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Implementing the Panca Cinta Love-Based Curriculum to Foster Students' Ecological Awareness in Elementary Science Education

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ABSTRACT

This study aims to describe the implementation of the Panca Cinta Love-Based Curriculum and examine students' ecological awareness in science learning. A descriptive qualitative approach was employed, with data collected through observation, interviews, and documentation, and analyzed through data selection, reduction, and summarization. The findings reveal that the Panca Cinta Love-Based Curriculum was implemented effectively and contributed to the development of students' ecological awareness, as reflected in their understanding of environmental issues, caring attitudes toward the environment, environmentally friendly behavior, critical thinking about ecological problems, and social responsibility for environmental conservation. These findings suggest that integrating love-based values into science learning can enhance students' ecological awareness while fostering environmental responsibility and character development, making the Panca Cinta framework a promising approach to supporting sustainable education in elementary schools.

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INTRODUCTION

Global environmental crises, including climate change, pollution, biodiversity loss, excessive exploitation of natural resources, and ecosystem degradation, have become increasingly urgent challenges affecting human well-being and sustainable development (Aula et al., 2025; Erawati et al., 2026). These environmental problems are not solely caused by technological limitations but are also closely associated with human behavior, values, and lifestyles that often neglect ecological responsibility (Al-Barakat et al., 2025). Consequently, education has become one of the most strategic sectors for cultivating environmentally responsible citizens from an early age. Elementary education, in particular, plays a significant role because children begin to develop

fundamental values, attitudes, and habits during this developmental stage. Environmental education should therefore extend beyond the transmission of scientific knowledge and encourage students to internalize environmental ethics as part of their daily lives. Previous studies have emphasized that ecological awareness developed during childhood contributes significantly to lifelong pro-environmental behavior and sustainable decision-making (Suryanullah et al., 2025). Therefore, strengthening ecological awareness through elementary education is essential to preparing future generations capable of responding to global environmental challenges responsibly (Sarbaini et al., 2022).

Education is expected not only to improve students' cognitive competence but also to develop their moral character and social responsibility toward environmental sustainability. In the context of Islamic elementary education, environmental stewardship aligns closely with Islamic teachings that emphasize humans' responsibility as stewards (khalifah) entrusted to preserve the balance of nature. However, educational practices often prioritize academic achievement while giving insufficient attention to cultivating ecological values and environmental ethics. Character education related to environmental care is particularly important during elementary school because children are at a stage where habits, attitudes, and values can be effectively formed through repeated experiences and meaningful learning activities. Research has shown that environmental education integrating affective, cognitive, and behavioral dimensions produces more sustainable learning outcomes than approaches focusing exclusively on conceptual understanding (Suryanullah et al., 2025). Consequently, integrating ecological values into classroom learning has become an educational necessity rather than merely an additional component of the curriculum (Sengul & Doi, 2025).

Despite growing awareness of environmental education, numerous challenges continue to hinder the development of students' ecological awareness in elementary schools (Muslichuddin et al., 2025). Environmental responsibility among students frequently depends on external supervision rather than intrinsic motivation. School cleanliness, for instance, is often maintained only when teachers provide direct instructions or when students perform scheduled cleaning duties. Outside these structured activities, littering remains common in classrooms and school environments, indicating that environmentally responsible behavior has not yet become an internalized habit. Similarly, water consumption during ablution (wudu) often reflects limited awareness of resource conservation despite Islamic teachings encouraging moderation. Environmental programs such as tree planting, waste collection, or school clean-up campaigns are commonly implemented as ceremonial activities instead of being integrated into continuous learning experiences (Ariza et al., 2021). These conditions

suggest that environmental education has not yet succeeded in fostering students' ecological awareness as a personal value, but instead relies predominantly on external regulation and institutional control (Vesterinen & Ratinen, 2023).

Within the implementation of Indonesia's Independent Curriculum, the Natural and Social Sciences (IPAS) subject provides considerable opportunities to develop students' ecological awareness because it addresses interactions between humans and the environment, sustainability, and social responsibility. Nevertheless, classroom implementation still tends to emphasize conceptual understanding and problem-solving skills rather than value internalization and behavioral transformation. Teaching modules generally present ecological concepts scientifically but rarely integrate them with religious values and students' everyday experiences in a systematic manner (Jeni & Syafril, 2025). As a result, students may understand environmental issues theoretically without consistently demonstrating environmentally responsible behavior in daily life. This situation indicates the need for a more holistic educational approach capable of integrating cognitive, affective, spiritual, and behavioral dimensions of learning. Such an approach is expected to bridge the gap between environmental knowledge and environmental practice while enabling students to develop ecological awareness as an integral part of their character rather than merely as academic knowledge.

