process and outcomes of implementing participatory action research (PAR) to enhance the capacity of CBEWS program facilitators in nonformal education settings, investigating how PAR supports facilitator understanding of CBEWS concepts, develops contextual and adaptive facilitation skills, cultivates reflective capacity, and identifies enabling and inhibiting factors.

**Research Method** - This qualitative descriptive study was conducted between 2021 and 2024 across seven disaster-prone Indonesian provinces: Central Java, East Java, West Java, Banten, South Kalimantan, Gorontalo, and Bali. Forty-five CBEWS facilitators participated in PAR cycles involving planning, action, observation, and reflection stages. Data were collected through 60+ hours of participatory observation, 20 in-depth interviews, 8 focus group discussions, and document analysis. Thematic analysis was employed to identify patterns and themes.

**Research Findings** - Three key capacity dimensions were identified: improved understanding of CBEWS concepts in specific contexts; enhanced adaptive facilitation skills for inclusive community engagement; and strengthened reflective capacity for continuous improvement. Enabling factors included institutional support, openness to learning, and collaborative relationships, while constraints involved limited reflection time, dual roles, and organizational barriers.

**Research Conclusion & Novelty** - PAR effectively enhances facilitator capacity when supported by institutional commitment and sustained engagement. This approach offers a practical model for community-based disaster risk reduction and contributes to adult learning theory in nonformal education contexts.

**Keywords:** Capacity building, CBEWS, disaster risk reduction, facilitator development

## How to Cite:

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## INTRODUCTION

Indonesia's territorial vulnerability to disasters is primarily shaped by its geographical and tectonic characteristics. Located at the intersection of four major tectonic plates, Indonesia frequently experiences earthquakes, tsunamis, and volcanic eruptions, as well as significant hydrometeorological hazards such as floods and landslides. Floods, in particular, account for over 74% of disasters reported annually, affecting densely populated regions such as Java and Sumatra (BNPB, 2020). In response to the increasing frequency and severity of disasters, Indonesia has adopted the Sendai Framework for Disaster Risk Reduction 2015-2030, which emphasizes inclusive, localized, and community-centered approaches (UNDDR, 2015). This marks a shift from government-centered disaster management to Community-Based Disaster Risk Reduction (CBDRR), a bottom-up approach that empowers local actors to lead disaster preparedness and risk reduction efforts.

Community-Based Early Warning Systems (CBEWS) have emerged as critical components within this framework. CBEWS integrates scientific hazard data with local knowledge, enabling communities to anticipate and respond effectively to disasters while prioritizing inclusivity and participation for vulnerable groups such as women, children, and persons with disabilities. Contemporary research emphasizes the critical importance of community engagement and trust building in making early warning systems effective (Perscaroli et al., 2025; IFRC, 2020). Facilitators are central to CBEWS implementation, serving as intermediaries who translate technical information into actionable insights for communities. They organize training, workshops, and simulations to build community readiness and foster trust between local actors and institutions. Recent research emphasizes that facilitators require specialized training in disaster preparedness and community engagement (Sofyana et al., 2024). Despite their essential role, facilitators often face systemic challenges including limited access to structured training, inadequate institutional support, and the lack of participatory tools (BNPB, 2020). Current facilitator development approaches frequently employ top-down training methods that fail to engage facilitators as active agents in their own learning or leverage their contextual knowledge. Recent research on disaster preparedness training demonstrates that integrated training models combining didactic and simulation-based approaches can effectively enhance community capacity across knowledge, skills, and attitudes. However, the effectiveness of such approaches depends heavily on facilitators who can translate technical information into contextually relevant, engaging learning experiences. Moreover, many disaster risk reduction practices remain overly technical and neglect local wisdom (Lassa et al., 2017).

