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Development of the Eco-ECE Method for Fostering Environmental Care Character in Early Childhood

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Abstract

This study was motivated by the implementation of environmental education in early childhood education (ECE) settings, which tends to be incidental, has not yet been systematically integrated into daily learning activities, and is not supported by a method that teachers can consistently apply. This study aimed to develop the Eco-ECE (Environmental Early Childhood Education) Method to foster environmental care character in early childhood, describe its implementation, and analyze its effectiveness in developing environmentally responsible behavior. The study employed a Research and Development (R&D) method adapted from the Borg and Gall model. The limited trial involved 29 children in Group B at KB PKK Sumberagung. Data were collected through expert validation, observation, interviews, and documentation, and were analyzed interactively through data reduction, data display, and conclusion drawing. The Eco-ECE Method was developed through six stages: Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection, and Eco Sustainability. The results showed that the method could be implemented effectively and helped teachers integrate environmental education into learning activities in a structured and sustainable manner. Following implementation, the children demonstrated behavioral changes, from previously requiring guidance to becoming more independent in disposing of waste properly, maintaining cleanliness, caring for plants, conserving water, and reusing used materials. Environmentally responsible behaviors also began to be practiced at home. Therefore, the Eco-ECE Method is effective as an alternative habituation-based learning method for fostering environmental care character in early childhood.

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INTRODUCTION

Early childhood education (ECE) is a strategic period for establishing the foundations of children's knowledge, attitudes, values, and habits related to both social and environmental life. At this stage, children learn primarily through concrete experiences, social interaction, imitation, play, and repeated habituation. Therefore, environmental education in early childhood should not be limited to providing information about the environment but should be realized through direct experiences that enable children to recognize, interact with, and take concrete actions to care for the environment (Kuo et al., 2019). Environmental education from an early age also contributes to broader child development, including cognitive and socio-emotional development, as well as children's ability to interact with the natural environment (Ardoin & Bowers, 2020; Kuo et al., 2019).

The urgency of environmental education in early childhood has become increasingly evident alongside growing environmental problems and the need to foster behaviors that support sustainability. Pro-environmental behavior in children encompasses various simple actions that benefit the environment or reduce negative environmental impacts, such as disposing of waste properly, maintaining cleanliness, conserving resources, caring for plants, and reusing materials that can still be utilized. The development of such behaviors does not occur automatically merely because children understand environmental concepts. Knowledge needs to be accompanied by experience, opportunities to take action, social support, and consistent habituation (Chawla, 2020; Otto et al., 2019). Moreover, a recent meta-analysis indicates that interventions designed to enhance pro-environmental behavior can significantly influence children's behavior, with stronger effects observed among younger children (Swiatkowski et al., 2024).

In the context of early childhood education, environmental learning has characteristics that differ from environmental education at the primary and secondary levels. Young children require approaches that are concrete, active, enjoyable, and relevant to their everyday lives. A systematic review by (Ardoin & Bowers, 2020) of environmental education research in early childhood indicates that environmental education programs generate various positive outcomes, both for child development and for environmental-related outcomes. Approaches that utilize nature, direct experience, play, exploration, and social engagement are important components of environmental learning during childhood. Accordingly, children's surrounding environment can be positioned not merely as an object of learning but also as a learning resource and a space for

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developing environmentally caring habits.

However, the implementation of environmental education in ECE settings still faces several challenges. A review of Education for Sustainability in Early Childhood Education indicates that research in this field remains predominantly qualitative, while intervention studies examining how sustainability education can systematically shape children's behavior remain limited (Yildiz et al., 2021). This issue is important because sustainability education is concerned not only with conceptual understanding but also with children's ability to develop attitudes and actions that support sustainability in their everyday lives. Therefore, a learning approach is needed that can integrate knowledge, experience, attitudes, and actions in a coherent manner.

