



Advancing Environmental Stewardship through Action-Based Outdoor Learning: A Community-Based Early Childhood Environmental Education Model in Pigcawayan, North Cotabato, Philippines

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Research and Development

DOI: <https://doi.org/10.51584/IJRIAS.2026.11080139>

Received: 5 September 2026; Accepted: 10 September 2026; Published: 19 September 2026

ABSTRACT

Early childhood is an important period for developing familiarity with nature, environmental values, and developmentally appropriate forms of participation. This retrospective study revisits a 2019 to 2022 community-based Early Childhood Environmental Education (ECEE) initiative implemented in three day-care centres in Pigcawayan, North Cotabato, Philippines. The study had two linked purposes: first, to identify environmental education and youth-engagement principles from selected New Zealand practices; and second, to translate relevant principles into a locally contextualized ECEE initiative. An exploratory qualitative and program-development design was used, drawing on literature and institutional materials, key-informant insights, community consultation, implementation records, teacher observations, parent feedback, and observations of children's participation. The available implementation records document 60 children aged 3 to below 5 years, 60 parents, three day-care teachers, and seven facilitators, with two modules and ten activity sessions implemented. Because the surviving records do not contain a complete numerical pre/post dataset, the study does not estimate intervention effects or claim causal changes in children's environmental knowledge, attitudes, or behavior. Instead, it reports formative evidence concerning feasibility, participation, implementation processes, and observed environmental practices. The revised analysis identifies four recurring engagement conditions—knowledge and awareness, motivation and self-efficacy, direct experience in nature, and place attachment—and situates them within experiential learning, place-based education, early childhood environmental education, and collective-action perspectives. These foundations informed the proposed five-stage Connect–Explore–Understand–Act–Engage (CEUAE) model. The model differs from a simple knowledge-to-action sequence by beginning with children's relationships to familiar places and moving through developmentally appropriate exploration and understanding toward concrete action and family/community reinforcement. The findings support the feasibility of action-oriented, nature-rich, community-embedded ECEE in a Philippine day-care context, while also demonstrating the need for stronger measurement, ethical documentation, longitudinal follow-up, and comparative evaluation. CEUAE should therefore be treated as a practice-informed, testable framework rather than a validated causal model.

Keywords: early childhood environmental education; environmental education; experiential learning; place-based education; nature connection; environmental stewardship; collective action; Philippines; Mindanao; CEUAE

INTRODUCTION

Environmental degradation and biodiversity loss are not only ecological problems; they are also problems of knowledge, values, social norms, participation, and opportunities to experience constructive relationships with the environment. Mindanao contains biologically diverse ecosystems and species, including endemic and threatened taxa, while communities simultaneously experience pressures associated with habitat change, resource use, pollution, and other human activities (Amoroso et al., 1996; Sanguila et al., 2016). These

conditions make environmental education relevant not only to formal environmental management but also to the development of everyday environmental practices and community stewardship.

Environmental education traditionally emphasizes environmental knowledge, awareness, attitudes, skills, and participation. However, knowledge alone does not guarantee sustained pro-environmental behavior. Earlier environmental education theory emphasized the importance of knowledge, experience, personal factors, action skills, and opportunities for participation in moving learners toward responsible environmental behavior (Hungerford & Volk, 1990). More recent work likewise suggests that environmental education can influence knowledge, attitudes, intentions, and behavior, but that effects vary across approaches and study designs and require stronger outcome measurement (Stern et al., 2022).

Early childhood environmental education (ECEE) has particular relevance because the early years provide opportunities for children to build curiosity, competence, emotional connection, and everyday habits through play and repeated interaction with their surroundings. A systematic review of 66 empirical ECEE studies found that the field commonly emphasizes nature-rich settings, play and movement, social interaction, family connection, personal connection, and action-taking, with environmental literacy, cognitive development, and social-emotional development among the most frequently reported outcomes (Ardoin & Bowers, 2020). Research on childhood nature connection further indicates that repeated, positive, multisensory experiences with nature can contribute to children's sense of connection and later care for the environment (Chawla, 2020).

