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Integrating Permaculture and Ecological Learning into Pancasila-Based Character Education: A Gapura Pancawaluya Perspective

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ABSTRACT

Environmental character education requires the integration of ecological practices, ethical principles, and culturally relevant values. However, permaculture, ecological learning, Pancasila education, and local cultural values have largely been examined separately, leaving their conceptual integration underexplored. This study develops a conceptual framework integrating these domains for ecological character education in elementary schools. Using an integrative literature review approach, relevant publications were identified through targeted searches and purposively selected. The literature was categorized, comparatively analyzed, conceptually mapped, and synthesized into a proposed framework. The framework connects permaculture-based ecological practices, experiential ecological learning, pedagogical mediation, and character-value orientations. Pedagogical mediation through teacher modelling, dialogue, collaboration, and reflection links ecological experiences with ethical understanding and character development. Pancasila serves as the national ethical foundation, while the five Pancawaluya values—Cageur, Bageur, Bener, Pinter, and Singer—provide a culturally grounded character framework. This integration offers a conceptual contribution to ecological character education and practical guidance for curriculum development and school-based environmental learning through gardening, composting, water conservation, and waste management. Empirical research is needed to examine the framework's implementation and applicability.

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1. INTRODUCTION

Environmental degradation, changing patterns of resource consumption, and the growing distance between everyday life and ecological systems have strengthened the need to reconsider the relationship between education and the environment. Schools are not only

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places for transmitting knowledge about environmental problems; they are also social environments in which learners experience responsibility, cooperation, decision-making, and the consequences of collective action. Reviews of environmental education indicate that educational programs can support environmental knowledge, attitudes, intentions, and behavior, although outcomes vary and direct environmental effects are harder to establish [1], [2], [3]. Ecological education therefore has the potential to connect knowledge with practices and dispositions relevant to sustainable living. Reviews of K–12 environmental education also describe diverse learning outcomes while identifying methodological differences across interventions [4]. These findings suggest that environmental education should extend beyond the acquisition of ecological knowledge to include meaningful opportunities for learners to translate what they understand into responsible actions and sustained behavioral orientations. However, the relationship between knowing environmental issues, participating in ecological activities, and developing character is not necessarily automatic. It requires learning experiences that connect cognitive understanding, practical engagement, social interaction, and personal reflection.

Within this broader educational concern, the central problem is how environmental activities can be transformed into meaningful pedagogical experiences that contribute to character development rather than remaining limited to routine environmental practices. Permaculture offers one possible context for this connection. Commonly associated with the design of productive and regenerative human–environment systems, permaculture emphasizes relationships among living systems, resources, and human activity. Unlike environmental education activities that may focus on particular issues or isolated practices, permaculture provides an integrated learning context in which ecological relationships, resource management, human needs, and collective responsibility can be explored through interconnected activities. Its emphasis on designing and maintaining mutually supportive systems makes it particularly relevant to learning about interdependence, sustainability, care, and responsibility. In educational settings, gardens, composting, water management, food production, and other ecological practices can become contexts in which learners observe interdependence, respond to practical problems, and share responsibility. Studies have examined permaculture as a context for science and sustainability education and as a school-based educational practice [5]–[8]. Related research on garden-based learning suggests that practical learning environments can support academic and educational outcomes, while the effects depend on design and implementation [9].

Nevertheless, the educational potential of garden-based learning and other environmental activities does not necessarily provide the same conceptual scope as permaculture. While these approaches can facilitate direct interaction with nature and practical environmental engagement, permaculture offers a broader organizing framework that connects ecological processes with everyday human activities and the management of shared resources. This integrated orientation provides a suitable foundation for examining how ecological learning can be associated with broader social and moral values.

Nevertheless, participation in an environmental activity should not be equated automatically with character formation. A student may participate in gardening because it is required, without necessarily developing a sustained sense of responsibility or care.

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Environmental education research emphasizes the importance of meaningful local issues, opportunities for action, collaboration, and intentional evaluation [1]–[2], [10], [11], [12]. This distinction highlights the need to differentiate four interconnected but conceptually distinct dimensions: ecological knowledge, environmental behavior, experiential learning, and character formation. Ecological knowledge concerns learners' understanding of environmental systems and the consequences of human activities. Environmental behavior refers to the actions through which this understanding is expressed in everyday practices. Experiential learning provides opportunities to construct understanding through direct experience, observation, participation, and reflection. Character formation concerns the development of relatively consistent values and dispositions that guide responsible decisions and actions across different situations. Accordingly, ecological knowledge may inform environmental behavior, while repeated and meaningful experiences can provide opportunities to internalize the values underlying those behaviors. However, neither knowledge nor participation alone is sufficient to establish character development.

The educational meaning of an activity depends on the design of the learning experience, relationships among participants, teacher guidance, school expectations, and opportunities to reflect on why an action matters. Pedagogical mediation is therefore essential in connecting ecological activities with character education. Through teacher facilitation, collaborative tasks, guided observation, shared decision-making, feedback, and structured reflection, students can move beyond completing environmental tasks toward understanding the values represented by their actions. For example, maintaining a school garden can provide opportunities to learn responsibility through caring for plants, cooperation through distributing tasks, justice through sharing resources, and concern for others through maintaining a shared environment. These values need to be explicitly discussed, practiced, and reinforced within the learning process so that ecological participation becomes an intentional character-learning experience. Ecopedagogy and environmental education thus need to be connected with curricular work, institutional practices, and local contexts rather than treated as isolated activities [13], [14], [15]. Research on effective climate change education likewise emphasizes personally relevant content, active learning, and deliberative discussion [16]. Consequently, pedagogical mediation functions as the conceptual bridge between ecological experience and character formation, ensuring that environmental activities are accompanied by value interpretation, social engagement, and opportunities for reflective action.

