Journal of Ecohumanism
2024
Volume: 3, No: 5, pp. 1017 – 1027
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i5.3952

Developing of Eco-Literacy Learning Model to Enhance Environmental Caring Character

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Abstract

This research aims to develop a family partnership-based ecoliteracy learning model to improve the character of caring for the environment in early childhood in Bengkulu City. The research method used is Research and Development (R&D) with reference to the Borg and Gall model, which involves the stages of needs analysis, model design, expert validation, field trials, model refinement, and implementation. The results of the study show that with an average increase from 55 to 80 in PAUD A, from 58 to 82 in PAUD B, and from 60 to 85 in PAUD C. The collaborative approach applied in learning creates a holistic and enjoyable learning environment for children. This research makes a significant contribution to the development of environmental education in Indonesia and emphasizes the importance of the role of parents and teachers in instilling the character of caring for the environment in the younger generation.

Keywords: *Eco-literacy, Learning Model, Family Partnership, Environmental Education, Early Childhood.*

Introduction

Environmental problems that are increasingly complex and urgent require attention from various parties, including early childhood education (Savinova et al., 2021) . In Bengkulu City, environmental problems such as air pollution and suboptimal waste management are quite serious issues (Badeni & Saparahayuningsih, 2021). The low environmental awareness of the community is shown by the low Environmental Awareness Index (IKPLH), which reflects the lack of collective efforts in preserving the environment not only in the surrounding environment but also in the school and family environment (Harmi et al., 2022). This requires an effective educational strategy to foster the character of caring for the environment in the younger generation (Neitzel et al., 2019) .

The family has a crucial role in the process of children's education. The family environment is the first place where children learn and develop (Soler & Blazquez-Parra, 2022). Therefore, family involvement in environmental education is very important. Through a partnership approach between families and educational institutions, children can gain a more comprehensive and applicable understanding of the importance of protecting the environment (Swanberg et al., 2022). The city of Bengkulu experiences various environmental problems such as poor air quality due to pollution from household waste, trade activities, and industrial houses. In addition, Learning oriented to environmental education has obstacles in materials and learning methods that are inadequate and not applicable (Rahmani et al., 2023). Thus, the understanding of the target group becomes incomplete (Chansa-Kabali, 2023). Mindset mistakes in environmental learning that require high-tech infrastructure for environmental education, thus lowering motivation to implement environmental education (Watson & Newman, 2023).This approach is also expected to create synergy between learning at home and at school, so that it has a more significant impact in shaping children's character (Mills et al., 2021).

Ecoliteracy or ecological literacy is the ability to understand the basic principles of ecology and the relationship of humans with ecosystems (Woźniak, 2021). Ecoliteracy education aims to form individuals

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who not only have knowledge about the environment, but also have awareness and responsibility to maintain its sustainability (Kassim & Ndumbaro, 2022). In this context, a family partnership-based ecoliteracy learning model was developed to increase ecological awareness and environmental care character in early childhood (Darsinah & Purwatiningsih, 2020). This model is expected to be an effective solution in instilling ecological values in children. In the context of early childhood education, active and participatory learning is very important. Children learn most effectively through hands-on experience and interaction with their environment (Joner et al., 2023). Therefore, the learning model proposed in this study is designed to actively engage children in activities that stimulate their curiosity and empathy for nature. These activities are also designed to be done together with parents, thus strengthening family bonds and creating a fun and meaningful learning experience (Byun & Jeon, 2023).

Learning methods that involve direct experience and active interaction with the environment have been proven to be more effective in increasing children's understanding and awareness of the environment as stated by (de Castro-Filho et al., 2022). Early childhood children learn best through activities that are engaging and meaningful to them (Hidayatullah et al., 2023).

Therefore, the learning model developed in this study is designed to actively involve children in fun and educational ecoliteracy activities. This activity is also designed to be done with parents, thus strengthening family relationships and creating an immersive learning experience (Thackrah et al., 2022).

By paying attention to these various aspects, this research hopes to make a meaningful contribution to environmental education efforts in Indonesia. This research aims to develop a family partnership-based ecoliteracy learning model that can improve the character of caring for the environment in early childhood in Bengkulu City. Through this research, it is hoped that an effective and applicable method can be found in teaching ecological values to children. In addition, this research is also expected to make a real contribution to efforts to increase environmental awareness of the community in general, as well as be an inspiration for the development of environmental education programs in other regions.