Participatory Action Research (PAR) offers a collaborative and cyclical approach to addressing these challenges. As a participatory process concerned with developing practical knowing while pursuing meaningful social purpose, PAR has been extensively documented in recent reviews as an effective approach for community capacity development and facilitator empowerment in disaster risk reduction and community health contexts (Chen et al., 2021; Mitwalli et al., 2025). PAR is grounded in principles of nonformal education and community based learning, emphasizing collaborative inquiry and the co-creation of knowledge between researcher and community members (Chen et al., 2021; Sufri et al., 2020). Its iterative process plan, act, observe, reflect-enables facilitators to co-develop preparedness strategies with communities, fostering ownership and enabling ongoing improvements grounded in community participation and collective learning (Chen et al., 2021; Mitwalli et al., 2025). By embedding PAR into facilitator training within nonformal education

contexts, capacity-building initiatives can move beyond theoretical knowledge transmission to encompass experiential learning and reflective practice. This empowers facilitators to tailor disaster preparedness strategies to specific community needs, strengthen trust and collaboration, and enhance inclusivity by addressing vulnerable populations' needs.

Although many disaster risk reduction programs exist, empirical research on facilitators' roles in community-based systems and the effectiveness of their capacity-building interventions remains limited. Previous studies on CBEWS implementation in Indonesia document technical components and community outcomes but rarely focus on facilitators' learning processes or capacity development within nonformal education settings. This study addresses this gap by describing the process and outcomes of implementing Participatory Action Research to develop CBEWS facilitators' capacity in nonformal education settings. Specifically, the study investigates: (1) how PAR processes support facilitator understanding of community-based early warning concepts; (2) how PAR develops facilitators' contextual and adaptive facilitation skills; (3) how PAR cultivates facilitators' reflective capacity; (4) factors that enable or constrain effective PAR implementation; and (5) strategies facilitators employ to sustain learning outcomes. By providing evidence-based insights into facilitator capacity building through participatory approaches in community-based nonformal education contexts, this research contributes to both theoretical understanding of adult learning and practical guidance for practitioners, program developers, and disaster risk reduction policymakers.

## **METHODS**

### **Research Design**

This qualitative descriptive study (Creswell, 2013) employed Participatory Action Research (PAR) as its overarching framework. PAR is particularly suited for developing practical knowledge about facilitator capacity in community-based nonformal education settings. The research was conducted from 2021 to 2024 across seven disaster-prone provinces in Indonesia: Central Java, East Java, West Java, Banten, South Kalimantan, Gorontalo, and Bali. Research sites were selected jointly with provincial disaster-management offices based on disaster vulnerability and active CBEWS program implementation.

### **Research Participants**

Participants included 45 CBEWS facilitators representing both civil society and government-led disaster risk management programmes. Facilitators were selected using purposive sampling based on their active involvement in training sessions, simulations, and reflection forums of the CBEWS program during the study period. Research participants represented diverse backgrounds in terms of geographic location, professional experience, and institutional affiliation.

### **Data Collection Techniques**

Data were collected through four complementary methods: (1) Participatory observation conducted over 60+ hours of training sessions, facilitation activities, simulations, and reflection forums, recorded through field notes and observation checklists; (2) In-depth interviews with 20 facilitators (45-60 minutes each), exploring their experiences, perceptions, and understanding of capacity building through PAR; (3) Focus group discussions conducted with 8 facilitator groups (5-8 participants per group), examining shared learning experiences and collaborative reflection on PAR implementation; and (4) Documentation studies of training materials, meeting notes, facilitator reflections, and program documents. Reflective journals were also written by facilitators throughout

the activity to capture their thoughts, feelings, and learning experiences. The instruments developed for this research included interview guides, observation formats, process notes, and FGD protocols.

### **Data Analysis**

Data analysis employed a qualitative interactive model consisting of three main stages: (1) data reduction through selecting, focusing, and simplifying raw data obtained from observations, interviews, and documentation, organized into meaningful units relevant to research questions; (2) data display through organizing information in descriptive form to facilitate interpretation and understanding; and (3) conclusion drawing conducted inductively based on patterns, categories, and meanings emerging from field data. The study also employed thematic analysis technique developed by (Braun & Clarke, 2022), which involves six stages: familiarization with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Thematic analysis was chosen because it allows flexibility in identifying, analyzing, and reporting patterns within qualitative data while remaining theoretically grounded. This approach aligns with contemporary methodological to understand facilitator development (Margeviča-Grinberga & Kalēja, 2025), which emphasize the importance of capturing reflective processes and nuanced capacity changes that quantitative measures often miss.

### **Data Validity**

To ensure research quality and trustworthiness, multiple validity strategies were employed: (1) triangulation through combining observation, interviews, focus group discussions, and documents; (2) member checking through sharing preliminary findings with participant facilitators for verification and feedback; (3) thick description through detailed accounts of research context and participant perspectives; and (4) reflexivity through researcher awareness of potential biases and impacts on the research process.