Place-based education provides another relevant perspective. Rather than treating environmental content as decontextualized information, place-based education connects learning with the physical, cultural, social, and ecological characteristics of the places where learners live. Recent reviews describe place-based education as experiential, community-based, and contextual, with learners positioned as active investigators of local environments rather than passive recipients of information (Yemini et al., 2023). For early childhood settings, this orientation is compatible with activities such as gardening, observing local plants and animals, caring for shared spaces, exploring water and waste issues, and connecting classroom learning with family practices.

The present manuscript originated from a 2019 to 2022 inquiry into environmental education and youth engagement in New Zealand. The purpose of the international inquiry was not to reproduce New Zealand programs in the Philippines. Rather, it was to identify principles that might be meaningfully adapted to a Philippine community context. The inquiry highlighted collective action, experiential learning, outdoor engagement, environmental education, and place-based participation. These principles subsequently informed an applied ECEE initiative in Pigcawayan, North Cotabato.

The decision to work with early childhood participants emerged from an applied question: if established environmental practices can be difficult to change later in life, can environmental stewardship be introduced earlier through developmentally appropriate experiences? The initiative therefore treated children not as miniature environmental activists but as learners who can develop familiarity with nature, simple environmental knowledge, confidence in performing age-appropriate actions, and relationships with families and communities that reinforce these practices.

Study Objectives

The study addressed five objectives:

- To identify environmental education and youth-engagement practices in selected New Zealand organizations and programs.
- To identify factors associated with meaningful environmental engagement, particularly knowledge and awareness, motivation and self-efficacy, direct experience in nature, and place attachment.
- To translate relevant principles into a locally appropriate environmental education approach for a community setting in North Cotabato.
- To develop and initially implement a community-based ECEE initiative in three day-care centres.



- To document implementation outputs, participant observations, challenges, and lessons that could inform a preliminary place-based environmental education model.

Contribution and Scope of the Study

The manuscript makes a deliberately bounded contribution. It does not claim that the 2019 to 2022 intervention caused measurable changes in children's environmental knowledge, attitudes, or behavior. Instead, it documents how an action-oriented ECEE initiative was conceived, co-designed, implemented, and observed in a Philippine community setting and uses these formative observations to develop a theoretically informed model. The CEUAE model is therefore presented as a proposition for future testing, not as an empirically validated intervention model.

Conceptual and Theoretical Foundations

The revised manuscript explicitly positions CEUAE at the intersection of four complementary traditions: experiential learning, early childhood environmental education, place-based education/nature connection, and collective environmental engagement. These traditions are related but not interchangeable, and their distinction helps clarify what the proposed model adds.

Experiential Learning

Experiential learning emphasizes learning through experience and subsequent reflection and conceptualization (Kolb, 1984). In the ECEE context, experience can include touching soil, planting seeds, observing living things, sorting materials, conserving water, or caring for a shared space. The 2019 to 2022 initiative operationalized this orientation through activity-based and outdoor tasks rather than relying solely on verbal instruction. The CEUAE sequence therefore treats direct experience as a central mechanism through which abstract environmental concepts become meaningful to young children.

Early Childhood Environmental Education

ECEE research indicates that effective early childhood programs frequently combine time in nature, play and movement, social interaction, creative expression, knowledge and skills, action-taking, family connection, and personal connection (Ardoin & Bowers, 2020). The present initiative is consistent with this evidence base, particularly in its use of outdoor activities, gardening, reuse, environmental observation, family participation, and simple action tasks. The study nevertheless differs from an outcome evaluation because its surviving records do not provide a complete standardized dataset.

Place-Based Education and Nature Connection

Place-based education emphasizes the relationship between learning and the physical and sociocultural context in which learning occurs (Yemini et al., 2023). Nature-connection research similarly emphasizes repeated, meaningful experiences through which children develop emotional, experiential, and relational connections with the natural world (Chawla, 2020). In the present study, place is not treated merely as a venue for activities. Familiar places, people, stories, gardens, waste areas, water sources, and shared community spaces become learning resources. This is why CEUAE begins with Connect rather than with a knowledge test.