Literature Review

Environmental education is one of the important fields that has received widespread attention from researchers and education practitioners around the world (Graven & Jorgensen, 2023). A number of studies show that effective environmental education can foster ecological awareness and responsibility in individuals from an early age. According to (Harun et al., 2020) environmental education should focus on developing the awareness, knowledge, attitudes, skills, and participation necessary to make wise and responsible decisions in protecting the environment (Hwang, 2024). Therefore, a learning approach that actively engages children is essential in achieving this goal (Galoyan et al., 2021).

Ecoliteracy, as outlined by (Sigit et al., 2023) is the ability to understand the basic principles of ecology and how they are applied in everyday life. Ecoliteracy includes an understanding of natural cycles, the interconnectedness between living things, and the impact of human activities on the environment. (Berman, 2021) stated that eco-literacy involves not only cognitive but also affective aspects, which include the development of attitudes and values that care for the environment. In the context of early childhood education, ecoliteracy learning must be designed in such a way that it can stimulate children's curiosity and concern for nature (Gillon, 2023) .

The role of the family in environmental education is also an important highlight in various studies. According to (Xu et al., 2009) the ecological theory of child development states that the family is the microenvironment that has the most influence on child development. A study by (Häikiö et al., 2020) shows that parental involvement in environmental education can increase children's understanding and awareness of environmental issues. Therefore, partnerships between families and schools in environmental education programs can strengthen the effectiveness of ecoliteracy learning (Asrial et al., 2022).

The family partnership-based ecoliteracy learning model is also supported by research that shows that collaborative and participatory learning approaches are more effective in shaping children's character.

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According to (Kołłątaj et al., 2023) social interaction and collaboration with adults and peers can help children to develop their cognitive and affective abilities. A study by (Hemans et al., 2023) also found that family involvement in children's education can improve their learning motivation and academic outcomes. In this context, ecoliteracy learning that involves families can create a supportive and holistic learning environment (Ha et al., 2023) .

In addition, research also shows the importance of using innovative and interesting learning methods in environmental education. According to (Franck, 2022) outdoor learning and hands-on experience with nature can increase children's interest and understanding of the environment. A study by (Holenko Dlab & Hoic-Bozic, 2021) shows that project-based learning involving nature exploration and practical activities can make children more engaged and motivated (Thackrah et al., 2022). Thus, the ecoliteracy learning model designed in this study also integrates interactive and fun activities to increase learning effectiveness (Volodymyr, 2020).

Through this literature review, it can be concluded that effective environmental education must involve a comprehensive and participatory approach, involving the family as an active partner in the learning process (Sigit et al., 2023). The family partnership-based ecoliteracy learning model developed in this study is expected to be an effective solution in instilling ecological values in early childhood and increasing environmental awareness in society as a whole. This research is also expected to make a meaningful contribution to the development of environmental education theory and practice in Indonesia.

Research Questions

This research is focused on developing a family partnership-based ecoliteracy learning model to improve the character of early childhood environmental care in Bengkulu City. The environment in this study focuses on the abiotic and social environment.

- What are the conditions of eco-literacy learning in Bengkulu City?
- How is the development of an eco-literacy learning model based on family partnerships to improve the character of caring for the environment in early childhood in Bengkulu City?

Research Objective

This research is original to find out:

- Knowing the conditions of eco-literacy learning in Bengkulu City?
- Producing a family partnership-based ecoliteracy learning model to improve the character of caring for the environment in Bengkulu City.

Method

This study uses a research and development method that refers to the *Borg and Gall* model that has been used by (Harmi et al., 2022). This method was chosen because it makes it possible to develop and test the effectiveness of the proposed learning model systematically (Badeni & Saparahayuningsih, 2021). The following are the stages carried out in this study:

- *Needs Analysis*

The first step in this study is to conduct a needs analysis to identify the problems and needs of ecoliteracy learning in Bengkulu City. This analysis was conducted through surveys and interviews with early childhood education teachers, parents, and environmental education experts. The goal is to obtain information about the current conditions, the challenges faced, and expectations for the learning model to be developed.