## **RESULTS AND DISCUSSION**

### **Planning Participatory Action Research to Meet Facilitator Capacity Development Needs**

The planning of PAR was carried out through collaborative discussions between researchers and facilitators based on identified learning needs. Three primary learning needs emerged: strengthening understanding of CBEWS concepts and principles, improving contextual and adaptive facilitation skills, and increasing the ability to engage communities in disaster preparedness. Researchers and facilitators jointly designed a PAR cycle that included planning, implementation, observation, and reflection activities tailored to local contexts and specific disaster vulnerabilities in each province. This participatory planning approach increased relevance of the learning activities and built a sense of ownership among facilitators, as they felt more responsible for implementing plans they had co-created. The collaborative identification of learning needs reflects recognition that facilitators possess contextual expertise about their communities' disaster vulnerabilities that external researchers may overlook. This participatory approach to identifying capacity-building needs aligns with community-centered frameworks for early warning systems effectiveness (Pescaroli et al., 2025), which emphasize the importance of bridging technical expertise with social and cultural considerations in disaster risk reduction contexts.

The involvement of facilitators in the planning phase reflects core principles of participatory action research, where practitioners themselves are engaged in identifying problems, setting learning objectives, and designing interventions. PAR is characterized by democratic participation, co-

research relationships, and iterative cycles of action and reflection that generate knowledge while creating conditions for social change. Contemporary applications of PAR in community-based settings particularly in disaster risk reduction and community health contexts demonstrate that this approach significantly enhances practitioner engagement, ownership, and capacity development (Pescaroli et al., 2025; Thomas et al., 2024). This approach is grounded in foundational adult learners are motivated when learning is clearly relevant to their professional contexts and when they participate actively in planning their own learning (Farnsworth et al., 2016) By engaging facilitators in the collaborative identification of learning needs, this study honoured their professional expertise and contextual knowledge, creating conditions for meaningful engagement and co-ownership of the learning process (Chen et al., 2021; Pescaroli et al., 2025).

Research on adult learning in community-based settings demonstrates that participatory planning increases not only relevance but also builds intrinsic motivation and sense of ownership (Vaculíková et al., 2024). The tailoring of activities to local disaster contexts ensured that learning was directly applicable to facilitators' daily work and connected to authentic professional experiences. This approach addresses key principles in andragogy that emphasize adult learning must be problem centered, self-directed and grounded in real world contexts (Pradnya et al., 2023). The integration of local disaster knowledge with systematic learning design reflects contemporary research on community based early warning systems emphasizing that sustainable disaster preparedness requires bridging scientific approaches with locally grounded understanding and community expertise (Chen et al., 2021; Pescaroli et al., 2025; Sufri et al., 2020a; Lassa et al. 2017)

The planning process also established collaborative relationships between researchers and facilitators that would persist throughout the PAR cycle. These relationships were characterized by mutual respect and recognition that facilitators, as experienced community members and educators, brought valuable knowledge to the research process. The establishment of trust and shared vision in the planning phase was noted as particularly important, as contemporary research on peer mentoring and collaborative learning demonstrates that quality relationships enhance learning outcomes, foster belonging, and strengthen commitment to shared goals (Hall, 2021; Arslantas and Kocaöz, 2021; Li, 2025). Facilitators initial participation in planning contributed to what organizational learning theory terms "integration" the process of developing shared understanding and taking coordinated action through mutual adjustment and dialogue among group members. This integration at the group level created the foundation for continued collective learning and mutual adjustment throughout the subsequent PAR cycles.

### **Implementation of Participatory Action Research in the CBEWS Program**

PAR implementation was carried out cyclically in four stages. During the planning stage, facilitators identified problems and determined learning objectives relevant to their communities. In the action stage, facilitators facilitated activities in communities using participatory approaches such as community mapping, hazard analysis, and simulation exercises. During the observation stage, facilitators and researchers observed the process and outcomes of facilitation activities, documenting challenges and successes. In the reflection stage, facilitators reflected on their experiences to formulate improvements. Each cycle was conducted continuously to ensure ongoing learning and adaptation, enabling facilitators to progressively refine their facilitation strategies based on community feedback and observed outcomes. This cyclical implementation ensured that PAR

functioned not as a one-time training event but as an embedded, continuous learning process within the CBEWS program.