The Indonesian context reveals similar challenges. Research on teachers' strategies for fostering environmental care character in early childhood indicates that teachers play an important role through habituation, modeling, and the integration of environmental care values into learning activities (Nurhayati et al., 2024). However, environmental education practices in ECE settings still require support in the form of more structured methods, learning media, and practical guidelines. A study by (Anastasya et al., 2025) involving 109 ECE teachers in the Special Region of Yogyakarta found that 92.7% of teachers recognized the importance of fostering environmentally caring behavior, yet its implementation still faced several challenges, including children's limited understanding and insufficient parental support. Furthermore, 82.6% of teachers considered learning-by-doing approaches, such as disposing of waste properly, gardening, and recycling activities, relevant to developing children's environmentally caring behavior. These findings indicate that the need for environmental education in ECE extends beyond increasing teachers' awareness; it also requires learning approaches that can be implemented concretely and sustainably.

Several studies in Indonesia have attempted to develop various strategies to enhance environmental care character in early childhood. Science learning through demonstrations and hands-on activities has been shown to improve children's environmental care character (Mursalin & Setiaji, 2022). Project-based learning has also been employed to develop environmental care character by providing children with opportunities to engage in project activities related to the environment (Aisyah et al., 2023). In addition, the My City Cleaning Waste Recycle game was developed to enhance environmental care character through play-based activities related to waste management (Halida et al., 2023). Research on the development of flashcard media has also indicated a need for learning media specifically designed to foster environmental care character in early childhood (Ramadhani & Masykuroh, 2022). Similarly, animated video media

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introducing different types of waste have been developed as an alternative medium to support the development of environmental care character (Masykuroh & Khairunnisa, 2022).

These studies make important contributions; however, most remain focused on specific activities, media, or programs rather than on the development of a method that integrates diverse environmental experiences into systematic stages of behavioral development. Project-based learning, for example, provides meaningful experiences through projects but is not specifically designed as a method for habituating environmentally responsible behaviors within children's daily routines (Aisyah et al., 2023). Likewise, games, flashcards, and animated videos can help children understand environmental messages, but their use primarily emphasizes media as specific instructional tools (Halida et al., 2023; Masykuroh & Khairunnisa, 2022; Ramadhani & Masykuroh, 2022). Therefore, there remains an opportunity to develop a method that integrates environmental awareness, modeling, habituation, direct experience, reflection, and sustainability within a single learning framework.

This gap becomes increasingly important when environmental education is understood as a process of character formation. Environmental care character needs to be manifested in observable actions that are performed consistently, rather than merely in children's ability to answer questions about the environment. Therefore, the learning process should provide children with opportunities to directly experience the expected behaviors, observe examples from adults, practice the behaviors repeatedly, and receive reinforcement from their social environment. Research on instruments for assessing environmental care character in ECE also indicates that environmental care character needs to be translated into observable behavioral indicators that can be systematically assessed (Azis et al., 2021). This further reinforces the need for a learning approach that explicitly guides the process of behavioral development from awareness to action.

Experiential learning and direct interaction with the environment play an important role in this process. Children who are given opportunities to explore their environment directly can develop more meaningful sensory and social experiences than through learning that focuses solely on the delivery of information. Research on nature exploration in school environments indicates that exploratory activities can support environmental awareness as well as children's cognitive, socio-emotional, and motor development (Sriyanto et al., 2025). Similarly, green school practices in early childhood education demonstrate that gardening, waste management, and plant care activities can be used to develop children's environmental awareness and responsibility (Puspita et al., 2024). These findings indicate that the school environment can serve as an effective pedagogical space for developing environmentally caring behavior when activities are designed

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and implemented systematically.

Based on a preliminary study conducted at KB PKK Sumberagung, several activities related to environmental care had already been implemented, including maintaining cleanliness, disposing of waste, caring for plants, reusing used materials, and engaging in activities in the surrounding environment. However, these activities had not yet been integrated into a method with systematic learning stages. The implementation of environmental education still depended largely on teachers' initiatives and had not been fully directed toward the development of sustainable habits. Children still required guidance in performing several simple behaviors, such as disposing of waste properly, maintaining cleanliness, conserving water, and caring for plants. This condition indicates a gap between the availability of environmental care activities and the development of independent and consistent environmentally caring behavior.