Previous studies have highlighted various strategies for strengthening ecological awareness through environmental education. Research has demonstrated that project-based learning, outdoor learning, experiential learning, and environmental literacy programs can significantly improve students' environmental knowledge, attitudes, and participation in conservation activities. Other studies have emphasized the ecological paradigm, which positions humans as inseparable components of the ecosystem and promotes harmonious relationships between humans and nature through ethical responsibility (Simanjuntak & Anjani, 2025). Furthermore, scholars have argued that a love-based curriculum encourages empathy, compassion, and responsibility as the foundation of meaningful learning experiences. Within the context of Islamic education, environmental stewardship is regarded as an implementation of humanity's responsibility as khalifah, making environmental conservation both a social and religious obligation. Collectively, these studies indicate that integrating ecological and moral values into education contributes positively to students' environmental character development (Rahmawati et al., 2022).

Although previous research has provided valuable insights, several important gaps remain. Most studies have examined ecological awareness from the perspectives of environmental literacy, project-based learning, or environmental campaigns without comprehensively integrating ecological values, Islamic teachings, and character education into a unified learning framework (Alas & Korutürk, 2024). Likewise, investigations of love-based

education have generally focused on strengthening students' moral character, empathy, and social relationships, while paying limited attention to its potential contribution to ecological awareness. Existing studies also tend to evaluate students' environmental knowledge or attitudes separately rather than examining ecological awareness as a holistic construct encompassing environmental understanding, caring attitudes, environmentally responsible behavior, critical thinking, and social responsibility. Consequently, there is still limited empirical evidence explaining how a Love-Based Curriculum can systematically cultivate comprehensive ecological awareness through science learning (Aulina et al., 2025). Addressing this research gap is essential for developing educational models that integrate cognitive, affective, spiritual, and behavioral dimensions in environmental education.

The novelty of this study lies in the integration of the Panca Cinta Love-Based Curriculum into science learning as a holistic framework for fostering ecological awareness among elementary school students. Rather than focusing solely on environmental knowledge or isolated character-building activities, this study combines ecological values with the five dimensions of Panca Cinta, enabling students to connect environmental responsibility with compassion, moral commitment, and everyday practice. This approach positions ecological awareness as a multidimensional competency encompassing environmental understanding, emotional attachment to nature, environmentally responsible behavior, critical reflection on ecological issues, and social responsibility. By embedding these values within science learning activities, the study proposes a more contextual, reflective, and meaningful learning model capable of transforming environmental knowledge into sustainable habits and character development. This integrated perspective represents a practical innovation for strengthening environmental education within elementary schools.

Based on these considerations, this study addresses the question of how the implementation of the Panca Cinta Love-Based Curriculum in science learning contributes to the development of students' ecological awareness. The study argues that ecological awareness cannot be effectively cultivated through cognitive instruction alone but requires the integration of affective, spiritual, and behavioral learning experiences that encourage students to internalize environmental values. The Panca Cinta framework is expected to provide meaningful learning experiences by connecting scientific concepts with compassion, religious values, and authentic environmental practices. Consequently, students are expected not only to understand ecological concepts but also to demonstrate greater environmental care, responsible behavior, critical thinking toward ecological challenges, and active participation in environmental

preservation. Through this integrated approach, science learning is anticipated to become a powerful medium for developing students' ecological character and supporting the achievement of sustainable education goals.

RESEARCH METHODS

This study employed a qualitative descriptive case study design to explore the implementation of the Panca Cinta Love-Based Curriculum and its contribution to students' ecological awareness in science learning (Lavarda & Bellucci, 2022; Sibbald et al., 2021). A qualitative case study was selected because it enables researchers to obtain an in-depth understanding of a contemporary educational phenomenon within its natural context while capturing participants' experiences, interactions, and interpretations holistically. Rather than testing hypotheses or producing statistical generalizations, this approach emphasizes the meaning and complexity of educational practices as they occur in authentic classroom settings. The research was conducted at an Islamic elementary school that has implemented the Panca Cinta Love-Based Curriculum as part of its educational program. This site was purposively selected because it provides an appropriate context for examining how love-based educational values are integrated into science learning and how these values influence students' ecological awareness through everyday teaching and learning activities.