Character education in Indonesia can be interpreted through both the national value foundation of Pancasila and locally grounded cultural knowledge. Pancasila's five principles—belief in One Almighty God; just and civilized humanity; the unity of Indonesia; democracy guided by deliberation and representation; and social justice for all Indonesian people—provide an ethical orientation for collective life. As the national philosophical foundation, Pancasila establishes shared normative principles concerning spirituality, humanity, unity, democratic participation, and social justice. These principles offer a broad ethical framework for interpreting responsible relationships between individuals, communities, and their surrounding environments. Nevertheless, translating these national principles into everyday educational practices requires contextual

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interpretations that are meaningful to learners and connected with their cultural experiences. In West Java, Gapura Pancawaluya articulates five character values grounded in Sundanese local wisdom: Cageur, Bageur, Bener, Pinter, and Singer. These five orientations represent complementary dimensions of individual and social development: Cageur emphasizes physical and mental well-being; Bageur reflects kindness, moral conduct, and care for others; Bener concerns truthfulness, integrity, and appropriate conduct; Pinter emphasizes knowledge, intelligence, and understanding; while Singer represents practical competence, adaptability, and resourcefulness. Together, these orientations provide a culturally grounded perspective on developing individuals who are knowledgeable, responsible, socially considerate, and capable of responding constructively to their surroundings. Recent literature has examined Pancawaluya as a framework for character education and its relationship to Sundanese cultural values [17], [18], [19], [20].

The relevance of Pancawaluya to ecological character education lies not merely in its geographical association with West Java but also in its potential to connect personal development with collective well-being and responsible everyday conduct. Sundanese local wisdom provides a cultural context in which relationships, mutual assistance, respect, social harmony, and shared responsibility can be interpreted as meaningful foundations for community life. These orientations are relevant to ecological learning because environmental sustainability also involves caring for shared resources, considering the needs of others, maintaining collective spaces, and recognizing the interdependence between human activities and natural systems. From this perspective, Cageur can be interpreted in relation to well-being within a healthy environment; Bageur in relation to care and cooperation; Bener in relation to ethical and responsible environmental conduct; Pinter in relation to ecological understanding and informed decision-making; and Singer in relation to practical skills and adaptive responses to environmental challenges. These relationships represent conceptual interpretations rather than fixed or exclusive correspondences between individual cultural values and environmental behaviors.

The integration of Pancasila and Pancawaluya is therefore theoretically justified by their complementary functions in character education. Pancasila provides the national ethical foundation that establishes the broader principles of responsible individual and collective life, whereas Pancawaluya provides culturally situated character orientations through which these principles can be interpreted and practiced in the Sundanese educational context. Their integration does not imply that the two frameworks are identical or that each Pancawaluya value corresponds exclusively to one Pancasila principle. Instead, the relationship is complementary and interpretive: Pancasila establishes the normative direction, while Pancawaluya contextualizes character development through locally meaningful values and practices. In this article, Pancasila and Pancawaluya are not treated as competing or interchangeable systems. Pancasila provides the national normative foundation, while Pancawaluya offers a locally meaningful interpretive framework for translating values into educational experiences.

Existing literature addresses permaculture education, environmental learning, ecopedagogy, Pancasila-based character education, local wisdom, and Pancawaluya from different perspectives. Research on permaculture education has primarily provided a basis

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for understanding ecological systems and sustainability through practical learning experiences, while garden-based learning has highlighted the educational potential of direct engagement with natural environments [5]–[9]. Ecopedagogical studies have further emphasized critical awareness, active participation, and the connection between environmental issues and educational practices [10]–[16]. Meanwhile, research on Pancasila-based character education has established the importance of national values as a foundation for students' moral and social development, and studies on Sundanese cultural values have highlighted Pancawaluya as a locally grounded framework for character education [17]–[22]. Although these strands offer complementary insights, they address different dimensions of the educational process. Permaculture and ecological learning explain the environmental context and opportunities for practical engagement; ecopedagogy emphasizes the critical and participatory dimensions of learning; Pancasila provides the national ethical orientation; and Pancawaluya offers culturally situated character orientations.

The limitation, therefore, is not the absence of studies on these individual themes but the limited conceptual integration of their respective contributions into a coherent pedagogical framework. In particular, the relationship between permaculture-based ecological experiences, the pedagogical processes required to interpret those experiences, the five principles of Pancasila, and the five character orientations of Gapura Pancawaluya remains insufficiently articulated. Existing discussions of environmental education do not necessarily explain how ecological practices can be systematically connected with national and local character values. Similarly, studies of Pancasila and Pancawaluya do not automatically establish how these values can be operationalized through sustained ecological learning experiences. Work on local wisdom-based character education and ethnopedagogy further supports the relevance of culturally grounded approaches, while also showing that implementation depends on educational setting and practice [21], [22].

This article addresses that relational task through a targeted conceptual literature review informed by integrative review methodology. It asks: How can permaculture and ecological learning be conceptually connected with the five principles of Pancasila and the five character values of Gapura Pancawaluya? More specifically, the article examines the relationship between ecological knowledge, practical environmental engagement, experiential learning, pedagogical mediation, and character development within a culturally grounded educational framework. The article contributes a conceptual pathway that positions Pancasila as a national ethical foundation, ecological learning as a context for value practice, and Pancawaluya as a culturally grounded character lens. The proposed framework is particularly relevant to elementary education in West Java, where the integration of national educational values with Sundanese local wisdom can make character education more contextually meaningful and connected to students' everyday experiences. At the same time, its underlying conceptual structure may be adapted to other cultural settings by replacing or contextualizing Pancawaluya with locally recognized values while retaining the broader ethical orientation of Pancasila and the pedagogical principles of experiential ecological learning. It does not claim that permaculture directly causes character development; instead, it proposes relationships that can guide curriculum

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design and future empirical research [23]–[25]. Thus, the primary contribution of this article is a conceptual integration that explains not only why ecological learning, national values, and local wisdom are relevant to character education, but also how pedagogical mediation can connect them within an educational process.