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Learning Model Design

Based on the results of the needs analysis, the next step is to design an ecoliteracy learning model based on family partnerships. The design of this model involves the development of key components, including learning objectives, materials, methods, and evaluations. This model is designed to be applied in the home and school environment, by involving the active role of parents in the learning process.

Expert Validation

Once the learning model is designed, the next step is to validate it by experts. This validation aims to ensure that the model developed is of good quality and in accordance with the needs. The experts involved include early childhood education experts, environmental education experts, and education practitioners. The validation process includes assessing the components of the model, as well as providing input and suggestions for improvement.

Field Trials

The validated learning model is then tested in the field. This trial was carried out in several PAUDs in Bengkulu City by involving teachers, parents, and children as participants. The trial design uses an experimental approach with pretest-posttest to measure the effectiveness of the model in improving the character of caring for the environment in children. Data was collected through observations, interviews, and questionnaires.

Model Enhancements

Based on the results of field trials, the learning model developed is evaluated and refined. This process involves analyzing the data from the trial results to identify the strengths and weaknesses of the model. Input from teachers, parents, and children is also taken into account in the improvement process. The refined model is then expected to be used as a guide in family partnership-based ecoliteracy learning.

Implementation and Dissemination

The last step is the wider implementation of the model and the dissemination of research results. Implementation is carried out in collaboration with the education office and related institutions to implement learning models in various PAUD in Bengkulu City. In addition, the results of the research are also disseminated through scientific publications, seminars, and workshops to share knowledge and experience with other educators and researchers.

Data Collection and Techniques

This research uses various data collection tools and techniques to ensure that the data obtained is accurate and relevant. Techniques used include:

Observation: To observe the implementation of learning and interaction between children, parents, and teachers.

Questionnaires: To collect quantitative data on perceptions and responses to learning models.

Documentation: To collect secondary data such as policy documents, activity reports, and learning materials.

With this methodology, it is hoped that the family partnership-based ecoliteracy learning model developed can be effective in improving the character of caring for the environment in early childhood in Bengkulu City. This research is also expected to make a meaningful contribution to the development of environmental education in Indonesia.

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Results And Discussion

This research produces a family partnership-based ecoliteracy learning model that has gone through several stages of development and testing. There are five stages of the research:

- *Needs Analysis*

From the results of surveys, it was found that most teachers and parents felt the need for more applicable learning materials and methods to instill environmental care values in children.The main problems identified are the lack of appropriate teaching materials and the minimal involvement of parents in environmental education.

- *Learning Model Design*

The learning model developed involves three main components: socialization to PAUD teachers, transformational learning for parents, and the implementation of ecoliteracy activities with children. Learning materials cover topics such as recycling, energy conservation, and environmental conservation presented through engaging and interactive activities.

- *Expert Validation*

The results of validation by experts show that this learning model has good quality and is in accordance with the needs of environmental education. Experts provide input to strengthen collaborative aspects between teachers and parents and add outdoor activities to improve children's learning experience.

- *Field Trials*

Field trials were carried out in three PAUDs in Bengkulu City involving 30 children, 30 parents, and 6 teachers. The results of the pretest and posttest showed a significant improvement in the character of caring for the environment of children after the implementation of this learning model. Observations and interviews also revealed that parents and teachers felt more involved and motivated in educating their children about the importance of protecting the environment.

- *Model Enhancements*

Based on the trial results, several improvements were made to the learning model, such as adding exercise modules for parents and more detailed instructions for outdoor activities. The refined model is then integrated into the PAUD curriculum with the support of the local education office.

- *Effectiveness of the Learning Model*

The results of the study show that the family partnership-based ecoliteracy learning model is effective in improving the character of caring for the environment in early childhood. Children involved in the program showed improvement in their understanding of environmental issues and pro-environmental behaviors, such as putting garbage in place and conserving water.

- Parent Involvement

Parental involvement in the learning process has proven to be a key factor in the success of this model. Parents not only play the role of companions, but also as active participants in ecoliteracy activities.Through transformational learning, parents gain the knowledge and skills needed to support their children in safeguarding the environment.