Data were collected using observation, semi-structured interviews, and documentation to ensure comprehensive and credible findings through methodological triangulation (Agilan, 2026). Classroom observations were conducted to examine the implementation of learning activities, teacher student interactions, and students' ecological behaviors during science lessons and school activities. Semi-structured interviews were carried out with teachers and selected students to obtain in-depth information regarding their experiences, perceptions, and understanding of the Panca Cinta Love-Based Curriculum and ecological awareness. This interview format allowed participants to express their perspectives naturally while enabling the researcher to explore issues relevant to the research objectives. Documentation was also analyzed to complement observational and interview data, including lesson plans, learning modules, students' work, school activity reports, photographs, and other written records related to curriculum implementation. Combining these three techniques enhanced the credibility, richness, and trustworthiness of the research findings.

The collected qualitative data were analyzed using an interactive analysis model consisting of data condensation, data display, and conclusion drawing or verification. Data condensation involved selecting, organizing, simplifying, and categorizing information obtained from observations, interviews, and documentation according to the research objectives. This process enabled the

researcher to identify significant patterns and eliminate irrelevant information without losing the essential meaning of the data. The condensed data were subsequently organized and presented in the form of descriptive narratives, matrices, and tables to facilitate interpretation and comparison across different data sources. Finally, conclusions were drawn through continuous verification by comparing evidence from multiple sources and ensuring consistency throughout the analysis process. This iterative analytical procedure enabled the researcher to develop credible interpretations regarding the implementation of the Panca Cinta Love-Based Curriculum and its role in fostering students' ecological awareness in science learning.

RESULTS AND DISCUSSION

Results

Implementation of the Panca Cinta Love-Based Curriculum

The findings indicate that the implementation of the Panca Cinta Love-Based Curriculum was carried out effectively in science learning. Classroom observations revealed that the curriculum was systematically integrated into both instructional activities and the broader school culture. The implementation emphasized the five dimensions of Panca Cinta, namely love for Allah and the Prophet, love for knowledge, love for the environment, love for oneself and others, and love for the homeland. These dimensions were not taught as separate subjects but were embedded within daily learning activities, classroom interactions, school routines, and character-building programs. Consequently, students experienced these values through authentic learning practices rather than merely receiving theoretical explanations.

Table 1. Implementation of the Panca Cinta Love-Based Curriculum

Dimension of Panca Cinta	Indicators of Implementation
Love for Allah and the Prophet	Students begin and end lessons with prayers, practice gratitude for God's creation, and demonstrate Islamic values during learning activities.
Love for Knowledge	Students actively participate in science learning, ask questions, conduct observations, and show curiosity toward scientific phenomena.
Love for the Environment	Students maintain classroom cleanliness, dispose of waste properly, care for plants, and participate in environmental conservation activities.
Love for Oneself and Others	Students demonstrate mutual respect, cooperation, empathy, and responsibility during individual and group learning activities.
Love for the Homeland	Students participate in school activities that foster national identity, appreciate local environmental resources, and demonstrate responsibility toward their community.

Table 1 demonstrates that the implementation of the Panca Cinta Love-Based Curriculum encompasses all five dimensions of love through observable learning behaviors and school activities. The findings show that each dimension is translated into concrete educational practices rather than remaining as conceptual values. Love for Allah and the Prophet is reflected through religious routines and gratitude toward nature; love for knowledge is demonstrated through active participation and scientific inquiry; love for the environment is manifested in environmentally responsible behaviors; love for oneself and others is evident in students' cooperation and empathy; while love for the homeland is reflected in students' appreciation of national values and responsibility toward their surrounding community. These findings indicate that the Panca Cinta framework has been implemented comprehensively, integrating spiritual, cognitive, social, and ecological dimensions within everyday science learning and school life.

Ecological Awareness of Grade 4 Students in Science Learning

The findings indicate that the implementation of the Panca Cinta Love-Based Curriculum contributed to the development of students' ecological awareness in science learning. Data obtained from classroom observations, interviews, and documentation show that students demonstrated ecological awareness through their knowledge, attitudes, and environmental behaviors. These findings suggest that ecological awareness extends beyond conceptual understanding and is reflected in students' daily actions and sense of responsibility toward environmental sustainability.

