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Empowering Ecopedagogical Communities and Restructuring Environment-Based Early Childhood Education Curriculum in Coal Mining Regions

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Abstract: *The Early Childhood Education Curriculum should always be thoughtfully tailored to contextual conditions. For institutions situated in coal mining regions, an environmentally-based curriculum becomes imperative to address the ongoing exploitation of the environment. However, it has come to light that Early Childhood Education institutions in coal mining areas have not aligned their curricula with these contextual considerations. In response to this discrepancy, a Participatory Action Research (PAR) initiative was undertaken by a team of researchers collaborating with mentor subjects, who are Early Childhood Education teachers in the Hatungun, Binuang, Tapin Selatan, and Salam Babaris Districts. The overarching goal was to rectify this less-than-ideal situation. The series of PAR activities proved to be transformative, leading to the graduation of 38 community members equipped to design, implement, and evaluate environment-based Early Childhood Education practices. This achievement represents a significant step toward nurturing a generation of educators who can effectively engage with the unique challenges of coal mining regions, fostering sustainable and responsible approaches to education that align with the local environmental context. Ultimately, it paves the way for a more harmonious relationship between early childhood education and the environment, contributing to the broader goal of mitigating environmental exploitation.*

Keywords:
Early Childhood Education, Ecopedagogy, Environment-Based Curriculum, Environmental Damage, PAR

Introduction

The local economy in South Kalimantan, Indonesia, has been shaped by coal mining [1]. Coal mining drives the economy in Hatungun, Binuang, Salam Babaris, and

[1] Karina Shella Putri, Yuniar Siska Novianti, and Djoyakim Parulian Simanungkalit, "Sektor Pertambangan Dalam Rantai Pasokan Domestik Provinsi Kalimantan Selatan: Dampak Pengganda," *Jurnal*

South Tapin Subdistricts of Tapin Regency, South Kalimantan. A complex and important issue lies underlying economic prosperity: coal mining's environmental impacts [2]. This issue is global, not local to South Kalimantan. The conscious environmental movement has a tough battle as capitalist calamities continue [3]. Academics must promote eco pedagogy with community involvement. Eco pedagogy can gradually reveal school curricula's ignorance of sustainable living and environmental crises [4].

Eco pedagogy, which recognizes the complex relationships between humans and their environment, has become a popular lens for addressing these issues. Eco pedagogy holds that human actions, particularly coal mining, can have major environmental impacts. The connection of mankind and the natural world means that today's actions affect future generations. Despite being part of nature, humans prefer to exploit it without considering balance and sustainability [5][6]. It's no surprise that humans' desires degrade the environment. Progress often sacrifices pollution and contamination. Sadly, the existing ecological education system just teaches kids about the environment but not how to protect it or take responsibility for its devastation. Eco pedagogy teaches pupils that natural resources are limited and sustainable development must protect the environment [7].

The research team conducted preliminary research for this community engagement effort at Tunas Harapan Kindergarten, Hatungun. The curriculum of several early childhood education (ECE) near mining zones does not include eco pedagogy, according to early study. Also, coal businesses employ the people around these preschools. Because it challenges the political, economic, and cultural status quo of globalization and transnational capitalist expansion, eco pedagogy can face considerable challenges in establishing itself.

The research team found that Early Childhood Education (ECE) schools lacked school gardens despite adequate space. The curriculum in these institutions was a copy of others and lacked contextual study of the local environment, social dynamics, and culture. These environments are key to shaping curriculum ideals. A child's existing

GEOSAPTA 7, no. 2 (2021): 133–39.

[2] Nusa Idaman Said and Satmoko Yudo, "Status Kualitas Air Di Kolam Bekas Tambang Batubara Di Tambang Satui, Kabupaten Tanah Laut, Kalimantan Selatan," *Jurnal Teknologi Lingkungan* 22, no. 1 (2021): 048–057.

[3] Naomi Klein, *This Changes Everything: Capitalism vs. the Climate* (Simon and Schuster, 2015).