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- Synergy between Teachers and Parents

Solid partnerships between teachers and parents create a holistic and supportive learning environment. Teachers provide learning materials and methods, while parents reinforce the application of these values at home. This collaboration ensures that messages about the importance of the environment are understood and internalized by children.

- *Active Learning and Participation*

Learning that involves hands-on activities and active participation of children has been shown to be more effective in instilling ecological values. Activities such as tree planting, creative recycling, and educational games help children understand ecological concepts in a fun and memorable way. Outdoor activities also provide real experiences that strengthen children's emotional connection with nature.

- *Implications and Recommendations*

This research makes an important contribution to the development of an ecoliteracy learning model in Indonesia. This model can be adapted and applied in various regions to increase environmental awareness from an early age. The education office is expected to support the spread of this model through teacher training and the provision of appropriate teaching materials. In addition, this program can also be integrated with national education policies to achieve the sustainable development goals (SDGs), especially in the field of quality education and the environment.

Observation Results and Questionnaires

Observations were made in three Early Childhood Education (PAUD) in Bengkulu City to see how the family partnership-based ecoliteracy learning model is applied in daily activities. The following are the observation results of each PAUD:

- *Early Childhood Education (PAUD) A*

  Learning Activities: Children look enthusiastic when participating in ecoliteracy learning activities, such as planting trees and making crafts from recycled materials.

  The Role of Teachers: Teachers actively provide explanations and facilitate discussions about the importance of protecting the environment. They also use interesting props to strengthen children's understanding.

  Parent Involvement: Parent involvement in school activities looks quite good. They participate in workshops and help children in ecoliteracy projects.

- *Early Childhood Education (PAUD) B*

Learning Activities: Children carry out various ecoliteracy activities, such as separating organic and inorganic waste, and playing educational games about the environment.

Teacher Role: The teacher provides full support and ensures that each child is actively involved in the activity. They also give small awards to children who show pro-environmental behavior.

Parent Involvement: Parent participation in school activities is more varied. Some are very active, but some are still less involved.

- *Early Childhood Education (PAUD)*

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Learning Activities: Ecoliteracy activities carried out include creating a small garden in the school and making visits to waste treatment sites.

Role of Teachers: Teachers are very creative in arranging activities and providing opportunities for children to explore and ask questions.

Parent Involvement: Parents in PAUD C are very supportive and actively participate in every eco-literacy activity. They also apply some of the same practices at home.

Questionnaire Results

Questionnaires were distributed to teachers and parents to collect data on their views on ecoliteracy learning and family partnerships. Here are the results of the questionnaire analysis:

- *Views on the Importance of Ecoliteracy Learning*

Most respondents (95%) stated that learning about ecoliteracy is very important to be introduced early. Respondents believe that this learning can form the character of caring for the environment in children.

- *Level of Engagement in Ecoliteracy Learning*

Teachers: 85% of teachers feel they are sufficiently involved in learning about ecoliteracy, but there are still 15% who feel the need for capacity building. Parents: 70% of parents feel involved in ecoliteracy activities at school, while another 30% feel less involved due to limited time or knowledge.

- *Obstacles Faced*

Teachers: The main obstacles faced are limited resources and teaching materials (60%), as well as lack of training (40%). Parents: The main obstacle is lack of time (50%) and knowledge (30%) about environmental issues.

- *Effectiveness of the Learning Model*

90% of respondents stated that the family partnership-based ecoliteracy learning model is effective in increasing environmental awareness in children. 80% of parents stated this model helped them to be more engaged and understand the importance of taking care of the environment.

Advice and Recommendations

Teachers: They recommend more training and workshops, as well as the development of more varied teaching materials.

Parents: They suggest activities that can be done at home with children, as well as more intensive communication with the school.

The results of observations and questionnaires show that the family partnership-based ecoliteracy learning model is well received by teachers and parents in Bengkulu City. Despite some obstacles, such as limited resources and varied parental involvement, most respondents felt that the program was effective in raising environmental awareness in children. Suggestions from teachers and parents indicate that with further support, such as additional training and more varied teaching materials, the program can be further improved and widely adopted. The family partnership-based ecoliteracy learning model developed in this study has proven to be effective in improving the character of caring for the environment in early childhood in Bengkulu City. By actively engaging parents and teachers, this model creates a supportive and holistic

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learning environment, which can be adopted in various regions to strengthen environmental education in Indonesia.