Environmental Behavior and Collective Engagement

Hungerford and Volk (1990) emphasized that responsible environmental behavior depends on more than environmental knowledge. The Theory of Engagement developed by Hickman, Riemer, and the YLEC Collaborative (2016) extends the discussion by focusing on the conditions and active ingredients that support youth engagement in collective environmental action. CEUAE draws from this perspective but adapts it to

early childhood. Young children are not expected to lead collective environmental campaigns independently. Instead, the model treats their actions as developmentally appropriate entry points into collective engagement through teachers, parents, local leaders, and community partners.

The proposed model therefore distinguishes between a learning sequence and a behavior-change theory. CEUAE is a pedagogical pathway: it organizes how a child may move from relationship with place, to exploration, to age-appropriate understanding, to action, and finally to engagement with family and community. It does not assert that every child will progress linearly or that the five stages are sufficient to produce sustained pro-environmental behavior. Social norms, family practices, access to nature, adult modeling, resources, institutional support, and perceived efficacy may strengthen or interrupt the pathway.

Relationship to UNESCO Environmental Education Traditions

The model is also consistent with the broad goals of environmental education associated with the Tbilisi tradition, which emphasizes awareness, knowledge, attitudes, skills, participation, and opportunities to address environmental problems. Hungerford et al. (1994) translated these principles into curriculum-oriented environmental education. CEUAE does not replace these established dimensions. Instead, it proposes a developmentally sequenced entry point for young children: connection and exploration precede formalized understanding, while action and engagement provide opportunities to practice and reinforce learning. In this sense, CEUAE is best viewed as a contextualized early-childhood pedagogical pathway that operationalizes established environmental education principles rather than as a competing general theory of environmental education.

Methods

Research Design

The study used a retrospective exploratory qualitative and program-development design. The work consisted of two connected phases. Phase 1 involved review of environmental education and youth-engagement literature and institutional materials, together with key-informant inquiry into environmental activism, waste management and environmental education, ecosystem services, conservation management, and ecosanctuary education. Phase 2 translated selected principles into a community-based ECEE initiative and documented its implementation in three day-care centres in Pigcawayan, North Cotabato.

The design is important for interpreting the findings. This was not a randomized controlled trial, quasi-experimental study, or complete mixed-methods pre/post evaluation. The implementation was formative and descriptive. The retrospective analysis therefore focuses on implementation feasibility, participant engagement, observed practices, stakeholder perspectives, and model development rather than causal efficacy.

Study Setting and Participants

The applied component was implemented in three Early Childhood Day Care Centres in Pigcawayan, North Cotabato. Available implementation records document 60 children aged 3 to below 5 years, 60 parents, three day-care teachers, and seven facilitators. Local government and the Municipal Social Welfare and Development Office participated in consultation and co-design. The intervention was therefore community-embedded rather than delivered solely by an external research team.

Key-Informant Inquiry and Resolution of the Participant-Count Discrepancy

The original manuscript contained a discrepancy between a statement that five key informants were interviewed and a surviving appendix that identified four named representatives. Because the surviving documentation does not provide sufficient evidence to independently verify a fifth participant, the revised manuscript reports four identifiable key-informant representatives and does not use the unverified fifth participant in the analytic description. This decision prevents the publication of a participant count that cannot

be supported by the available records. The identities and contact details of informants are not reproduced in this manuscript.

The key-informant discussions addressed: (a) practical approaches to youth and community environmental engagement; (b) perceived barriers to environmental action; (c) approaches to environmental education, waste education, conservation, and outdoor learning; and (d) mechanisms through which environmental learning could become participation. The available records indicate a semi-structured, topic-guided approach; however, the original interview guide and full transcripts are not preserved in the materials available for this retrospective revision. Consequently, the manuscript does not claim formal instrument validation for the interview guide.

Development of the ECEE Intervention

The intervention followed a participatory development process. First, the project engaged community stakeholders and volunteer teachers to identify relevant environmental concerns and feasible activities for young children. Second, environmental education modules were co-designed with community stakeholders, local government, and the Municipal Social Welfare and Development Office. Third, the modules were implemented in the three centres. The working theory of change was that embedding environmental learning in early childhood settings could create repeated opportunities for children to participate in environmental actions while strengthening reinforcement within families and communities.