The four-stage PAR cycle—planning, action, observation, reflection is well-established as an effective approach for professional practice improvement and organizational learning (Thomas et al., 2024). This cyclical process enables practitioners to engage in systematic reflection on their practice, developing greater understanding through structured observation followed by critical analysis of experiences. Contemporary research on facilitating reflection through experimental learning demonstrates that guided reflection significantly enhances facilitators' ability to analyze their own practice and identify improvements, particularly when reflection is combined with peer discussion and formal documentation (Margeviča-Grinberga & Kalēja, 2025; Pradnya et al., 2023; Sudirman et al., 2024) enhances facilitators' ability to analyze their own practice (Pradnya et al., 2023). In the context of facilitator development, the continuous cycling of the PAR process allows facilitators to move from awareness to competence through iterative practice and reflection. Recent scholarship on reflective practice in adult education emphasizes that systematic reflection on experience is essential for developing deeper understanding, promoting behavioral change, and facilitating transformative learning (Vaculíková et al., 2024).

The use of community-based activities such as mapping, hazard analysis, and simulation provided authentic learning contexts where facilitators could practice and refine their skills in real professional situations. These activities are grounded in experimental learning principles, which emphasize that meaningful learning occurs through active engagement with authentic problems and direct experience in professional contexts (Li, 2025; Sudirman et al., 2024). The design of these activities created collaborative learning environments that functioned as communities of practice spaces where learning occurs through meaningful participation in shared professional activities alongside more experienced practitioners (Bortoletto, 2017). The involvement of researchers as observers and co-learners, rather than expert instructors, created space for collaborative reflection and peer learning, which contemporary research demonstrates is particularly effective for professional development in community-based settings. This facilitative approach aligns with contemporary scholarship on collaborative capacity building, emphasizing that facilitators are most effective when they function as supportive partners who guide and scaffold learning rather than direct it prescriptively (Chen et al., 2021; van der Velden et al., 2023a).

The continuous cycling approach addresses what Chen et al. (2021) identified as critical for disaster risk reduction capacity development: the need for adaptive learning that responds to changing local conditions and emerging challenges. The flexibility of PAR to accommodate diverse contexts and learning paces was essential in heterogeneous facilitator groups, reflecting contemporary understanding that effective adult education must be responsive to learner diversity (Vaculíková et al., 2024). The documentation of challenges and successes during the observation stage provided data for reflection but also created organizational memory—information that could be shared across the facilitator community and contributed to collective learning (Rhodes, 2013).

### **Development of Facilitator Capacity in Three Dimensions**

The PAR approach significantly enhanced facilitator capacity across three dimensions. First, facilitators demonstrated enhanced understanding of community-based early warning concepts and principles, moving from general awareness to contextualized knowledge applicable to their specific disaster environments. Second, facilitators developed contextual, adaptive, and inclusive facilitation

skills, showing increased ability to tailor content to community needs, create inclusive learning environments for diverse participants including vulnerable groups, and adapt strategies based on community responses. Third, facilitators cultivated reflective capacity, demonstrating systematic ability to examine their facilitation practice, identify areas for improvement, and implement changes based on reflection. Facilitators who actively participated in all PAR stages showed increased confidence, improved communication skills, and enhanced ability to analyze field situations.

The development of capacity across these three dimensions reflects an integrated understanding of facilitator competence that extends beyond technical knowledge to encompass both professional skills and metacognitive abilities, and reflective capacities. This multidimensional approach to professional development aligns with contemporary research on adult learning and facilitator training, which emphasizes that effective capacity development must address knowledge, skills, and attitudes simultaneously. (Merriam & Bierema, 2014). Cognitive dimension development enhancing understanding of CBEWS concepts involves movement from foundational knowledge to contextualized understanding applicable in specific disaster environments. Contemporary non-formal education research emphasizes that effective adult learning must directly connect to practitioners' professional contexts and real-world applications (Almeida & Morais, 2025). The development of adaptive and inclusive facilitation skills reflects the ability to work effectively with diverse populations and adapt approaches based on cultural, social, and contextual factors. [Click or tap here to enter text](#). Inclusive facilitation, specifically the ability to create learning environments accessible to vulnerable groups, represents an important dimension of nonformal education practice that addresses equity and social justice (Freire et al., 2018)