2. METHOD

2.1. Research Design

This article adopts a conceptual research design informed by integrative literature review methodology. Integrative reviews enable the synthesis of theoretical and empirical literature from different research traditions to develop a broader conceptual understanding of a particular research issue [23], [24]. This approach was selected because the study seeks to integrate interdisciplinary perspectives on permaculture education, ecological learning, pedagogical mediation, national character values, and Sundanese local wisdom rather than evaluate the effectiveness of a specific educational intervention. The unit of analysis consists of concepts, theoretical arguments, educational practices, and relationships discussed in published literature, rather than students, teachers, or school practices directly observed by the authors. Accordingly, the article presents a conceptual synthesis rather than original empirical findings.

2.2. Literature Sources and Search Strategy

A targeted literature search was undertaken on 11 October 2026 using scholarly web searches and relevant journal or publisher websites, supplemented by backward reference-list checking. The search focused on five interconnected domains: (1) permaculture in education; (2) ecological and environmental learning; (3) experiential learning and pedagogical mediation; (4) character education and school culture; and (5) Sundanese local wisdom and Gapura Pancawaluya. These domains were established to ensure that the literature search covered the ecological, pedagogical, normative, and cultural dimensions of the proposed framework.

The search terms were combined using Boolean operators (AND and OR), quotation marks for exact phrases, and alternative terminology to identify relevant publications across the five domains. The principal search combinations included the following:

1. Permaculture and education: ("permaculture education" OR "school permaculture" OR "permaculture learning") AND (education OR school OR students OR learning).
2. Ecological and environmental learning: ("ecological learning" OR "environmental education" OR "garden-based learning" OR "environmental education outcomes") AND (school OR education OR students OR behavior).
3. Experiential learning and pedagogical mediation: ("experiential learning" OR "learning through experience" OR "pedagogical mediation") AND (ecological OR environmental OR sustainability OR character).
4. Character education and national values: ("character education" OR "environmental character education" OR "school culture") AND (Pancasila OR values OR environmental responsibility OR ecological behavior).

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5. Sundanese local wisdom and Pancawaluya: ("local wisdom" OR "Sundanese local wisdom" OR ethnopedagogy) AND (Pancawaluya OR "Gapura Pancawaluya" OR "Sundanese character education").

These combinations were used to identify publications relevant to the five review domains. The search also involved examining reference lists of relevant publications to identify additional sources that contributed to the conceptual discussion. This was a targeted conceptual search rather than an exhaustive systematic review. Therefore, the study does not claim exhaustive literature coverage or report PRISMA-style identification and screening statistics.

2.3. Inclusion and Exclusion Criteria

Sources were selected purposively based on their relevance to at least one of the five review domains and their contribution to explaining relationships among ecological practices, learning processes, character education, national values, and local cultural frameworks. The review included publications addressing educational applications of permaculture or school gardens, environmental and experiential learning, pedagogical processes relevant to character development, local-wisdom-based character education, and Pancasila and Pancawaluya in educational contexts.

Peer-reviewed journal articles were prioritized because they provided theoretical discussions and empirical findings relevant to the research focus. Foundational books and institutional publications were also considered when they clarified essential theoretical concepts or cultural frameworks. Sources were excluded when they focused exclusively on technical ecological design without an educational connection or when their bibliographic details and substantive relevance could not be established.

The purposive selection process involved examining publication titles and available abstracts, assessing the substantive relevance of potentially relevant publications, and categorizing the selected literature according to its primary conceptual contribution. Particular attention was given to the relationship between ecological engagement, pedagogical processes, and character-related values. The review did not apply a formal quality-scoring instrument; therefore, claims were interpreted in consideration of each source's research approach, conceptual contribution, and stated limitations. Because the selection process was conceptual and purposive, the synthesis should be understood as a theory-building effort rather than a quantitative estimate of the overall evidence base.

2.4. Analysis and Conceptual Synthesis

The conceptual synthesis proceeded through four interconnected stages informed by guidance on integrative reviews and conceptual framework development [23]–[25].

Stage 1: Concept Identification and Categorization. Relevant concepts, theoretical arguments, and educational findings were identified and organized into five analytical domains: permaculture and ecological practices; environmental and experiential learning; pedagogical mediation; Pancasila-based character education; and Sundanese local wisdom and Gapura Pancawaluya. This stage aimed to identify the central constructs and

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distinguish the ecological, pedagogical, normative, and cultural dimensions represented in the literature.

Stage 2: Comparative Analysis of Conceptual Contributions. The identified concepts and arguments were compared to examine similarities, differences, complementary perspectives, and conceptual limitations across the five domains. Particular attention was given to how previous studies explained ecological engagement, the relationship between ecological knowledge and environmental behavior, the role of experiential learning, and the contribution of national and local values to character education. This comparison helped establish which concepts could be integrated and which required contextual interpretation.

Stage 3: Mapping Conceptual Relationships. The relationships among ecological practices, ecological knowledge, experiential learning, pedagogical mediation, Pancasila principles, and Pancawaluya character orientations were mapped conceptually. Ecological practices were positioned as learning contexts, while experiential learning was considered the process through which students encounter and interpret ecological situations. Pedagogical mediation was conceptualized as the process connecting ecological experiences with value understanding, social participation, and reflection. Pancasila was positioned as the national ethical foundation, while Pancawaluya provided culturally grounded character orientations. This stage also considered how these dimensions could support responsible environmental attitudes and actions without assuming a direct or automatic causal relationship.

Stage 4: Framework Reconstruction and Theoretical Interpretation. The relationships identified through the preceding stages were synthesized into an integrated conceptual framework. This reconstruction involved organizing the identified concepts into a coherent educational pathway connecting ecological experiences with guided learning, value interpretation, social participation, and character-related orientations. The proposed framework was examined in terms of conceptual coherence, consistency with the reviewed literature, and relevance to elementary education in West Java. Its potential applicability to other cultural settings was also considered by distinguishing the national normative foundation from locally contextualized character orientations.

The four stages were interconnected and iterative rather than strictly linear. Insights obtained during comparative analysis and conceptual mapping informed the categorization and interpretation of the literature, while the resulting framework was considered in relation to the conceptual contributions of the selected publications. The resulting propositions are interpretive and theoretical rather than empirically tested causal effects.