Data Sources

The retrospective dataset comprised the following source types: literature and institutional materials; key-informant insights; community consultation observations; implementation records; teacher observations; parent feedback; and observations of children's participation in environmental tasks. Implementation counts were used to document reach and outputs. Qualitative information was organized around recurring concepts relevant to environmental engagement: knowledge and awareness, motivation and self-efficacy, direct experience in nature, place attachment, participation, and community reinforcement.

Qualitative Analysis and Trustworthiness

The qualitative analysis was conducted as a thematic, practice-oriented synthesis rather than as a formal phenomenological or grounded-theory analysis. First, available notes and records were read repeatedly to identify statements and observations relevant to environmental learning and participation. Second, descriptive codes were assigned to recurring content, including knowledge/awareness, motivation/self-efficacy, nature experience, place connection, participation/action, family reinforcement, community ownership, and resistance. Third, related codes were grouped into broader themes. Fourth, the themes were compared across source types to identify convergent and divergent observations. Finally, the themes were used to organize the intervention rationale and the proposed CEUAE sequence.

Because the original project was not designed as a contemporary qualitative research study, some conventional trustworthiness procedures—such as a fully documented codebook, independent double-coding, formal member checking, and an audit trail—were not systematically preserved. The revised manuscript therefore does not claim a level of qualitative rigor that cannot be documented retrospectively. Credibility was strengthened where possible through source triangulation across interviews, consultations, teacher observations, parent feedback, and implementation records, as well as through negative evidence such as reported community resistance. The resulting themes should be interpreted as a formative synthesis of the available records rather than as a fully auditable qualitative dataset.

Instrument Development and Validation

The original records document age-appropriate activity questions and observation of children's performance, but they do not contain a complete standardized instrument, validation protocol, or psychometric analysis. The revised manuscript therefore treats these measures as formative implementation tools rather than validated

outcome instruments. This limitation is consequential because it prevents reliable estimation of changes in environmental knowledge, attitudes, or behavior. For future implementation, the study recommends developing an age-appropriate assessment package through expert review, cognitive pretesting with children and teachers, pilot administration, inter-rater reliability checks for observational measures, and test-retest or internal-consistency assessment where appropriate.

Ethical, Consent, Child Protection, Gender, and Inclusion Considerations

The intervention was described in the surviving documentation as emphasizing child protection, confidentiality, gender-sensitive participation, inclusion, respect for family and community contexts, and non-threatening learning activities. Parents and guardians were treated as partners in children's learning.

Data Analysis Boundaries

Descriptive counts were used only for implementation outputs. No inferential statistics, effect sizes, or causal claims were calculated. In particular, observed practices such as proper waste disposal, plant care, and reuse of materials are reported as instances of participation during implementation, not as evidence that the intervention produced sustained behavioral change. This distinction is central to the validity of the manuscript.

RESULTS

Environmental Education and Engagement Practices Identified in the Initial Inquiry

The initial inquiry highlighted collective action, repeated exposure to nature, dynamic and participatory environmental education, outdoor engagement, and communication that connected individual experience with broader environmental issues. Environmental education activities involving arts, music, movement, storytelling, and outdoor experiences were perceived as more engaging than information delivery alone. Repeated contact with natural environments was viewed as an opportunity to develop familiarity, curiosity, and practical understanding.

Four Interrelated Engagement Factors

Factor	Interpretation in the 2019 initiative
Knowledge and awareness	Children and families need understandable explanations of environmental problems, causes, consequences, and practical solutions.
Motivation and self-efficacy	Participation can be reinforced when learners experience that they can successfully perform meaningful actions.
Direct experience in nature	Outdoor observation, gardening, sensory learning, and care activities create opportunities for curiosity, familiarity, and embodied learning.
Place attachment	Repeated experiences with familiar places can support emotional and social meanings that may strengthen willingness to care for those places.

Table 1. Engagement factors identified through the initial inquiry and applied in the ECEE intervention.