The cultivation of reflective capacity, the ability to systematically examine practice and formulate improvements is increasingly recognized as essential for professional effectiveness in community-based education and disaster preparedness settings. Schön (2017) Research on facilitator training demonstrates that reflection skills enable facilitators to move beyond following prescribed approaches to developing adaptive, responsive practice tailored to community contexts Pradnya et al., 2023). The increased confidence, communication skills, and analytical ability observed among highly engaged facilitators suggest that consistent participation in iterative learning cycles produces cumulative benefits across multiple competency areas. These multidimensional capacity improvements align with contemporary disaster management frameworks, including the ASEAN Capacity Building Roadmap (2025-2030), which identifies as essential for disaster risk reduction the combination of technical knowledge, interpersonal skills, and analytical capacity (AHA Centre, 2024; Chen et al., 2021).

The integrated development of these three dimensions cognitive, skills based and reflective reflects what contemporary scholarship terms “transformative learning”: development that extends beyond accumulating information to fundamentally changing how one understands and engages with professional practice (Kiewra et al., 2023; Li, 2025). For disaster risk reduction facilitators, transformative learning is particularly important because it enables practitioners to question underlying assumptions about disaster vulnerability, community capability, and the role of external actors in community processes. Several facilitators documented in their journals how participation in PAR had shifted their understanding from viewing communities as passive recipients of disaster preparedness training to recognizing communities as agents with deep local knowledge and capacity.

### **Formative and Participatory Evaluation Model**

The evaluation model used was formative and participatory, conducted through joint reflection sessions, facilitator journals, and interviews. This model allowed facilitators to assess their knowledge, attitudes, and skills development contextually and adaptively. Unlike standardized quantitative measures, reflection-based evaluation provided space for facilitators to explore personal progress and challenges in abstract and contextual capacities such as reflective ability and adaptive facilitation. Facilitators used journals to document their learning experiences, thoughts, and feelings throughout the PAR process, providing rich qualitative data about their capacity development. The participatory nature of evaluation ensured that facilitators had voice in defining what constituted meaningful progress and success, rather than having external measures imposed upon them.

The use of formative and participatory evaluation approaches aligns with contemporary understanding of assessment in adult education and nonformal learning contexts. formative evaluation provides ongoing feedback to support learning and improvement rather than simply measuring outcomes at the end, making it particularly suited to iterative learning processes like PAR. Participatory evaluation involving stakeholders in the evaluation process itself reflects empowerment-oriented approaches to adult education that view evaluation as a learning opportunity rather than merely an assessment tool (Kiewra et al., 2023; Sudirman et al., 2024). Contemporary scholarship on non-formal education emphasizes that assessment approaches in community based setting must be flexible and responsive to practitioners contexts, recognizing that learning outcomes often extend beyond measurable knowledge gains to include changes in perspective, practice, and professional identity (Almeida & Morais, 2025).

The use of reflective journals as an evaluation instrument recognizes that learning in professional contexts often involves changes in understanding, perspective, and practice that are difficult to capture through standardized measures (Margeviča-Grinberga & Kalēja, 2025; Pradnya et al., 2023) Click or tap here to enter text. Research on reflective practice in professional development demonstrates that systematic documentation of reflections on experience—as in journaling—strengthens metacognitive awareness and supports deeper learning. Facilitators' journals revealed not only what they were learning but how they were experiencing the learning process, including emotional dimensions of learning that quantitative measures typically miss. The joint reflection sessions created what Bortoletto (2017) termed "communities of practice," where facilitators could share experiences and collectively make meaning of their learning. These sessions also served an important function for organizational learning: they created space for facilitators at different stages of learning to support each other and share strategies, contributing to what organizational learning theory terms "knowledge sharing and peer mentoring" in professional development contexts.

The challenge of evaluating abstract and contextual capacities highlights an important limitation of conventional quantitative evaluation approaches in adult education contexts, particularly in nonformal education where learning outcomes often involve subtle changes in perspective, attitude, and practice that resist easy quantification (Merriam & Bierema, 2014). Current research on non-formal education emphasizes that evaluation approaches must accommodate these complex, contextual learning outcomes (Almeida & Morais, 2025; Kolb, 2015). The participatory evaluation model used in this research responded to this challenge by creating multiple pathways for facilitators to demonstrate learning—through their documented reflections, their observed facilitation practice in community settings, and their own articulation of what they had learned and how they had changed.