2.5. Scope and Status of the Framework

The article develops a conceptual framework to inform educational planning and future research. It does not evaluate the effectiveness of a particular school program and does not use survey, interview, or observational data. The literature search was targeted rather than exhaustive, and source selection was purposive. Accordingly, the proposed framework should be treated as a theoretically informed conceptual proposal whose scope may be refined through broader literature searching and empirical investigation.

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The framework is primarily situated within the elementary education context of West Java, particularly in relation to the integration of Pancasila values and Sundanese cultural orientations through ecological learning. Its adaptation to other cultural settings requires consideration of the relevant local values, social practices, and educational characteristics. Further empirical research is needed to examine the framework's applicability, pedagogical implementation, and potential contribution to character education in different educational contexts.

3. RESULTS AND DISCUSSION

3.1. Main Findings of the Conceptual Literature Synthesis

The conceptual synthesis identifies five interconnected findings concerning the integration of permaculture, ecological learning, pedagogical mediation, Pancasila, and Gapura Pancawaluya. First, permaculture provides an integrated ecological context in which students can experience environmental interdependence through practical activities and shared resource management. Second, ecological knowledge and participation in environmental activities do not automatically translate into responsible behavior or character development. Third, experiential learning and pedagogical mediation provide conceptual processes through which environmental experiences can be interpreted, discussed, and connected with ethical and social values. Fourth, Pancasila and Pancawaluya offer complementary normative and culturally grounded orientations for interpreting the character significance of ecological experiences. Fifth, the continuity of ecological character education depends on enabling conditions, including teacher competence, school culture, leadership, curricular alignment, and community participation.

These findings indicate that the educational significance of permaculture does not lie exclusively in its ecological activities but in the relationships established among environmental experience, pedagogical processes, value interpretation, and institutional support. The synthesis therefore produces an integrated conceptual pathway rather than an empirically tested intervention model.

3.2. Permaculture as a Context for Experiential Ecological Learning

Permaculture can be understood in education as both a set of ecological practices and a context for learning about relationships. Activities such as planting, composting, maintaining soil, collecting rainwater, managing waste, or planning the use of school space require learners to observe conditions, consider constraints, and understand how decisions affect other elements of a system. These activities can connect abstract concepts such as cycles, resource use, interdependence, and sustainability with tangible situations.

The educational value of permaculture lies not simply in the presence of a garden or ecological facility. It emerges when learners participate in meaningful tasks, explain their decisions, and observe the consequences of care or neglect over time. Lebo and Eames' study of a permaculture approach to science and sustainability education suggests that practical field experiences can make learning more relevant and engaging [5]. Research mapping permaculture practices in schools similarly situates permaculture within a wider discussion of school-based educational practices [7], while newer work has

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explored the integration of permaculture with students' interest in nature and environmental awareness [8]. These studies support the plausibility of permaculture as a learning context, but do not establish that participation alone produces particular character traits.

The distinctive educational potential of permaculture can be further understood through its systems-oriented perspective. Rather than presenting environmental issues as isolated topics, permaculture encourages learners to examine the relationships among living organisms, natural resources, human activities, and the consequences of resource management. This perspective provides opportunities to understand ecological interdependence while considering the social responsibilities associated with maintaining shared environments. Consequently, permaculture offers a broader pedagogical context than an environmental activity conducted solely to complete a particular task.

From this perspective, permaculture-based learning can be associated with several potential learning experiences. Observation encourages learners to attend to environmental conditions rather than act only from assumption. Shared maintenance tasks create opportunities to negotiate roles and fulfil commitments. Resource management invites consideration of scarcity, waste, and consequences. Practical problem-solving can encourage learners to test ideas and revise decisions. These experiences may become relevant to character education when educators make their ethical and social dimensions explicit.

The relationship between these activities and character-related outcomes can be explained through several potential learning mechanisms. Responsibility may be encouraged when students receive continuing tasks and recognize the consequences of fulfilling or neglecting agreed responsibilities. Empathy may develop through opportunities to consider the needs of other people, living organisms, and groups sharing environmental resources. Collaboration may be practiced through task distribution, collective decision-making, and mutual assistance. Critical thinking may be exercised when learners investigate ecological conditions, compare possible solutions, and evaluate the consequences of their decisions. Initiative may emerge when students identify environmental problems and contribute practical solutions. These mechanisms represent educational possibilities that depend on the quality and continuity of learning experiences rather than guaranteed outcomes of ecological participation.

However, an ecological activity may remain procedural if learners are not given opportunities to interpret its purpose. A task such as separating waste, for example, may be completed to satisfy a rule without developing an understanding of shared responsibility. Permaculture should therefore be viewed as a possible educational context, not as a self-sufficient character intervention.

This distinction is important because environmental participation and character formation operate at different conceptual levels. Completing an ecological task represents an observable action, whereas developing responsibility, empathy, and initiative concerns the values and dispositions that may guide actions across different situations. The transition between these levels requires opportunities for repeated practice, meaningful feedback, social interaction, and reflection.

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3.3. Ecological Learning, Experiential Learning, and the Mediation of Character Development

Character learning involves more than the completion of observable tasks. It also concerns how learners interpret situations, understand obligations, respond to others, and make decisions when external supervision is limited. For this reason, the relationship between ecological practice and character education is better conceptualized as mediated by pedagogical processes. Teacher modelling, habituation, dialogue, feedback, collaborative decision-making, and reflection can help learners connect an activity with the values that the activity is intended to cultivate. This interpretation is consistent with research reviews emphasizing that environmental education outcomes depend on program design and the opportunities learners have to engage in meaningful action [1], [2], [11], [12].

Experiential learning provides a useful conceptual bridge because experience becomes educationally significant when learners examine and make meaning from it [26], [27]. In relation to Kolb's Experiential Learning Theory, ecological learning can be interpreted through four interconnected processes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Concrete experience occurs when students participate directly in activities such as gardening, composting, or water management. Reflective observation takes place when they examine the outcomes of their actions, identify problems, and consider the responsibilities involved. Abstract conceptualization allows learners to connect these experiences with broader ideas such as ecological interdependence, fairness, resource conservation, and collective responsibility. Active experimentation occurs when students apply their emerging understanding to improve practices, revise decisions, or address new environmental challenges.