To address this gap, this study developed the Eco-ECE (*Environmental Early Childhood Education*) Method. Eco-ECE was designed as an experiential and habituation-based learning method that integrates environmental education into children's daily activities. The method consists of six stages: *Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection,* and *Eco Sustainability*. The *Eco Awareness* stage is intended to develop children's initial awareness of the environment; *Eco Modeling* provides role modeling through teachers' behavior; *Eco Habituation* develops behavior through repetition; *Eco Exploration* provides direct experiences through exploratory activities; *Eco Reflection* helps children make meaning of their experiences; while *Eco Sustainability* reinforces the continuity of environmentally caring behavior through family involvement.

The novelty of this study lies in the development of a learning method that sequentially integrates six processes for developing environmentally caring behavior within the context of ECE, rather than merely developing instructional media or focusing on a single type of environmental activity. Eco-ECE positions habituation as a bridge between knowledge and action, while modeling, exploration, reflection, and family involvement are employed to strengthen the process of value internalization. This approach is consistent with the need for more contextual, experiential, and behavior-oriented environmental education (Swiatkowski et al., 2024; Yildiz et al., 2021). Thus, Eco-ECE is expected not only to help children understand appropriate behaviors toward the environment but also to develop habits of practicing such behaviors independently and sustainably.

Based on the foregoing discussion, this study aimed to (1) develop the Eco-ECE Method as a learning method for fostering environmental care character in early childhood, (2) describe the

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implementation of the Eco-ECE Method in learning activities, and (3) analyze the effectiveness of the Eco-ECE Method in developing children's environmentally caring behavior. This study is expected to contribute theoretically to the development of character education and environmental education in ECE, as well as practically to assist teachers in implementing learning methods that are concrete, systematic, contextual, and sustainable.

METHOD

This study employed a Research and Development (R&D) method by adapting the Borg and Gall development model. The selection of the R&D method was based on the objective of the study, namely to produce a learning product in the form of the Eco-ECE (Environmental Early Childhood Education) Method that can be used to foster environmental care character in early childhood. The Borg and Gall development model was selected because it provides systematic stages for identifying needs, developing products, conducting validation, testing, evaluating, and revising products (Gall et al., 2007; Sujiono, 2019). In this study, the development stages were adapted to the research needs through a preliminary study, product design, initial product development, expert validation, revision, limited trial, evaluation, and final revision.

The study was conducted in Group B at KB PKK Sumberagung, with 29 children participating in the limited trial. The participants were selected purposively based on the suitability of their characteristics with the objectives of the method development. In addition to the children as product users, the study involved two validators, namely an early childhood education content expert and a learning expert, as well as the Group B teacher as the method user. Expert validation was conducted prior to the trial to assess the content appropriateness, suitability with the characteristics of early childhood learning, clarity of the syntax, language, feasibility of implementation, and alignment of the method with the objectives of fostering environmental care character.

The product developed was the Eco-ECE Method, consisting of six stages: Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection, and Eco Sustainability. The six stages were designed sequentially to develop children's awareness of the environment, provide role modeling, establish habits, provide direct experiences through exploration, help children reflect on their experiences, and sustain environmentally caring behavior through family involvement. Following validation and revision, the method was implemented in a limited trial through daily learning activities, routine habituation, environment-based projects, creative activities using used materials, and learning activities conducted both indoors and outdoors.

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The research data were qualitative and were obtained through expert validation, observation, interviews, and documentation. Validation sheets were used to obtain expert assessments and feedback regarding the feasibility of the Eco-ECE Method. Observations were conducted throughout the implementation to identify the implementation of the stages, teacher and children's activities, and changes in environmental care behavior. The behavioral indicators observed included children's ability to dispose of waste properly, maintain cleanliness, care for plants, use water wisely, and reuse materials that could still be utilized. Interviews were conducted with the teacher to obtain information regarding the ease of implementation, children's responses, benefits, challenges, and suggestions for improving the method. Documentation was used as supporting data, including photographs of activities, learning materials, method guidelines, and children's work.

The data were analyzed interactively through data condensation, data display, and conclusion drawing and verification (Miles et al., 2014). Data obtained from various collection techniques were compared to obtain a comprehensive description of the feasibility, implementation, and outcomes of the Eco-ECE Method. Data credibility was strengthened through source and technique triangulation by comparing information from validators and the teacher with observations of children, interviews, and documentation. The effectiveness of the method was analyzed descriptively by identifying changes in children's environmental care behavior during implementation. The method was considered to have produced positive outcomes when changes were observed from behaviors that initially required guidance to behaviors that were more independent, consistent, and sustainable in maintaining cleanliness, disposing of waste, caring for plants, conserving water, and reusing materials that could still be utilized.