## Enabling and Inhibiting Factors in PAR Implementation

The research identified several factors affecting PAR effectiveness in facilitator capacity building. Enabling factors included institutional support from CBEWS program leadership, openness of facilitators to continuous learning, flexibility of the PAR method in accommodating diverse contexts and learning styles, and collaborative relationships between researchers and facilitators. Inhibiting factors included limited time available for reflection and learning cycles amid facilitators' regular duties, dual roles of facilitators as both program implementers and learners, initial lack of understanding of PAR concepts among some facilitators, and inconsistent participation across different cycles. The identification of these factors underscores that capacity building outcomes are shaped by complex interactions among methodology, individual factors, organizational context, and available resources.

The identification of both enabling and inhibiting factors reflects systemic understanding of adult learning in organizational contexts. Research on organizational learning demonstrates that learning is not determined by methodology alone but by complex interaction of individual, organizational, and contextual factors (Ghazali et al., 2018). Institutional support emerges as a critical enabling factor, consistent with recent research showing that organizational commitment, leadership support, and allocation of time and resources are essential for sustaining professional development initiatives (Masika & Mutui, 2019; Mori et al., 2024). The integration of perceived organizational support with learning motivation is well-documented in recent scholarship, with studies demonstrating that employees learn more effectively when they perceive their organization values their development (Mori et al., 2024).

Facilitators' openness to learning reflects what contemporary research terms “disorienting dilemmas” situations where existing perspectives are challenged and practitioners become motivated to seek new approaches and deepen their understanding (Kiewra et al., 202; Hall, 2021). The importance of collaborative relationships between researchers and facilitators reflects contemporary understanding of peer mentoring and communities of practice, where effective learning occurs through relationships characterized by mutual respect and shared purposes (Gehreke et al., 2024; Sufri et al., 2020) and contemporary understanding of peer mentoring, where effective learning occurs through relationships characterized by mutual respect and shared purposes (Maia et al., 2024). Recent research on peer mentoring demonstrates that quality mentoring relationships enhance learning outcomes across multiple dimensions (Hall, 2021; Wahlstrom, 2017).

Inhibiting factors, particularly time constraints and dual roles, represent common challenges in adult education in community-based settings. Research on professional development demonstrates that insufficient time and competing role demands significantly undermine learning outcomes and can lead to what some scholars term “learning fatigue” where practitioners become overwhelmed by expectations to simultaneously improve practice while continuing regular duties (Sudirman et al., 2024). This challenge is particularly acute in community-based disaster risk reduction, where facilitators are typically community members with other responsibilities and limited dedicated time for professional learning. Initial lack of understanding of PAR concepts highlights the importance of conceptual clarity and adequate preparation in introducing new methodologies to practitioners unfamiliar with participatory action research approaches. [Click or tap here to enter text.](#) The research addressed this by providing initial orientation to PAR concepts and providing ongoing support and modeling from experienced researchers.

The ASEAN Capacity Building Roadmap (2024-2025) similarly identifies time constraints, resource limitations, and the need for contextual adaptation as key considerations in disaster risk management capacity-building (AHA Centre, 2024). The identification of inconsistent participation across cycles suggests that maintaining engagement in long-term, iterative learning processes requires not only compelling methodology but also addressing the structural and organizational factors that affect practitioners' ability to participate consistently. Recent research on organizational learning emphasizes that sustained learning requires intentional attention to cognitive barriers and organizational supports (Farnsworth et al., 2016)

### **Participatory Action Research as a Comprehensive Capacity-Building Strategy**

The involvement of facilitators in all stages of the PAR cycle, rather than being passive recipients of training, honors adult learning principles by recognizing their experience and engaging them as active agents in their own development. This aligns with experiential learning theory, which emphasizes that knowledge is formed through direct experience and reflection (Thomas et al., 2024b). The presence of researchers as co-learners and observers added value through feedback and facilitation of reflection, demonstrating that PAR functions not only as a research method but as a comprehensive capacity-building strategy. The continuous learning cycle enabled facilitators to bridge theory and practice, strengthening the quality of facilitation provided to communities. This integration of theory and practice is particularly important in nonformal education contexts where the boundary between learning and doing is inherently blurred (Almeida & Morais, 2025).