The contribution of this theoretical perspective is that it explains why environmental participation needs to be accompanied by reflection and subsequent action. Students do not necessarily develop a deeper understanding simply because they have completed an ecological activity. The educational process becomes more meaningful when they examine what happened, interpret why it happened, and use the resulting understanding in subsequent situations. In this respect, permaculture provides concrete learning experiences, while experiential learning explains how those experiences may become sources of conceptual understanding and further action.

Dewey's educational philosophy provides a complementary theoretical explanation. Dewey emphasizes the educational significance of experience, reflective thinking, and social participation. Experience is not automatically educational; its value depends on how it contributes to further understanding and the quality of subsequent experiences. This perspective is particularly relevant to ecological learning because environmental activities involve practical problems that require observation, inquiry, communication, and collective responses. A school garden, for example, can become an educational environment when students investigate why plants do not grow properly, discuss possible solutions, distribute responsibilities, and evaluate the consequences of their decisions.

The Deweyan perspective also strengthens the social dimension of the proposed framework. Ecological problems within schools are rarely experienced as purely individual

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matters. Waste management, water conservation, shared gardens, and the maintenance of common spaces require interaction and consideration of collective interests. Through discussion and participation, students have opportunities to understand that responsible action involves both personal conduct and contributions to a community. Accordingly, Dewey's emphasis on reflective and socially meaningful experience complements Kolb's explanation of experiential learning processes.

In an ecological project, a teacher may invite students to discuss why a shared garden deteriorated, how responsibilities were distributed, or how a decision affected other groups. Such dialogue moves the learning process beyond the technical outcome of the project and toward questions of accountability, fairness, care, and problem-solving. Environmental education research also highlights the relevance of action competence, local problem-solving, and learner participation [28], [11]. The relevant learning mechanism is not assumed to be automatic; it depends on how experiences are structured and interpreted. A broader theory of environmentally significant behavior further distinguishes environmental concern from the contextual and personal factors shaping actual behavior [29].

The relationship between ecological learning and ecopedagogy further broadens this interpretation. Experiential learning emphasizes how individuals construct understanding through experience and reflection, whereas ecopedagogy highlights the critical examination of relationships between human society, environmental conditions, and sustainability. The two perspectives are complementary: experiential learning provides a process for engaging with ecological situations, while ecopedagogy encourages learners to question the social, ethical, and environmental implications of those situations. Their integration allows students not only to learn how ecological processes operate but also to consider why environmental responsibility matters to individuals and communities.

School culture is another important condition. When ecological practices are embedded in daily routines, resource management, curriculum, and collective expectations, learners encounter a more coherent relationship between what is taught and what is practiced. Research on nature-based schools in Indonesia has discussed ecological responsibility from a socio-institutional perspective [30]. Studies of local-wisdom-based character education likewise point to the importance of educators, school culture, and community context in translating values into practice [21], [22]. These findings should be interpreted according to the evidence collected in each study rather than treated as universal proof of behavioral change.

Accordingly, ecological character education can be represented as an interaction among ecological opportunities, learner participation, experiential learning, pedagogical mediation, and institutional support. The school environment provides opportunities; learners engage with those opportunities; teachers and peers facilitate interpretation and reflection; and school culture can reinforce or weaken the values communicated. This framework differs from an activity-based approach because it places the educational process between environmental participation and character-related interpretation. It also differs from an exclusively knowledge-oriented approach because it recognizes the importance of practice, social interaction, and reflection.

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3.4. Gapura Pancawaluya as a Culturally Grounded Interpretive Framework

Gapura Pancawaluya provides a locally grounded language for discussing character in West Java, while Pancasila provides the national ethical foundation for interpreting responsibilities toward God, humanity, the nation, democratic participation, and social justice. In this article, the two frameworks are positioned as complementary but distinct: Pancasila articulates the broad normative principles, and Pancawaluya offers five culturally grounded character orientations that can help translate those principles into learning and everyday conduct. The five Pancawaluya values Cageur, Bageur, Bener, Pinter, and Singer can be used to interpret ecological experiences without reducing character education to a checklist of isolated behaviors.

The five orientations provide complementary dimensions for interpreting how students may respond to ecological learning experiences. Cageur emphasizes physical and mental well-being, including the importance of maintaining a safe and healthy learning environment. In ecological activities, this orientation may be expressed through awareness of hygiene, environmental health, personal safety, and balanced participation. Bageur emphasizes kindness, care, empathy, and consideration for others. It may be expressed when students protect shared resources, assist peers, care for living organisms, and consider the effects of environmental actions on the wider community. Bener concerns integrity, truthfulness, discipline, and responsible conduct. Its expression may involve fulfilling agreed responsibilities, reporting observations honestly, following environmental procedures, and recognizing the consequences of neglect. Pinter emphasizes knowledge, understanding, critical reasoning, and the ability to make informed decisions. It may be demonstrated through ecological observation, investigation, communication, and the evaluation of environmental problems. Singer represents initiative, practical competence, adaptability, and resourcefulness. Its expression may involve proposing improvements, developing practical solutions, adapting activities to environmental conditions, and contributing actively to collective projects.

These orientations should be understood as interconnected rather than independent categories. For example, maintaining a composting facility may involve Cageur through attention to hygiene and safety, Bageur through care for the shared environment, Bener through consistent responsibility, Pinter through understanding decomposition, and Singer through initiative in improving the composting process. One ecological activity can therefore provide opportunities to practice several character orientations simultaneously.

Recent literature has addressed Pancawaluya as a basis for character education and the integration of Sundanese cultural values [17], [18], [19], [20]. This means that the contribution of the present article should not be framed as introducing Pancawaluya to an otherwise empty field. Instead, the proposed contribution is to connect Pancawaluya more explicitly with permaculture-based ecological practice and the pedagogical processes through which environmental experiences may be interpreted as character learning.