Table 2. Students' Ecological Awareness in Science Learning

No.	Dimension of Ecological Awareness	Characteristic Features
1	**Environmental Understanding**	Students understand the concepts of ecosystems, food chains, natural resources, pollution, and environmental change. Students also understand the impact of human activities on environmental balance.
2	**Environmental Care**	Students maintain classroom and school cleanliness, reduce plastic use, protect plants and animals in the surrounding environment, and conserve water and energy.
3	**Environmentally Friendly Behavior**	Students separate organic and inorganic waste, participate in reforestation activities, reuse appropriate materials, and recycle waste whenever possible.
4	**Critical Thinking about Ecological Problems**	Students are able to identify environmental problems in their surroundings and propose appropriate solutions, such as improving waste management and protecting water resources.

5	**Social Responsibility for the Environment**	Students recognize that environmental protection is a shared responsibility and encourage their peers and community members to participate in environmental conservation efforts.

Table 2 presents the ecological awareness demonstrated by students during science learning through five interrelated dimensions: environmental understanding, environmental care, environmentally friendly behavior, critical thinking about ecological problems, and social responsibility. The findings indicate that students possess a satisfactory understanding of ecological concepts, including ecosystems, food chains, natural resources, pollution, environmental change, and the impact of human activities on ecological balance. This conceptual understanding serves as the foundation for developing positive environmental attitudes and responsible actions. Classroom observations further revealed that students consistently applied their knowledge in daily school activities, suggesting that ecological awareness had progressed beyond theoretical comprehension. These findings demonstrate that science learning supported by the Panca Cinta Love-Based Curriculum enables students to connect scientific concepts with real-life environmental issues, thereby strengthening the integration of cognitive knowledge and environmental values within meaningful learning experiences.

Furthermore, students demonstrated environmental care by maintaining classroom cleanliness, reducing plastic use, conserving water and energy, and protecting plants and animals within the school environment. They also exhibited environmentally friendly behaviors through waste separation, recycling, reusing materials, and participating in reforestation activities organized by the school. In addition, students showed critical thinking by identifying environmental problems in their surroundings and proposing practical solutions, such as improving waste management and protecting water resources. Their ecological awareness was further reflected in a strong sense of social responsibility, as they recognized that environmental conservation is a shared obligation and actively encouraged their peers to participate in environmentally responsible practices. Collectively, these findings indicate that students' ecological awareness extends beyond environmental knowledge to encompass affective, behavioral, and social dimensions, demonstrating the successful integration of ecological values into science learning through the Panca Cinta Love-Based Curriculum.

Discussion

The findings indicate that the implementation of the Panca Cinta Love-Based Curriculum was reflected in the integration of the five dimensions of love, namely love for Allah and the Prophet, love for knowledge, love for the environment, love for oneself and others, and love for the homeland, into students' daily learning activities. These values were not only introduced conceptually but were also practiced through religious activities (Minsih et al., 2025), classroom routines, environmental programs, and social interactions. This finding is consistent with previous studies reporting that a love-based curriculum encourages the development of empathy, compassion, and responsibility as the foundation of meaningful learning. Likewise, from the perspective of Islamic education, environmental stewardship and social responsibility represent the implementation of humans' role as khalifah in preserving nature (Lo et al., 2021). Therefore, the implementation of the Panca Cinta Love-Based Curriculum demonstrates that integrating spiritual and moral values into learning activities can support the formation of students' character while strengthening the learning process.

The implementation of the curriculum also encouraged students to develop a love for knowledge through active participation in classroom learning, asking questions, conducting simple experiments, utilizing library resources, and sharing knowledge with their peers. These findings support previous studies indicating that science learning provides opportunities for students to understand environmental issues through meaningful learning experiences. However, unlike previous studies that mainly focused on the cognitive aspects of science learning, the present study shows that students' curiosity was simultaneously accompanied by the cultivation of responsibility, discipline, and gratitude through the values of the Panca Cinta Love-Based Curriculum (Baptista et al., 2025). This finding suggests that science learning can function not only as a medium for developing scientific understanding but also as a means of strengthening students' moral and character development. Practically, this approach provides teachers with an alternative strategy for integrating character education into science learning without reducing the achievement of learning objectives.