Positioning facilitators as active agents in their own learning reflects what termed "conscientization"—developing critical consciousness through participatory processes that respect learners' agency and knowledge. The role of researchers as co-learners, rather than expert instructors, reflects principles of egalitarian adult education and aligns with feminist and progressive approaches to professional development that challenge traditional hierarchies of knowledge (Pescaroli et al., 2025). Research on feedback and reflection demonstrates that immediate, collaborative feedback in authentic professional contexts is far more effective for learning than deferred, standardized feedback. Recent scholarship specifically on PAR for capacity-building emphasizes that the co-learning relationship between facilitators and researchers creates a fundamentally different dynamic than traditional top-down training (Braun & Clarke, 2019)

The bridging of theory and practice through iterative cycles of action and reflection addresses what has been termed the "theory-practice gap" in professional education, where practitioners often struggle to apply theoretical knowledge to complex real-world situations (Margeviča-Grinberga & Kalēja, 2025) In community-based disaster risk reduction contexts, this bridging is particularly important because theories developed in different contexts may not directly apply to local disaster vulnerabilities and community characteristics. By engaging facilitators in cycles of action and reflection in their own communities, the PAR process enabled them to develop what (Schön, 2017) termed "professional artistry"—the ability to adapt general knowledge and approaches to specific, complex, and unique professional situations. The development of such adaptive professional capacity is increasingly recognized as essential in disaster risk reduction, where no two community contexts are identical (Chen et al., 2021).

The comprehensive capacity-building function of PAR reflects a fundamental shift from viewing capacity-building as transmission of information to viewing it as collaborative development of capability and agency Click or tap here to enter text.. This shift aligns with contemporary

understanding of adult learning and community development, where learning is understood as an ongoing social process embedded in communities of practice

### **Contextual and Adaptive Capacity Building**

The three dimensions of capacity development identified—understanding, skills, and reflective capacity—reflect an integrated approach addressing not only technical knowledge but also professional practice competencies and critical reflection essential for effective facilitation in nonformal education settings. These findings confirm that facilitator learning is influenced not only by methodology but also by environment, institutional support, individual readiness, and available resources. The reflection-based evaluation approach demonstrates that capacity building in nonformal education must accommodate learning outcomes difficult to measure quantitatively but highly meaningful to practitioners and their communities (Lassa et al., 2017)

This integrated, multidimensional approach to capacity building reflects contemporary understandings that professional competence encompasses cognitive, affective, and behavioral dimensions. Research on facilitator development demonstrates that effective facilitators require not only subject matter knowledge but also interpersonal skills, cultural competence, and capacity for ongoing reflection and self-improvement. The contextual and adaptive nature of capacity development reflects what has been termed "situated learning"—the understanding that learning is not a generic process but always embedded in specific social, organizational, and professional contexts.

Recognition that learning is influenced by environment, institutional support, and individual readiness reflects ecological systems theories of learning, which emphasize that individual learning cannot be separated from broader organizational and social systems. This understanding is particularly important for community-based disaster risk reduction, where facilitators' learning is shaped by their communities' disaster vulnerabilities, their organizations' capacities, and the broader policy environment for disaster risk reduction (Chen et al., 2021). Recent scholarship on disaster risk reduction capacity-building emphasizes that sustainable capacity development requires attention to these multiple levels simultaneously (AHA Centre, 2024; Penabulu Foundation, 2024). The challenge of measuring abstract learning outcomes in nonformal education contexts highlights debates in the field about evaluation approaches, with many scholars arguing that standardized quantitative measures are often inappropriate for capturing the complex, contextual learning that occurs in community-based adult education (Almeida & Morais, 2025).

The research also documented that capacity development was not uniform across facilitators. Those who engaged most fully in all PAR cycles showed greater development across all three dimensions, while facilitators with inconsistent participation showed more variable outcomes. This suggests that the quality of engagement, not merely exposure to the methodology, shapes learning outcomes. Research on adult learning and professional development emphasizes that meaningful learning requires active, engaged participation (Bortoletto, 2017). The variation in outcomes also highlights the importance of attending to the inhibiting factors identified—if time constraints or organizational barriers prevent full participation, then even high-quality methodology cannot fully realize its capacity-building potential.