[4] Lyn Parker and Kelsie Prabawa-Sear, *Environmental Education in Indonesia: Creating Responsible Citizens in the Global South?* (Routledge, 2019).

[5] Holmes Rolston, "Feeding People versus Saving Nature?," in *The Ecological Community* (Routledge, 2014), 208–25.

[6] Justice Mensah, "Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review," *Cogent Social Sciences* 5, no. 1 (2019): 1653531.

[7] Helen Kopnina, "Education for the Future? Critical Evaluation of Education for Sustainable Development Goals," *The Journal of Environmental Education* 51, no. 4 (2020): 280–91; Greg William Misiaszek, "Ecopedagogy: Teaching Critical Literacies of 'Development','Sustainability', and 'Sustainable Development,'" *Teaching in Higher Education*, 2019.

knowledge and new concepts can align more seamlessly when considering the environmental, social, and cultural context. Children in these early childhood education facilities also learn from their environment, society, and culture.

In this preliminary research phase, the research team interviewed Early Childhood Education teachers about the environment, education for sustainable development, and environmental-based curricula. These interviews shed light on environmental education's challenges and prospects in early childhood education. The interviews showed that most teachers recognized mining exploration's environmental impacts. The destruction of forests and community plantations, increased flooding risk, dangerous voids, air pollution, and road damage were major challenges. This acknowledgement highlights the region's coal mining's environmental consequences and the need to resolve them.

The interviews showed that teachers recognized coal mining's economic benefits, adding complexity. They highlighted that it created many local jobs and boosted the local economy. This dual perspective shows how resource-rich cities must balance economic benefits and environmental drawbacks. It shows the complex relationship between economic growth and environmental protection, a key topic in sustainable development [8]. The interviews also showed that teachers felt unable to adequately teach sustainable development. They felt powerless because they believed the government and business groups should drive change. This shows the importance of working with stakeholders, especially teachers, to achieve sustainable development [9]. It shows that empowering teachers and improving their capacity to integrate environmental education into their curricula is key to progress [10]. The interviews also underscored that teachers' environmental-based curriculum focused on cleanliness, personal hygiene, and trash disposal. This limited scope shows the potential for expanding environmental education to include biodiversity conservation, sustainable resource management, and climate change awareness, which are essential for building environmental literacy in young learners.

This research examines community engagement in the complicated relationship between coal mining, capitalist development, and environmental impacts in South Kalimantan. It emphasizes the need for a fundamental shift in educational paradigms to encourage ecological consciousness, responsibility, and active participation in the local community. This community engagement also explores community-based eco

[8] Mark Stafford-Smith et al., "Integration: The Key to Implementing the Sustainable Development Goals," *Sustainability Science* 12 (2017): 911–19.

[9] Adesuwa Vanessa Agbedahin, "Sustainable Development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, Efficacy, Eminence, and Future," *Sustainable Development* 27, no. 4 (2019): 669–80.

[10] Deborah RE Cotton, "Implementing Curriculum Guidance on Environmental Education: The Importance of Teachers' Beliefs," in *Curriculum and Environmental Education* (Routledge, 2019), 298–314.

pedagogy; where teachers, particularly those in coal-mining districts, shape educational curricula. Curriculum reform aims to create a sustainable generation by establishing a real appreciation for the environment and ecological knowledge in young learners [11]. The community engagement also considers unchecked environmental exploitation's long-term effects. It recognizes that today's actions will affect future generations. Eco pedagogy's basic values of nurturing responsibility and environmental sustainability match with the need to combat and ameliorate environmental degradation's long-term effects [12].

An Eco pedagogy community of preschool teachers in service regions can replace traditional environmental education, which oversimplifies the environmental situation without considering its social, cultural, and environmental implications. This community service highlights coal mining's environmental effects and preschools' remedies. As the earliest educational institutions, ECE in mining areas must create environmentally-based curricula to inspire a love of nature. The reform of this curriculum, however tiny, is a key step toward reducing environmental exploitation and achieving sustainable community development.