RESULT

1. Initial Conditions and Development of the Eco-ECE Method

The preliminary study at KB PKK Sumberagung showed that the school had implemented several activities related to environmental care, including proper waste disposal, maintaining cleanliness, caring for plants, reusing used materials, and conducting activities in the surrounding environment. However, these activities had not yet been integrated into a systematic learning method. The implementation of environmental education still depended largely on teachers' initiatives, while children continued to require guidance in performing several simple behaviors, such as disposing of waste, maintaining cleanliness, conserving water, and caring for plants. This

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condition indicated that the availability of environmental activities had not yet fully resulted in independent and consistent environmental care behavior.

Based on these conditions, the Eco-ECE (*Environmental Early Childhood Education*) Method was developed as a learning method for fostering environmental care character in early childhood. The method consists of six interconnected stages: *Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection,* and *Eco Sustainability*. These stages were designed to guide the learning process from environmental awareness and behavioral modeling toward habituation, direct experience, reflection, and behavioral sustainability through family involvement.

The developed product was presented in an Eco-ECE Method Guidebook, which contains the method's stages, examples of activities, learning plans, assessment instruments, illustrations, and documentation. Following expert validation and revision, the method was subjected to a limited trial involving 29 children in Group B at KB PKK Sumberagung.

2. Implementation of the Eco-ECE Method

The trial results showed that all six Eco-ECE stages could be implemented in daily learning activities. Teachers integrated environmental education through routine habituation, project activities, creative activities using used materials, and activities conducted both indoors and outdoors.

At the *Eco Awareness* stage, children were introduced to environmental conditions and simple environmental problems through conversations and observations. The *Eco Modeling* stage was implemented through teachers' direct examples of maintaining cleanliness, disposing of waste, caring for plants, and using resources wisely. During *Eco Habituation*, these behaviors were practiced repeatedly as part of daily routines. *Eco Exploration* provided opportunities for children to interact directly with the environment through plant care, environmental cleaning, and other environment-based activities. *Eco Reflection* was used to help children recall and discuss their experiences. Finally, *Eco Sustainability* was strengthened through family involvement so that the habits developed at school could be continued in children's daily lives.

The implementation demonstrated that Eco-ECE could integrate environmental education into learning activities without treating it as a separate learning component. Children were given opportunities to observe behavioral examples, engage in direct actions, repeat these behaviors through daily routines, and receive reinforcement from their social environment.

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3. Changes in Children's Environmental Care Behavior

Observation results indicated changes in children's environmental care behavior following the implementation of Eco-ECE. Initially, several behaviors still required teacher guidance. After implementation, children began to demonstrate greater independence in disposing of waste, maintaining cleanliness, caring for plants, conserving water, and reusing materials.

Table 1. Changes in Children's Environmental Care Behavior

Indicator	Initial Condition	After Implementation
Waste disposal	Waste disposal	Began to act independently
Maintaining cleanliness	Performed when reminded	Began to act voluntarily
Caring for plants	Required guidance	Performed more independently
Water use	Not yet a concern	Began using water appropriately
Reusing used materials	Did not yet understand	Able to use used materials in activities
Caring for plants	Limited	Demonstrated greater care and responsibility

Source: Research observation results.

The most visible changes were observed in waste disposal and maintaining cleanliness. Children who had previously waited for teachers' instructions began to look for waste bins independently after eating or playing. Some children also began reminding their peers to dispose of waste or tidy up play materials. Similar changes were observed in plant-care and water-use activities, where children began to demonstrate greater initiative and responsibility without always waiting for teacher instructions.

Interview findings also indicated that these habits had begun to extend to the home environment. Several parents reported that their children had started disposing of waste properly, maintaining cleanliness, and reminding family members to keep their surroundings clean. These findings suggest that the behaviors developed through school activities had begun to be practiced in children's everyday environments beyond school.