Implementation Outputs



Indicator	Documented output
Day-care centres	3
Children	60
Parents	60
Teachers	3
Facilitators	7
Environmental education modules	2
Activity sessions	10

Table 2. Documented implementation reach and outputs.

Ten-Session Environmental Action Sequence

Session	Activity focus
1	Know and Meet My Environment
2	Plant a Seed
3	My Clean Space
4	Waste Detective
5	Reuse and Create
6	Save Water
7	Little Gardeners
8	Friends of Nature
9	Family Green Action
10	My Green Promise

Table 3. Ten-session environmental action sequence documented in the implementation records.

Teacher and Parent Observations

Teachers described the activities as relatively new and more interactive than routine classroom activities. Outdoor activities provided opportunities for active participation, while parents assisted during implementation. Parent feedback also suggested that the activities provided practical alternatives to extended

gadget use by encouraging play and outdoor environmental activities. These observations support the feasibility of the approach but are not treated as standardized measures of program effectiveness.

Observed Environmental Practices

During implementation, children were observed performing simple environmental actions, including proper disposal of garbage, plant care, and reuse of materials in garden-related activities. These observations are important because they demonstrate that young children could participate in concrete environmental tasks when activities were structured around action and adult support. They do not, however, demonstrate that such behaviors persisted outside the intervention or increased relative to baseline.

Implementation Challenge: Social Resistance

Some community members reportedly mocked or made fun of the environmental activities. This observation is analytically important because it shows that environmental behavior is socially embedded. A child may learn a practice in a day-care setting while receiving contradictory cues elsewhere. The finding supports the importance of parents, teachers, local leaders, and other trusted adults in reinforcing environmental practices and normalizing participation.

DISCUSSION

From Environmental Awareness to Developmentally Appropriate Action

The central lesson of the implementation is not that information is unimportant, but that information becomes more actionable when children can connect it to experience and practice. The ten-session sequence repeatedly moved between observation, discussion, doing, and reflection. Planting, watering, sorting, reusing, and caring for shared spaces transformed environmental concepts into observable actions. This pattern is consistent with experiential learning and with ECEE research showing the prominence of play, movement, nature-rich experiences, social interaction, and action-taking (Ardoin & Bowers, 2020; Kolb, 1984).

Early Childhood as a Strategic Entry Point

The findings support treating early childhood as a strategic entry point for environmental learning, but not because young children should be assigned responsibility for solving complex environmental problems. Rather, early childhood settings can provide repeated opportunities to build dispositions and competencies—curiosity, care, confidence, cooperation, and familiarity with natural processes—that may support later environmental participation. The Philippine National Early Learning Curriculum emphasizes holistic child development and developmentally appropriate learning experiences grounded in context, individuality, and commonality. This provides a policy-compatible basis for integrating environmental experiences into early childhood learning rather than treating them as an unrelated add-on (ECCD Council, 2024).

Place-Based Learning and Place Attachment

The CEUAE model extends place-based education into an early childhood sequence by treating local places as active pedagogical resources. The child does not begin with a generic lesson on environmental degradation; the child begins with a familiar environment. A garden, clean space, water source, waste area, tree, animal, or community story can become the starting point for exploration. This aligns with the broader place-based education literature, which emphasizes experiential, community-based, and contextual learning and positions learners as active investigators of their local environments (Yemini et al., 2023).

Place attachment should nevertheless be interpreted carefully. The study does not demonstrate that repeated exposure automatically produced attachment or that attachment directly caused stewardship. Rather, place attachment is proposed as one possible pathway linking experience, meaning, motivation, and care. This cautious interpretation is consistent with nature-connection research, which suggests that positive and repeated

childhood experiences can contribute to connection with nature and later care while also recognizing the complexity of these pathways (Chawla, 2020).

CEUAE in Relation to the Theory of Engagement

Hickman et al. (2016) developed a theory of engagement for youth environmental action that integrates facilitating factors and active ingredients supporting collective action. The present model shares the emphasis on participation, efficacy, social support, and action, but it operates at a different developmental level. CEUAE is designed for children approximately three to below five years old and therefore uses adult-supported, concrete, sensory, and play-based activities. The Engage stage should consequently be understood as supported participation through families, teachers, and community actors rather than independent youth leadership. This distinction is important: CEUAE adapts the logic of engagement to early childhood without claiming that a preschool intervention is equivalent to a youth collective-action program.