Method

This community engagement uses PAR. PAR attempts to raise community awareness, shift perceptions, and start transformative movements to improve the disadvantaged conditions of intervention subjects [13]. Collective self-experimentation based on data, facts, and learning. PAR must be "with" people rather than "on" or "for" them, making intervention subjects the driving force.

Due to various aspects, Participatory Action Research (PAR) is ideal for building an environment-based curriculum and incorporating Eco pedagogy into early childhood education. First, PAR emphasizes community involvement in curriculum development, including teachers, parents, and local stakeholders. This makes the program contextually relevant to neighbourhood environmental challenges and opportunities. Second, PAR encourages collective decision-making and collaboration, involving a variety of stakeholders to contribute their expertise, resulting in a curriculum that reflects varied viewpoints and requirements.

PAR is action-oriented, moving beyond theory to transform teaching, classroom, and community participation. It smoothly integrates environmental education into daily

[11] Julie M Davis, *Young Children and the Environment* (Cambridge University Press, 2014).

[12] Mercedes Varela-Losada et al., "Going to Action? A Literature Review on Educational Proposals in Formal Environmental Education," *Environmental Education Research* 22, no. 3 (2016): 390–421.

[13] Stephen Kemmis et al., "Introducing Critical Participatory Action Research," *The Action Research Planner: Doing Critical Participatory Action Research*, 2014, 1–31; Stephen Kemmis, Robin McTaggart, and Rhonda Nixon, "The Action Research Planner: Doing Critical Participatory Action Research," 2014.

teaching and learning by connecting environmental theory and practice [14]. PAR also encourages researchers to immerse themselves in the community to understand the local context and address community-specific environmental challenges. PAR encourages participants, including teachers and students, to own the research process and results, making them change agents for environmental awareness and sustainable practices. This strategy promotes community responsibility and engagement. PAR's cycle of reflection, evaluation, and adaptation [15] matches the dynamic nature of environmental challenges and eco pedagogy, allowing for curriculum reform and refinement. PAR may transform individuals and society. A PAR approach to mainstreaming eco pedagogy in early childhood education can foster a culture of environmental awareness and sustainability in communities, resulting in social transformation and future environmental responsibility.

The intervention targets kindergarten teachers in Hatungun, Binuang, South Tapin, and Salam Babaris. Hatungun subdistrict has 24 teachers: 3 PNS and 21 honorary. In Binuang subdistrict, 16 PNS and 53 honorary teachers total 69. In South Tapin subdistrict, 17 PNS and 52 honorary teachers make up 69 teachers. Salam Babaris subdistrict has 27 teachers, 4 of whom are PNS and 23 honorary. Only 43 teachers are participating in community engagement activities to improve their environment-based curriculum development skills.

Researchers must follow these procedures to adopt the aforementioned strategy:

First, Researchers undertake preliminary study to investigate community perceptions of environmental conservation and identify concerns relating to human-environment relationships in the area.

Second, Community Organizing. Researchers build a community from intervention subjects, examine problems, and collaborate on solutions. The goal is a coherent community, not the number of people. After creating a priority-based problem matrix for environmental conservation and eco pedagogy, academics and the community collect ideas, explore resources, and create a methodical action plan.

Third, Action. Planned activities are implemented progressively, simultaneously, and collaboratively in this phase. The community is guided to develop eco pedagogy leaders during this action phase.

Fourth, Evaluation. Assesses if action plan implementation meets community framework and results in changes. If not, researchers and the community must adjust their policies and strategies.

[14] Ioan Fazey et al., "Ten Essentials for Action-Oriented and Second Order Energy Transitions, Transformations and Climate Change Research," *Energy Research & Social Science* 40 (2018): 54–70.

[15] Jacques M Chevalier and Daniel J Buckles, *Participatory Action Research: Theory and Methods for Engaged Inquiry* (Routledge, 2019).

Results

Community Organizing

1. Formation of Eco pedagogy Catalyst Group

The catalyst group was formed by contacting numerous Early Childhood Education (ECE) teachers who had consistently responded positively to early childhood education development conversations in their communities. Ms. Nadhirah (South Tapin), Mita (Salam Babaris), and Mr. Noripansyah (Binuang). These three ECE teachers were expected to lead local initiatives to persuade, organize support, and mobilize other ECE teachers to improve teacher competencies and environmental responsiveness.