The interpretation of Pancawaluya, however, should remain sensitive to educational level and sociocultural context. Elementary students may demonstrate these orientations through concrete behaviors such as sharing responsibilities, caring for plants, maintaining cleanliness, and helping classmates. At higher educational levels, the same values may be

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explored through more complex ethical reasoning, environmental decision-making, critical evaluation, and community participation. Similarly, the meaning and expression of Pancawaluya may vary according to local traditions, family practices, institutional expectations, and community interpretations. Therefore, the framework treats Pancawaluya as a culturally grounded interpretive orientation rather than a rigid behavioral classification applicable identically to every learner and setting.

3.5. Connecting Ecological Learning with the Five Principles of Pancasila

Pancasila adds a national ethical dimension to ecological character education. The five principles can be connected to ecological learning without assigning each principle to only one activity. Ecological questions often involve several principles at once: caring for living systems can raise moral and spiritual questions; environmental burdens may affect human dignity and health; shared environmental action can strengthen unity; decisions about school resources can be discussed deliberatively; and access to clean environments and resources raises questions of fairness. The mapping below is a conceptual interpretation for educational design, not a claim that the principles have a fixed or exclusive relationship with particular activities.

The theoretical justification for this integration lies in the relationship between ecological responsibility and the broader ethical concerns represented by Pancasila. Environmental decisions involve moral consideration, human well-being, collective identity, participation in decision-making, and the distribution of resources and environmental burdens. Consequently, ecological learning provides practical situations in which the five principles can be discussed and interpreted in relation to everyday conduct. The proposed connections are based on the ethical and social dimensions of environmental activities rather than on a one-to-one correspondence between a Pancasila principle and a particular ecological task.

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Table 1. Conceptual Mapping of Pancasila Principles, Ecological Learning Applications, and Pancawaluya Values

No.	Pancasila Principles	Ecological Learning Applications	Related Pancawaluya Values	Conceptual Justification
1	Belief in the One Almighty God	Developing moral and spiritual responsibility toward nature and all forms of life through caring for plants, maintaining ecological balance, and protecting the environment.	Cageur, Bener	Ecological responsibility can be understood as an expression of moral awareness, respect for life, and responsible conduct.
2	Just and Civilized Humanity	Promoting health, dignity, safety, and concern for the unequal environmental impacts experienced by individuals and communities.	Bageur, Cageur	Caring for the environment also involves protecting human well-being, demonstrating empathy, and ensuring that environmental conditions support a healthy life.
3	The Unity of Indonesia	Encouraging collaboration among students, teachers, and school communities in maintaining gardens, managing waste, and conserving shared resources.	Bageur, Singer	Collective ecological activities foster solidarity, mutual assistance, and initiative in achieving shared environmental goals.
4	Democracy Guided by the Inner Wisdom of Deliberation and Representation	Facilitating inclusive discussions and collective decision-making concerning garden management, water use, waste management, and the distribution of responsibilities.	Bener, Pinter, Singer	Deliberation develops responsible judgment, critical thinking, communication, and the ability to propose practical solutions.
5	Social Justice for All Indonesian People	Promoting fair access to clean water, green spaces, healthy food, and a safe and sustainable school environment.	Bageur, Bener, Pinter, Singer	Environmental justice requires empathy, integrity, informed decision-making, and initiative to address unequal access to environmental resources.

Source: Authors' conceptual synthesis based on the reviewed literature on environmental education, character education, Pancasila, and Pancawaluya [1], [2], [11], [17]–[22].

This mapping shows that Pancasila and Pancawaluya can be integrated without collapsing their meanings. For example, a student-led composting project can be discussed in relation to social justice when the class examines waste and shared environmental burdens; deliberation when students decide responsibilities; humanity when they consider health and sanitation; unity when they cooperate; and ethical responsibility when they reflect on care for life. The relevant Pancawaluya orientations may include Bageur, Bener, Pinter, and Singer, while Cageur can be relevant to health, safety, and personal well-being. The values emphasized should follow the learning objectives and context rather than a rigid one-to-one mapping.

The mapping also demonstrates that the proposed integration is interpretive and pedagogical rather than merely symbolic. Pancasila provides the ethical questions through which ecological situations can be examined, while Pancawaluya offers culturally meaningful character orientations for interpreting appropriate responses. For example, discussing fair access to school resources can introduce the principle of social justice,

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while Bener encourages students to consider accountability and fairness and Bageur emphasizes empathy toward others. This combination enables national values to be connected with concrete local learning experiences without reducing either framework to the other.

3.6. Integrating Permaculture, Ecological Learning, and Pancawaluya

The integration proposed in this article consists of three complementary dimensions. First, permaculture provides an ecological context for action and observation. Second, ecological learning organizes participation into experiences that may involve inquiry, collaboration, stewardship, and problem-solving. Third, Gapura Pancawaluya provides a culturally grounded orientation for interpreting the character significance of those experiences. Pedagogical mediation connects the dimensions by helping learners discuss, practice, and reflect on values.

The proposed integration extends existing experiential learning, ecopedagogy, and character education perspectives by positioning them within a single culturally contextualized educational pathway. Experiential learning explains the processes through which learners engage with and reflect on ecological experiences. Ecopedagogy contributes a critical and social perspective on environmental responsibility. Pancasila establishes the national ethical foundation, while Pancawaluya provides a locally grounded interpretation of character orientations. Permaculture supplies the practical ecological context in which these perspectives can be brought together. The distinctive contribution is therefore not the invention of a new isolated learning theory, but the conceptual integration of ecological practice, experiential processes, pedagogical mediation, and national and local value frameworks.

The relationship can be represented as follows: Pancasila as a national ethical foundation → permaculture-based ecological practices → experiential ecological learning → pedagogical mediation and reflection → character-value orientations interpreted through Gapura Pancawaluya.

The arrows represent proposed conceptual relationships, not established causal links. School culture, leadership, teacher competence, curricular alignment, and community participation may influence how the pathway is enacted.