CEUAE in Relation to Established Environmental Education Frameworks

The model also relates to established environmental education frameworks that connect awareness, knowledge, attitudes, skills, and participation. CEUAE reorganizes these elements around the developmental logic of young children. Connect and Explore foreground experience and relationship; Understand develops age-appropriate knowledge; Act creates opportunities to practice; and Engage extends learning into social contexts. The model therefore does not replace the established goals of environmental education. Its proposed contribution is the sequencing and contextualization of those goals for community-based early childhood settings.

Family and Community as Reinforcing Environments

The intervention's community co-design and parent participation are more than implementation supports. They represent a mechanism through which learning can be reinforced beyond the day-care centre. Children may learn to dispose of waste properly or care for plants during an activity, but persistence is more plausible when adults model and support the same behavior. This interpretation is consistent with the collective and social dimensions of environmental engagement and with place-based education's emphasis on community partnership (Hickman et al., 2016; Yemini et al., 2023).

International Learning and Philippine Contextualization

The New Zealand component should be understood as contextual learning rather than policy or program transfer. Practices observed in another country were used as prompts for identifying principles—collective action, outdoor learning, experiential engagement, and community participation—that were subsequently redesigned for a Philippine setting. This distinction is especially important when environmental education is implemented across different cultural, institutional, ecological, and socioeconomic contexts.

Relevance to Philippine Policy and Practice

The initiative has a clear policy connection to Philippine environmental education. Republic Act No. 9512, the National Environmental Awareness and Education Act of 2008, promotes environmental awareness through environmental education and provides a legislative basis for strengthening environmental learning across educational and public settings. The study's action-oriented approach is therefore compatible with a national policy environment that recognizes environmental education as an important means of building awareness and environmental responsibility.

The early childhood dimension is likewise compatible with the current Philippine ECCD policy environment. Republic Act No. 12199, enacted in 2025, further strengthens the Early Childhood Care and Development System and recognizes ages zero to eight as a crucial stage of educational development, while emphasizing developmentally appropriate experiences and the role of parents as children's first teachers. The National Early Learning Curriculum similarly emphasizes holistic development and learning experiences grounded in context

and developmentally appropriate practice. CEUAE can therefore be positioned as a supplementary pedagogical model that can be integrated with, rather than substituted for, the national early learning framework.

Proposed Connect–Explore–Understand–Act–Engage (CEUAE) Model

The CEUAE model is proposed as a preliminary practice-informed framework derived from the convergence of the 2019 implementation observations and the theoretical literature reviewed above. It should be tested empirically before being described as an effective or validated model.

Stage	Core purpose	Illustrative early-childhood practice	Expected proximal process
CONNECT	Establish relationship with familiar people, places, and living things.	Local stories, familiar spaces, noticing plants/animals, community routines.	Belonging, familiarity, relevance
EXPLORE	Generate curiosity through direct, sensory experience.	Outdoor play, observation, gardening, movement, art, discovery.	Curiosity, attention, enjoyment, nature experience
UNDERSTAND	Build age-appropriate environmental concepts.	Simple explanations of plants, water, waste, biodiversity, and care.	Knowledge, meaning-making, recognition of consequences
ACT	Practice concrete, feasible environmental actions.	Planting, watering, sorting waste, reusing materials, caring for spaces.	Self-efficacy, action skills, participation
ENGAGE	Connect child learning with family and community reinforcement.	Family green actions, shared commitments, adult modeling, community participation.	Social reinforcement, collective participation, continuity

Table 4. CEUAE as a developmentally adapted pedagogical pathway.

Proposed pathway: CONNECT → EXPLORE → UNDERSTAND → ACT → ENGAGE. The stages are iterative rather than strictly linear. Children may move back to exploration after acting, deepen understanding through repeated experience, and reconnect with place through family and community activities.