4. Product Evaluation and Refinement

The evaluation conducted during the trial was used to refine the Eco-ECE Method and its guidebook. The revisions primarily concerned the operationalization of the stages, the addition of

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activity examples, sample daily learning plans (*RPPH*), assessment instruments, illustrations, and documentation. These revisions did not alter the six main stages of Eco-ECE but clarified their implementation so that the method could be used more easily by teachers.

Overall, the trial results indicated that the Eco-ECE Method could be implemented in early childhood learning activities and was associated with positive changes in children's environmental care behavior. These changes were reflected in reduced dependence on teacher guidance and the emergence of more independent behaviors in maintaining cleanliness, disposing of waste, caring for plants, using water wisely, and reusing materials. The final research product consisted of the Eco-ECE Method and the Eco-ECE Method Guidebook, which can serve as an alternative practical guide for teachers in integrating environmental education into daily learning activities.

DISCUSSION

1. Eco-ECE as an Experience-Based and Habituation-Oriented Learning Method

The findings of this study indicate that the Eco-ECE Method can be implemented in daily learning activities through six interconnected stages: *Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection,* and *Eco Sustainability*. These six stages enable environmental education to be integrated into children's daily routines and learning experiences rather than being provided only through specific or incidental environmental activities. This finding suggests that environmental education in early childhood is more appropriately developed through concrete experiences, direct activities, social interaction, and habituation that are closely connected to children's everyday lives.

This finding is consistent with the systematic review conducted by Ardoin and Bowers (2020), which analyzed 66 studies on environmental education in early childhood. The review demonstrated that environmental education in early childhood provides various positive outcomes for children's development as well as environmental-related outcomes. Nature-based experiences, resource-rich environments, and direct activities constitute important components of environmental education during early childhood. Thus, the implementation of Eco-ECE reinforces the view that environmental education at the early childhood level should not merely focus on the transmission of environmental knowledge but should also provide opportunities for children to interact directly with their surroundings.

Learning experiences involving nature also provide opportunities for children to develop meaningful experiences. (Chawla, 2020) demonstrated that children's contact with nature provides various benefits for child development and well-being. Similarly, (Collado & Evans, 2019)

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found that children's experiences with nature are associated with pro-environmental behavior, although this relationship may be influenced by other factors, including outcome expectancy and environmental attitudes. Therefore, direct experience in Eco-ECE functions not merely as a learning activity but also as a context through which children can establish connections between experience, understanding, and environmental behavior.

An important characteristic of Eco-ECE is its positioning of habituation as a bridge between awareness and action. Children are not merely introduced to environmentally responsible behaviors but are provided with repeated opportunities to practice these behaviors in their daily activities. This finding is consistent with (Nabila et al., 2023), who demonstrated that habituating environmental care values through learning principles can serve as a contextual approach for developing environmental awareness among young children.

This finding is further supported by the meta-analysis conducted by (Swiatkowski et al., 2024), which found that educational interventions designed to promote pro-environmental behavior can produce positive changes in children's behavior, with stronger effects observed among younger children. Thus, Eco-ECE provides a framework that directs environmental education from knowing and recognizing toward doing and habituating environmentally responsible behaviors.

2. Behavioral Changes through Modeling, Habituation, and Direct Experience

The behavioral changes observed following the implementation of Eco-ECE indicate that teacher modeling, habituation, and direct experience constitute important components in developing children's environmental care character. At the beginning of the study, children still required guidance to perform several simple behaviors, such as disposing of waste properly, maintaining cleanliness, caring for plants, and using water wisely. Following the implementation, children began to demonstrate more independent and consistent behaviors, and some children even reminded their peers to maintain cleanliness.

This finding is consistent with (Nurhayati et al., 2024), who found that teachers play an important role in developing environmental care character among young children through habituation, modeling, observation, and the integration of environmental values into learning activities. In the context of Eco-ECE, teacher modeling is implemented through *Eco Modeling*, in which teachers provide concrete examples before children perform the expected behaviors. The teacher's role as a model is particularly important because young children learn extensively through observing and imitating the behaviors of adults in their surrounding environment.