Consider a school composting activity. At the practice level, students collect organic waste and maintain a composting process. At the learning-experience level, they observe decomposition, record changes, coordinate tasks, and address practical difficulties. Through pedagogical mediation, the teacher facilitates discussion about waste, responsibility, the distribution of work, and the consequences of neglect. These experiences may then be interpreted through Bageur as care for the environment, Bener as responsibility and discipline, Pinter as inquiry and problem-solving, and Singer as initiative. Cageur may be relevant to safe practice and awareness of personal well-being. The educational value is therefore located in the relationship among activity, reflection, and value interpretation—not in composting as an isolated task.

This example illustrates the proposed theoretical mechanisms in a more integrated manner. Direct engagement provides concrete experience; collaborative tasks create

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opportunities to practice social responsibility; reflection helps learners recognize the consequences of their actions; dialogue allows them to consider different perspectives; and subsequent experimentation enables them to apply their understanding to improved practices. These processes may support responsibility, empathy, collaboration, critical thinking, and initiative when they are intentionally facilitated and reinforced within the school environment.

This example also shows why assessment should not rely exclusively on whether an ecological project succeeds technically. Evaluation may consider participation, reliability in fulfilling agreed roles, quality of reasoning, collaboration, initiative, and the learner's capacity to reflect on consequences. Such indicators would need to be developed carefully and validated in context; the present conceptual review does not claim that they have been tested as a measurement instrument.

3.7. Proposed Conceptual Framework

The conceptual framework has four connected components. The first is ecological practice, represented by permaculture-based activities that bring learners into contact with environmental processes and shared resources. The second is ecological learning experience, in which students observe, participate, collaborate, investigate, and solve problems. The third is pedagogical mediation, including modelling, habituation, dialogue, feedback, and reflection. The fourth is character-value orientation, interpreted through Cageur, Bageur, Bener, Pinter, and Singer.

The four components represent different but interdependent functions. Ecological practice provides the experiential context, ecological learning organizes students' engagement with environmental situations, pedagogical mediation supports the interpretation and internalization of relevant values, and Pancawaluya provides the cultural orientation for understanding character-related learning. Pancasila functions as the overarching ethical foundation that guides the normative interpretation of these components.

The framework also identifies enabling conditions: school leadership, teacher competence, curricular alignment, continuity of ecological practices, school culture, and community participation. These conditions do not guarantee outcomes; they may support or constrain the opportunities available for learning. The framework is therefore best understood as a guide for designing and investigating character education, rather than as a predictive model with confirmed causal effects.

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Table 2. Conceptual Components of the Integrated Permaculture-Based Ecological Character Education Framework

No.	Framework Components	Main Elements	Pedagogical Function	Expected Character Orientations
1	Permaculture-Based Ecological Practices	School gardening, composting, soil care, water conservation, waste management, and the utilization of school spaces.	Provides authentic ecological contexts in which students can observe environmental problems and participate in practical activities.	Responsibility, care, discipline, and initiative.
2	Experiential Ecological Learning	Concrete experience, reflective observation, abstract conceptualization, and active experimentation.	Connects direct environmental experiences with reflection, conceptual understanding, and the application of knowledge in subsequent activities.	Environmental awareness, critical thinking, problem-solving, and responsibility.
3	Pedagogical Mediation	Teacher modelling, habituation, dialogue, feedback, collaborative decision-making, and guided reflection.	Helps students interpret experiences, understand social and environmental responsibilities, and translate participation into meaningful learning.	Empathy, cooperation, self-discipline, critical reasoning, and social responsibility.
4	Character-Value Orientation through Gapura Pancawaluya	Cageur, Bageur, Bener, Pinter, and Singer.	Provides a culturally grounded framework for interpreting and strengthening character orientations developed through ecological learning experiences.	Healthy and responsible conduct (Cageur); kindness and empathy (Bageur); integrity and discipline (Bener); knowledge and critical thinking (Pinter); initiative and practical competence (Singer).
5	National Ethical Foundation through Pancasila	Spiritual responsibility, humanity, unity, deliberation, and social justice.	Establishes the national ethical principles that guide the purpose, organization, and social orientation of ecological learning.	Moral responsibility, respect for others, solidarity, democratic participation, and environmental justice.
6	Enabling Conditions	School leadership, teacher competence, curriculum alignment, institutional support, continuity of activities, school culture, and community participation.	Supports the implementation, consistency, and sustainability of ecological learning practices within the school environment.	Collective responsibility, consistency, collaboration, and sustained environmental commitment.

Source: Authors' conceptual synthesis based on the reviewed literature [1], [2], [11], [13]–[22], [26]–[30].

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The framework also clarifies the conceptual status of pedagogical mediation. It is proposed as a mechanism that may explain how ecological experiences become connected with character-related understanding and conduct. However, the present review does not establish a statistically or empirically verified mediating effect. Demonstrating such an effect would require separate empirical research involving operationalized constructs, appropriate measurement instruments, and an appropriate research design.

3.8. Conceptual Propositions and Theoretical Contributions

The synthesis produces four conceptual propositions.

Proposition 1. Permaculture-based ecological practices can provide meaningful contexts for character education when learners participate in activities involving observation, shared responsibility, collaboration, and problem-solving.

Proposition 2. The relationship between ecological learning and character-value development can be conceptually explained through pedagogical processes, including teacher modelling, habituation, dialogue, feedback, and reflection, rather than ecological activities alone.

Proposition 3. Gapura Pancawaluya provides a culturally grounded interpretive framework for connecting ecological learning experiences with the five interconnected character orientations of Cageur, Bageur, Bener, Pinter, and Singer.

Proposition 4. The continuity of ecological character education may depend on alignment among classroom learning, school culture, leadership, teacher competence, curricular practices, and community participation.

These propositions are conceptual outcomes of the synthesis and have not been empirically tested. They are intended to guide subsequent studies, including research that examines how the values are expressed in practice, how teachers mediate ecological experiences, and how institutional conditions shape implementation.