What CEUAE Adds

- It begins with relationship to familiar place rather than with abstract environmental information.
- It treats outdoor and sensory experience as a central learning process rather than an optional enrichment activity.
- It translates environmental knowledge into concrete, developmentally appropriate actions.
- It explicitly includes family and community reinforcement as part of the learning pathway.
- It is designed as an early-childhood pedagogical model, not as a general theory of environmental behavior.
- It generates testable propositions for future research rather than claiming validated causal effects.

Research-to-Practice and Policy Implications

- Early childhood centres can serve as strategic sites for experiential and place-based environmental learning when activities are aligned with developmentally appropriate practice.
- Environmental learning should combine age-appropriate knowledge with repeated opportunities to observe, explore, practice, and reflect.
- Parents and community partners should be treated as co-implementers because social reinforcement can strengthen or undermine children's emerging environmental practices.
- Local biodiversity, waste, water, food, and land-use issues can provide authentic learning contexts without requiring abstract or overly technical instruction.
- Environmental education programs should include measurable, age-appropriate outcomes from the outset, including structured observation of performance and, where feasible, pre/post assessment.
- Philippine early childhood and environmental education policies provide a supportive policy context for integrating environmental experiences into existing ECCD programming rather than creating parallel systems.
- Programs should anticipate social resistance and use trusted teachers, parents, local leaders, and community organizations to normalize participation.
- Future program funding should support longitudinal monitoring because short-term participation is not equivalent to sustained behavior change.

RECOMMENDATIONS FOR FOLLOW-UP RESEARCH

A follow-up study would substantially strengthen the evidence base. If feasible, the next evaluation should retain the community-based character of CEUAE while adding systematic measurement. A recommended design is a mixed-methods longitudinal evaluation involving baseline assessment, immediate post-intervention assessment, and follow-up assessment after several months. Where feasible, a comparison group or staggered implementation design could strengthen causal inference.

- Develop an age-appropriate environmental knowledge assessment using pictorial, oral, and performance-based items.
- Develop an observation rubric for waste disposal, plant care, water conservation, reuse, and participation, with clear scoring criteria and inter-rater reliability checks.
- Assess children's nature connection or place-related responses using developmentally appropriate methods rather than adult-oriented self-report scales.
- Collect structured parent data on household practices to determine whether learning transfers beyond the day-care setting.
- Document implementation fidelity, teacher training, contextual barriers, and community reinforcement.
- Use qualitative interviews or focus groups with teachers, parents, and facilitators to examine how CEUAE is experienced and adapted.
- Compare CEUAE with routine early childhood practice or use a staggered rollout to strengthen inference.
- Test whether repeated nature experience, self-efficacy, and family reinforcement are associated with environmental participation.
- Replicate the model across municipalities and ecological contexts to determine which components are transferable and which require localization.

CONCLUSION

This retrospective study documents a 2019 to 2022 attempt to translate environmental education and engagement principles into a community-based early childhood setting in Pigcawayan, North Cotabato. The implementation involved 60 children, 60 parents, three teachers, and seven facilitators across three day-care centres and produced two modules and ten activity sessions.

The available evidence indicates that outdoor, activity-based learning created opportunities for children and adults to participate in practical environmental tasks such as planting, caring for plants, proper waste disposal, and reuse of materials. These observations demonstrate feasibility and participation, but they do not establish causal or sustained changes in environmental knowledge, attitudes, or behavior.

The study's main conceptual contribution is the proposed CEUAE model, which organizes environmental learning for young children around five connected processes: Connect, Explore, Understand, Act, and Engage. The model builds on experiential learning, early childhood environmental education, place-based education, nature connection, and collective engagement while adapting these traditions to the developmental realities of children below five years old. Its distinctive emphasis is the movement from familiar place and direct experience toward concrete action and family/community reinforcement. CEUAE should remain a testable proposition rather than a validated intervention model. Its next stage requires systematic assessment, transparent ethical documentation, validated age-appropriate measures, and longitudinal follow-up. The enduring implication of the 2019 to 2022 experience is therefore not that environmental stewardship can be proven through a short activity sequence, but that early childhood settings can provide a meaningful starting point for helping children know, experience, value, and care for the places in which they live.

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