The research team, university students, and local leaders organized a WhatsApp (WA) group to address early childhood education implementation challenges in their localities. Focus group discussion (FGD) included these findings: ECE curriculum not adapting to the environment; ECE teachers' learning design creativity stagnates; Passive ECE teachers' responses to mining-related environmental degradation.

Local leaders then invited many colleagues to help ECE teachers improve capability. WA also issued education department appeal letters to ECE teachers in Binuang, Hatungun, Salam Babaris, and South Tapin districts to join this initiative. Recruiting catalysts used Google Forms. 43 ECE teachers from 27 institutions committed to the PAR action during the seven-day recruitment period.

2. Mapping Problem Tree

ECE catalyst groups held their first online FGD to identify the key concerns and core causes of the three difficulties. FGD facilitators and moderators were the research team. The catalytic teacher groups then identified three core causes of the key issues: a. ECE teachers lack skills because most graduated from high school. b. A lack of competence improvement awareness due to rare training or knowledge. In addition, low institutional financing inhibited training. c. ECE courses mostly copied other schools. The setting of their environment prevented teachers from creating their own curriculum.

ECE teachers needed to conduct many steps, provided as training themes, to attain perfect conditions. ECE teachers needed to learn more about active learning through play to limit their use of Student Activity Sheets. Second, they should communicate with parents to strengthen relationships. Parents ran the distance learning program while teachers advised. Communications must be harmonic for the learning program to succeed. Third, teachers should improve their ability to create a curriculum that takes into account the institution's environmental, social, and cultural factors. A contextual curriculum could engage kids in learning by connecting them to the topics.

3. Pre-test

Conducting pre-tests to assess teachers' understanding and competencies in eco pedagogy and environment-based curriculum is essential for improving the quality of environmental education, fostering environmental stewardship, and addressing global environmental challenges. It provides a foundation for targeted interventions and long-term positive impacts on both teachers and students.

Table 1. Pre-Test Results of Teachers' Understanding of The Concept of Ecopedagogy and Environment-Based Curriculum

Statement	Percentage				
	Very Low	**Low**	**Medium**	**High**	**Very High**
Teachers can explain key concepts in eco pedagogy such as natural cycles, biodiversity, and human environmental impacts in depth	19.4	68.2	12.4		
Teachers can identify the relationship between education, culture, and sustainability in the context of eco-pedagogy.		65.6	34.4		
Teachers understand how environmental values and environmental awareness can be integrated into the learning process.		68.8	31.3		
Teachers can outline their role in teaching social and environmental responsibility to children.		46.9	53.1		
Teachers have in-depth knowledge of sustainable practices relevant to early childhood education.	6.2	55.8	38.0		
Teachers understand the importance of integrating an eco pedagogical perspective in all aspects of the ECE curriculum	3.1	68.8	28.1		
Teachers can detail how sustainable education contributes to shaping children's behavior and thinking towards the environment.		46.9	53.1		
Teachers can critically assess environmental problems and provide solutions based on eco pedagogy.		65.6	34.4		

This analysis highlights areas where teachers in early childhood education have room for improvement in their understanding of eco-pedagogy and environment-based curriculum. Professional development and training programs that focus on these specific areas can help teachers enhance their knowledge and skills, ultimately benefiting the quality of environmental education in early childhood settings.