The theoretical contribution of the proposed framework can be distinguished from existing approaches in three ways. First, experiential learning and ecopedagogy explain important aspects of ecological engagement and environmental understanding, but the proposed framework extends their application by explicitly connecting ecological experiences with Pancasila and Pancawaluya. Second, Pancasila-based character education provides a national ethical orientation, while local-wisdom-based education emphasizes cultural relevance. The proposed framework brings these perspectives together by positioning Pancawaluya as a culturally grounded interpretive framework within a broader national value foundation. Third, rather than treating ecological practices as stand-alone character-building activities, the framework explains the role of pedagogical mediation in connecting experience, reflection, social participation, and value interpretation.

Consequently, the novelty lies in the relational structure of the framework: permaculture provides the ecological context, experiential learning and Deweyan reflection explain the educational significance of experience, pedagogical mediation connects experience with value interpretation, Pancasila provides the national ethical foundation, and Pancawaluya contextualizes character orientations within Sundanese local wisdom.

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This integration offers a conceptual contribution to discussions of ecological character education, particularly in elementary education in West Java.

3.9. Theoretical and Practical Implications

Theoretically, the framework connects ecological practice, pedagogical processes, and local cultural values in a single conceptual pathway. It adds a culturally grounded interpretive dimension to discussions of permaculture education and ecological character learning. The framework also emphasizes mediation: ecological activity is treated as an educational opportunity whose significance depends on participation, interpretation, and reflection. This positioning is consistent with the broader literature suggesting that environmental education may support knowledge, attitudes, intentions, and behavior, while also cautioning that outcome variation and measurement challenges remain substantial [1], [2], [3], [11].

The framework further contributes by distinguishing the functions of ecological experience, pedagogical processes, and cultural value orientations. This distinction helps explain why environmental knowledge, behavioral participation, and character development should not be treated as equivalent outcomes. It also provides a basis for examining how the same ecological activity may generate different learning opportunities depending on students' developmental characteristics, teacher facilitation, institutional expectations, and cultural context.

Practically, schools may design ecological activities with explicit learning intentions rather than treating environmental projects as stand-alone events. A planning process can identify the ecological issue, the learner activities, the relevant Pancawaluya values, the teacher’s facilitation strategy, and the evidence that would indicate meaningful participation. Reflection prompts can ask learners what they observed, whose responsibilities were involved, what consequences followed from decisions, and how the experience relates to the five values.

For elementary education in West Java, this approach provides an opportunity to connect environmental learning with culturally meaningful character education. Teachers may use familiar ecological activities and local community practices as starting points for discussing care, cooperation, responsibility, knowledge, and initiative. However, the interpretation of Pancawaluya should be adjusted to students' developmental levels and the specific sociocultural conditions of each school. In other cultural settings, the general framework may be adapted through locally recognized character values without assuming that Pancawaluya has identical meanings across different communities.

Schools should also avoid reducing Pancawaluya to a labeling exercise. The values are interconnected orientations that may be expressed in more than one way. Assessment should therefore draw on multiple forms of evidence and should distinguish between participation in a single activity and more sustained patterns of conduct. The proposed framework can guide the design of such assessment, but the indicators and instruments require separate development and validation.

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3.10. Limitations and Future Research

This article is a targeted conceptual synthesis and does not report original fieldwork. Its proposed relationships should not be interpreted as evidence that permaculture causes improvement in any of the five Pancawaluya values. Because the search was purposive rather than exhaustive and no formal quality appraisal was conducted, relevant publications may have been missed and the strength of individual claims varies by study design.

A further limitation concerns the conceptual interpretation of Pancawaluya across educational and sociocultural contexts. Although the five orientations provide a relevant framework for elementary education in West Java, their expression may vary according to students' developmental stages, school environments, family practices, and local cultural interpretations. The proposed connections should therefore not be assumed to represent universal or identical manifestations of the five values.

Future research can examine the framework in different school settings and identify how ecological activities are designed, facilitated, and interpreted by learners and teachers. Studies may also develop context-sensitive indicators for Cageur, Bageur, Bener, Pinter, and Singer in ecological learning, while testing the feasibility and validity of those indicators. Comparative studies could investigate how leadership, school culture, and community participation shape implementation.

Further studies should also investigate the proposed pedagogical mediation mechanism empirically. For example, classroom-based research could examine whether modelling, collaborative dialogue, reflection, and feedback are associated with changes in students' environmental responsibility, empathy, cooperation, critical thinking, and initiative. Longitudinal research could explore whether the values practiced during ecological activities are maintained and transferred to other social situations. Comparative research across educational levels and cultural settings could further examine how Pancawaluya or equivalent local value frameworks are interpreted and operationalized in different learning environments.

Overall, the conceptual synthesis indicates that the integration of permaculture, experiential ecological learning, pedagogical mediation, Pancasila, and Gapura Pancawaluya provides a theoretically coherent pathway for designing culturally grounded ecological character education. Its central contribution is the explanation of how ecological activities may become meaningful character-learning experiences through intentional pedagogical processes and the interpretation of national and local values. The framework remains a conceptual proposal requiring further empirical examination.

4. CONCLUSION

This study proposes a conceptual integration of permaculture, ecological learning, Pancasila, and Gapura Pancawaluya for ecological character education in elementary schools. Permaculture provides authentic environmental activities, while ecological learning transforms these activities into meaningful experiences. Pedagogical mediation, through modelling, dialogue, collaboration, and reflection, serves as the conceptual link between ecological experiences and character-value orientations. Pancasila functions as the

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national ethical foundation, whereas Gapura Pancawaluya provides a culturally grounded framework through its five values: Cageur, Bageur, Bener, Pinter, and Singer.

The main theoretical contribution is the positioning of pedagogical mediation as a process connecting environmental participation with ethical reflection and culturally meaningful character development. Practically, this framework can inform curriculum design, contextual environmental education, and culturally responsive character education through activities such as gardening, composting, water conservation, and waste management. However, the proposed framework does not constitute empirical evidence that permaculture-based learning improves the five Pancawaluya values.

This study is limited by its purposive literature selection and the absence of original empirical data. Future research should empirically examine the framework's implementation, the role of pedagogical mediation, and the development of Pancawaluya values across different educational and sociocultural contexts.

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