Habituation subsequently strengthens this process. Behaviors such as disposing of waste

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properly, maintaining cleanliness, caring for plants, saving water, and reusing materials are practiced repeatedly in daily activities. Consequently, children do not merely understand that certain behaviors are appropriate; they are provided with opportunities to repeatedly practice these behaviors in real-life contexts. This finding is consistent with (Nabila et al., 2023), who identified habituation as an important approach for developing environmental care among young children.

Direct experience through *Eco Exploration* further strengthens the behavioral formation process. Children are given opportunities to interact with their environment through activities such as caring for plants, cleaning their surroundings, using water wisely, and utilizing used materials. (Puspita et al., 2024) demonstrated that green school activities, including gardening, waste management, and plant care, can contribute to the development of children's environmental awareness and responsibility.

Similarly, (Mursalin & Setiaji, 2022) found that science learning involving demonstrations and hands-on experiences can be used to improve environmental care character among young children. These findings support the results of the present study by demonstrating that concrete activities are important because they provide children with opportunities to connect environmental values with actions that they can perform directly.

Therefore, the behavioral changes identified in this study can be understood as the result of the interaction among modeling, repetition, and direct experience. Children first observe the expected behaviors through teachers, practice the behaviors repeatedly, and then experience these behaviors within real-life situations. This process helps transform environmental education from verbal knowledge into observable everyday behavior.

3. Reflection, Family Involvement, and Behavioral Sustainability

Eco-ECE differs from environmental activities that focus solely on providing experiences because it incorporates *Eco Reflection* and *Eco Sustainability* after children have obtained direct experiences. Reflection provides opportunities for children to recall activities, describe their experiences, and understand the meaning of the actions they have performed. Thus, environmental experiences do not end with physical activities but are directed toward a process of meaning-making.

This aspect is important because experiences with nature or the environment do not automatically result in pro-environmental behavior. (Collado & Evans, 2019) demonstrated that the relationship between nature experiences and pro-environmental behavior may be influenced by children's attitudes and beliefs regarding the consequences of their behaviors. Therefore, the

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inclusion of *Eco Reflection* in Eco-ECE can be understood as an effort to help children connect concrete experiences with the meaning and reasons underlying environmentally responsible behaviors.

Family involvement through *Eco Sustainability* is another important component of the method. The findings indicate that some of the behaviors developed at school were transferred to the home environment, including disposing of waste properly, maintaining cleanliness, and reminding family members to care for the environment. This finding suggests that behavioral changes were not limited to the school context but began to appear in children's everyday environments.

Family involvement is important because children's habits develop across different social environments. When behaviors learned at school are reinforced at home, children receive more consistent experiences and expectations. In the context of environmental education, continuity between school and home may increase the likelihood that environmentally responsible behaviors become more sustained. Therefore, *Eco Sustainability* extends the role of the teacher and school beyond providing learning experiences to becoming part of a broader social environment that supports the sustainability of children's behaviors.

4. Novelty and Contribution of the Eco-ECE Method

The main contribution of this study lies in the development of a method that integrates various processes of environmental behavior formation into a systematic learning framework. Previous studies in Indonesia have developed various approaches to fostering environmental care character among young children.

For example, (Mursalin & Setiaji, 2022) used science learning through demonstrations and hands-on activities to improve children's environmental care character. (Aisyah et al., 2023) developed environmental care character through *project-based learning*, providing children with opportunities to participate in environmental projects and activities. (Halida et al., 2023) developed the *My City Cleaning Waste Recycle* game as a play-based medium for improving environmental care character through waste management activities. Meanwhile, (Ramadhani & Masykuroh, 2022) developed *flashcard* media, while (Masykuroh & Khairunnisa, 2022) developed an animated video introducing waste as a medium for supporting environmental care character development.

These studies demonstrate that various activities, projects, games, and learning media can support environmental education in early childhood. However, these approaches generally focus on particular forms of intervention or specific learning media. *Project-based learning*, for instance,

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provides meaningful experiences through projects but is not specifically designed as a systematic sequence for habituating environmental behaviors within children's daily routines. Similarly, games, *flashcards*, and animated videos function primarily as particular learning media.