Furthermore, the findings reveal that students demonstrated environmental care through maintaining school cleanliness, conserving water and electricity, reducing plastic use, participating in tree-planting activities, and protecting plants within the school environment. These results are in line with previous research showing that environmental education contributes to the development of students' environmental awareness and environmentally responsible behavior (Suryanullah et al., 2025). Nevertheless, this study offers a

different perspective by showing that environmental responsibility was developed through the integration of the five dimensions of the Panca Cinta Love-Based Curriculum rather than through environmental learning alone. This finding constitutes the novelty of the present study because it integrates spiritual, social, and ecological values within science learning as a unified educational framework. Consequently, this study contributes to the development of science learning by demonstrating that ecological awareness can be fostered through a holistic approach that combines environmental knowledge, character education, and love-based values (Wibowo et al., 2024).

Students' ecological awareness was reflected in five dimensions, namely environmental understanding, environmental care, environmentally friendly behavior, critical thinking about ecological problems, and social responsibility for the environment. The findings indicate that students were able to understand ecological concepts such as ecosystems, food chains, natural resources, pollution, environmental change, and the impact of human activities on environmental balance. This understanding was accompanied by positive attitudes and environmental practices, including maintaining school cleanliness, sorting waste, conserving natural resources, participating in reforestation activities, and encouraging their peers to care for the environment. These findings are consistent with previous studies stating that environmental education should not only develop students' knowledge but also cultivate responsibility and commitment toward environmental sustainability (Suryanullah et al., 2025). Similarly, previous research has emphasized that ecological awareness should encompass cognitive, affective, and behavioral dimensions rather than focusing solely on environmental knowledge. Therefore, the findings demonstrate that science learning integrated with the Panca Cinta Love-Based Curriculum successfully supported the development of students' ecological awareness in a more comprehensive manner (Mohamed & Ali, 2024).

Another important finding is that students demonstrated critical thinking skills regarding ecological issues by identifying environmental problems in their surroundings and proposing simple solutions, such as improving waste management and protecting water resources (Kanaki et al., 2025). They also showed social responsibility by recognizing environmental conservation as a shared responsibility and encouraging others to participate in environmental protection activities. These findings support previous studies explaining that the ecological paradigm emphasizes harmonious relationships between humans and nature while encouraging moral responsibility toward environmental preservation (Simanjuntak & Anjani, 2025). Unlike previous studies that generally examined ecological awareness through environmental literacy or project-based learning, the present study demonstrates that ecological awareness

can also be strengthened through the integration of spiritual values, compassion, and character education within science learning (Pada et al., 2025). This finding has practical implications for teachers, suggesting that environmental education should be integrated into daily learning activities and school culture so that ecological awareness develops as a sustainable habit rather than as knowledge acquired only in the classroom.

Overall, this study contributes to the development of environmental education by demonstrating that the Panca Cinta Love-Based Curriculum provides a comprehensive framework for integrating science learning, Islamic values, and character education to foster students' ecological awareness. The novelty of this study lies in the implementation of the five dimensions of Panca Cinta as an integrated approach to developing ecological awareness through science learning, encompassing environmental understanding, caring attitudes, environmentally friendly behavior, critical thinking, and social responsibility (Portus et al., 2024). This integrated framework has not been comprehensively discussed in previous studies, which generally examined ecological awareness, environmental literacy, or love-based education separately (Rati et al., 2025). Theoretically, the findings enrich the discussion on value-based environmental education by demonstrating the relationship between love-based values and ecological awareness. Practically, the study provides an alternative model for teachers and schools seeking to integrate environmental education with character formation, thereby supporting the implementation of meaningful and sustainable science learning in elementary education.

CONCLUSION

This study demonstrates that the implementation of the Panca Cinta Love-Based Curriculum effectively fosters students' ecological awareness by integrating the five dimensions of love for Allah and the Prophet, love for knowledge, love for the environment, love for oneself and others, and love for the homelandinto science learning. The findings show that students' ecological awareness is reflected in their environmental understanding, caring attitudes, environmentally friendly behavior, critical thinking regarding ecological issues, and social responsibility toward environmental sustainability. These findings highlight that ecological awareness can be more effectively developed when environmental education is integrated with spiritual, moral, and character values through meaningful learning experiences. The study contributes to the field of elementary science education by providing empirical evidence that the Panca Cinta Love-Based Curriculum offers a holistic framework for integrating environmental education and character development within Islamic elementary schools. However, this study was limited to a single qualitative case study, which

restricts the generalizability of the findings. Future research is therefore recommended to involve multiple schools, employ mixed-methods or longitudinal designs, and examine the long-term effectiveness of the Panca Cinta Love-Based Curriculum in fostering ecological awareness across different educational contexts.

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