Results of Pretest and Posttest Scores

This study measures the effectiveness of the family partnership-based ecoliteracy learning model through pretest and posttest conducted in three PAUDs in Bengkulu City. Here are the results obtained:

Table 1. Illustrates the Pretest-Posttest Score

Early Childhood Education (PAUD) A	Pretest: The average pretest score in PAUD A is 55. This value shows that at first, children's awareness and understanding of the environment is still quite low.	Posttest: The average posttest score in PAUD A increased to 80. This increase shows a significant increase in children's understanding and awareness of environmental issues after participating in the ecoliteracy learning program.
Early Childhood Education (PAUD) B	Pretest: The average pretest score in PAUD B is 58. Just like in PAUD A, this score shows that children's initial understanding of the environment still needs to be improved.	Posttest: The average posttest score in PAUD B increased to 82. This increase reflects that the ecoliteracy learning program is effective in increasing environmental awareness and understanding among children.
Early Childhood Education (PAUD) C	Pretest: The average pretest score in PAUD C is 60. This value is slightly higher compared to PAUD A and B, but it still shows that there is still room for improvement.	Posttest: The average posttest score in PAUD C increased to 85. This is a very significant improvement, demonstrating the success of the learning model in increasing children's understanding and concern for the environment.

From the results of the pretest and posttest in the three PAUDs, it can be concluded that the family partnership-based ecoliteracy learning model has a significant positive impact on improving the character of caring for the environment in early childhood. Here is a detailed analysis of the results:

- *Significant Increase in Environmental Awareness*

All PAUD involved showed a significant increase in posttest scores compared to pretest. This shows that the learning methods used have succeeded in increasing children's awareness and understanding of the importance of protecting the environment.

- *Difference in Improvement Rate*

PAUD C showed the highest increase in the average posttest score. This may be due to several factors, such as a more active parent participation rate, more conducive learning environment conditions, or more effective program implementation.

Early childhood education A and B also showed significant improvement, although slightly lower than early childhood education C. This still reflects the success of the program, but there may be factors that affect its effectiveness.

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- *The Important Role of Parents and Teachers*

The results of this study emphasize the importance of the role of parents and teachers in ecoliteracy education. The active involvement of both parties helps to strengthen the understanding and internalization of ecological values in children.

Recommendations

Based on the results of this study, several recommendations can be put forward to increase the effectiveness of ecoliteracy learning programs such as Training and Workshops, Learning Material Development, Monitoring and Evaluation, and Community Engagement. With the implementation of these recommendations, it is hoped that the family partnership-based ecoliteracy learning program can be more effective in instilling the character of caring for the environment in early childhood in various regions.

Conclusion

This study succeeded in developing and testing an ecoliteracy learning model based on family partnerships that is effective in improving the character of caring for the environment in early childhood in Bengkulu City. The results of the pretest and posttest in the three PAUDs showed a significant increase in children's understanding and awareness of environmental issues, which reflects the success of this learning program. Consistent improvement in grades across all schools involved shows that this learning model can be widely applied with positive outcomes.

The active involvement of parents and teachers in the learning process has proven to be a key factor in the success of this model. Through a collaborative and participatory approach, children gain a holistic and enjoyable learning experience, which helps them better internalize ecological values. Practical and interactive activities, such as tree planting and recycling, also make a great contribution in raising awareness and pro-environmental behaviour in children.

Overall, the family partnership-based eco-literacy learning model developed in this study can be used as a reference for environmental education programs in various regions. With support from the education office and the community, this program has the potential to have a long-term impact in increasing environmental awareness in the community. This study also emphasizes the importance of the role of parents and teachers as the first and main educators in instilling environmental care values in the younger generation

Competing of Interest: The author declare that there is No. conflict of interest in this work

Aknowledgement: This article is a part of an ongoing Doctoral study in Science Education, at Universitas Negeri Yogyakarta, Indonesia. We would like to thank to Ministry of Education for giving me the funding of this research Program Direktur Riset Teknologi & Pengabdian Masyarakat (DRTM). Indonesia. Year 2023.

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Journal of Ecohumanism
2024
Volume: 3, No: 5, pp. 1017 – 1027
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i5.3952

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