Eco-ECE offers a different position by organizing various environmental experiences into six sequential processes: awareness, modeling, habituation, exploration, reflection, and sustainability. Therefore, the novelty of Eco-ECE does not primarily lie in creating completely new environmental activities, but rather in organizing diverse environmental experiences into a systematic method for behavioral formation.

This structure is important because environmental education in early childhood needs to move beyond knowledge toward observable behavior. (Azis et al., 2021) emphasized the importance of instruments that can identify and assess environmental care character through observable behavioral indicators among young children. Meanwhile, (Yildiz et al., 2021) demonstrated that research on education for sustainability in early childhood has been dominated by qualitative approaches and that more intervention-based research is needed to understand how sustainability education can systematically influence children's behaviors.

Accordingly, Eco-ECE contributes by positioning habituation as a bridge between awareness and action, while modeling, exploration, reflection, and family involvement function as reinforcing processes. This structure positions Eco-ECE as a method that integrates environmental education and character education within children's everyday lives.

5. Implications and Limitations of the Study

The findings imply that environmental education in early childhood can be integrated into daily learning activities without being treated as a separate learning program. Teachers can use routines, environmental projects, exploration activities, creative activities using used materials, plant care, and cleanliness activities as contexts for developing children's environmental care character. This approach is consistent with (Ardoin & Bowers, 2020), who emphasized the importance of nature-based and environmental experiences in early childhood environmental education.

However, the findings should be interpreted in accordance with the characteristics of the research design. The trial was limited to 29 children in one early childhood education institution, while behavioral changes were analyzed descriptively through observations, interviews, documentation, and expert validation. Therefore, the positive changes observed in this study should not yet be interpreted as causal evidence that can be generalized to a broader population. Future studies may involve larger samples, comparison groups, validated behavioral

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measurement instruments, and longer observation periods. The need for further intervention-based research in early childhood sustainability education has also been emphasized by Yildiz et al.

Overall, the findings indicate that the strength of Eco-ECE lies in the integration of six behavioral formation processes within a single learning sequence. *Eco Awareness* develops environmental awareness, *Eco Modeling* provides behavioral examples, *Eco Habituation* develops behaviors through repetition, *Eco Exploration* provides direct experiences, *Eco Reflection* helps children make meaning of their experiences, and *Eco Sustainability* extends behavioral continuity through family involvement. This integration positions Eco-ECE as a potentially useful experience- and habituation-based learning method that can support children's transition from knowing environmental values to practicing them in everyday life.

CONCLUSION

This study developed the Eco-ECE (*Environmental Early Childhood Education*) Method as an experience- and habituation-based learning method for developing environmental care character among young children. The method consists of six sequential stages: *Eco Awareness, Eco Modeling, Eco Habituation, Eco Exploration, Eco Reflection,* and *Eco Sustainability*. These stages integrate environmental awareness, teacher modeling, repeated practice, direct environmental experiences, reflection, and family involvement into children's daily learning activities.

The findings indicate that Eco-ECE can be implemented in early childhood education through daily routines, environmental projects, creative activities using reusable materials, plant care, cleanliness activities, and indoor and outdoor learning. Following implementation, children demonstrated positive behavioral changes, particularly in disposing of waste properly, maintaining cleanliness, caring for plants, using water wisely, and reusing materials. Behaviors that initially required teacher guidance gradually became more independent and consistent, and some of the behaviors were also reported to extend into the home environment.

The main contribution of this study is the development of a systematic method that integrates environmental education and character formation within children's everyday learning experiences. Unlike approaches that primarily focus on particular activities, projects, games, or learning media, Eco-ECE organizes environmental experiences into a sequential process from awareness to modeling, habituation, exploration, reflection, and sustainability. Therefore, Eco-ECE has the potential to serve as an alternative method for integrating environmental education

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into early childhood learning in a concrete, contextual, and sustainable manner.

Nevertheless, this study was conducted through a limited trial involving 29 children in one early childhood education institution, and the changes in children's behavior were analyzed descriptively. Therefore, the findings should not yet be generalized to broader populations or interpreted as definitive causal evidence. Future research should involve larger and more diverse samples, comparison groups, validated behavioral assessment instruments, and longer implementation periods to examine the effectiveness and sustainability of Eco-ECE more rigorously.

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