### **Sustainability and Institutional Support Requirements**

The enabling and inhibiting factors identified highlight important contextual considerations for sustained PAR implementation. While institutional support and individual readiness were crucial

enablers, limited time and dual roles remained significant constraints. These insights emphasize that capacity building must be flexible, responsive to local contexts, and supported by enabling institutional ecosystems. For PAR to achieve lasting impact, multi-year commitment, structured mentoring schemes, and participatory evaluation tools must be embedded within organizational systems. The integration of PAR into nonformal education programs for CBEWS facilitator development provides a viable model for combining research, learning, and community action, contributing to both theoretical understanding of adult learning in community-based settings and practical guidance for disaster risk reduction policymakers.

The importance of institutional support and enabling ecosystems for sustaining capacity building reflects broader research on organizational change and professional development. Recent scholarship on organizational learning and resilience demonstrates that organizational learning capabilities are essential for organizations to anticipate, cope with, and adapt to changing circumstances (Vázquez-González et al., 2021). Multi-year commitment recognizes that meaningful changes in professional practice typically require sustained effort over time, not one-time training events. The findings align with what recent disaster risk reduction literature emphasizes: that sustainable capacity development requires long-term institutional commitment and integration into organizational structures (AHA Centre, 2024; Chen et al., 2021).

Structured mentoring schemes reflect growing recognition that mentorship and ongoing peer support are essential for translating learning into sustained practice change. Recent research on peer mentoring demonstrates its effectiveness for supporting learning outcomes and creating institutional connection (van der Velden et al., 2023). The embedding of participatory evaluation tools within organizational systems reflects the principle that evaluation should be integrated into organizational practice rather than viewed as separate from it.

The viability of PAR as a model for combining research, learning, and action addresses what has been termed the "research-practice gap" in disaster risk reduction and nonformal education, where research findings often fail to be translated into practice change. This integration of PAR into nonformal education contexts demonstrates potential for addressing several persistent challenges in community-based disaster risk reduction: enhancing facilitator effectiveness, building local capacity, ensuring sustainability, and generating evidence about what works in real-world community settings (Penabulu Foundation, 2024; UNDDR, 2015). The approach aligns with what international disaster risk reduction initiatives identify as essential: community-based early warning systems that combine technical monitoring with community knowledge and responsive local action (Islam et al., 2025; Sufri et al., 2020b).

The research documented that facilitators who experienced structured ongoing support and institutional recognition of their learning were more likely to sustain improved practices beyond the research period. This suggests that individual learning, important as it is, must be reinforced by institutional recognition, integration into job responsibilities, and continued support structures. The ASEAN Capacity Building Roadmap and other recent initiatives similarly emphasize the importance of institutional frameworks that support, recognize, and sustain facilitator development (AHA Centre, 2024).

## CONCLUSION

This study demonstrates that participatory action research is an effective approach for developing facilitator capacity in community-based early warning systems programs. Through cyclical planning, action, observation, and reflection processes, facilitators developed integrated capacity across three dimensions: enhanced understanding of CBEWS concepts, improved contextual and adaptive facilitation skills, and cultivated reflective practice. The research confirms that facilitator capacity development is shaped by complex interactions among individual characteristics, organizational context, institutional support, and available resources. While institutional support, facilitator openness to learning, and collaborative relationships between researchers and facilitators emerged as enabling factors, limited time, dual roles, and organizational barriers inhibited full participation. The three-dimensional model of capacity development provides a useful framework for designing comprehensive facilitator development programs that address technical knowledge, professional practice competencies, and critical reflection. For organizations implementing disaster risk reduction and community-based early warning systems, investing in long-term, participatory capacity-building processes yields more sustainable improvements in facilitator effectiveness than conventional top-down training. The integration of PAR into facilitator development demonstrates how participatory methodologies can simultaneously serve research, learning, and community change purposes, contributing to both adult learning theory and disaster risk reduction practice. As countries advance community-based disaster risk reduction efforts, systematic facilitator capacity building through approaches like PAR is essential for ensuring communities have access to effective, contextually responsive education and preparedness programs.

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