Table 2. Pre-test Results of Teacher Competency in Designing and Implementing an Environment-Based Curriculum in ECE

Statement	Percentage				
	Very Low	Low	Medium	High	Very High
Teachers can integrate eco pedagogical concepts into lesson plans		78.1	21.9		
Teachers can use eco pedagogy-based teaching methods	3.1	68.8	28.1		
Teachers can form environmentally friendly thoughts and behavior in children through concrete examples.	3.1	59.4	37.5		
Teachers can involve children in activities that connect them directly with nature and the environment	3.1	68.8	28.1		
Teachers can collaborate with local communities or environmental organizations to integrate eco pedagogical perspectives in learning	34.1	58.9	7.0		
Teachers can develop and implement continuing education projects in the ECE curriculum	3.1	59.4	37.5		
Teachers can involve parents and families in efforts to teach social and environmental responsibility to children		59.4	40.6		
Teachers can regularly evaluate the effectiveness of the eco-pedagogy-based ECE curriculum used	27.9	52.7	19.4		
Teachers actively seek feedback from children and peers to improve the curriculum	27.9	52.7	19.4		
Teachers can continually improve their understanding of environmental issues and sustainable education.	6.2	55.8	38.0		

The data indicates that there is a significant need for professional development and training to enhance teachers' competencies in integrating Eco pedagogical concepts into their lesson plans and using eco-pedagogy-based teaching methods effectively. It also highlights the importance of fostering environmentally friendly behavior in children and involving them in nature-related activities. Collaboration with local communities and consistent curriculum evaluation are areas that require attention. Encouraging teachers to seek feedback and continuously improve their understanding of environmental issues is essential for the successful implementation of environment-based curriculum and eco-pedagogy in early childhood education.

Action Plan

The improvement of competencies and capacities for ECE teachers in developing environmentally based curricula was presented asynchronously through the flipped classroom model. The selection of this format aimed to provide more time for teachers to deepen their understanding of the materials before discussing them and creating action plans during face-to-face sessions. The research team would facilitate the presenters in creating videos related to the agreed-upon themes by the catalyst groups. The online competency enhancement utilized the WhatsApp (WA) application and

Google Classroom. The team then developed a schedule for theme distribution in line with the problem tree's problem-solving flow. Each theme shared had a specific timeframe for study and discussion within the WA or Google Classroom groups.

Each theme would include two types of follow-ups: reflective and progressive, with a composition of 60% for reflective follow-ups and 40% for progressive follow-ups. This composition was determined by the belief that ECE teachers possessed valuable assets as early childhood education facilitators, namely their experiences and analyses of issues they had encountered.

Reflective follow-ups aimed to introduce ECE teachers to the SWOT analysis process so they could empower themselves to address various issues in early childhood education at their institutions and generate innovative ideas to advance their institutions. Progressive follow-ups aimed to lead to improvements. These efforts are related to enhancing the competency of ECE teacher groups in developing locally-based environmental curricula. Facilitator guidance played a crucial role in the success of this competency enhancement because, in essence, the majority of ECE teachers did not have backgrounds in early childhood education or psychology, as mandated by law. These different backgrounds undoubtedly made it challenging for them to formulate early childhood education curricula while considering their surrounding contexts.

1. Understanding Early Childhood Education Challenges

Identifying early childhood education concerns, ECE teachers are invited to reconsider their profession's obstacles. ECE teachers must reflect on their strengths and weaknesses. Every teacher, regardless of level, should reflect to improve their teaching and adapt to children's requirements. Making contemplative practice a habit is rare. Teachers can empower themselves and increase their desire for continual learning to handle education difficulties through reflection. This theme covers early childhood education (ECE) difficulties. Five sub-themes focus on specific features of this educational milieu.

a. Identifying concerns in education: The main goal is to gain a comprehensive grasp of early childhood education challenges within the educational system. These obstacles may include curriculum inadequacies, resource shortages, or structural barriers that affect ECE.
b. Identifying concerns inside ECE institutions: This sub-theme focuses on difficulties unique to ECE institutions. This may involve examining infrastructure, teaching methods, or educational institution administration issues.
c. Identifying teaching challenges: This sub-theme explores the particular issues early childhood teachers face due to their importance. These problems may include training and professional development gaps, resource limits, or difficulty engaging young learners.

d. Identifying Parental involvement: Parental involvement in early education is crucial. This sub-theme explores the obstacles parents have in supporting their child's education, including awareness, accessibility, and resources.
e. Identifying issues faced by children: Finally, the focus changes to the children's struggles. These issues may include access to quality education, diverse and interesting learning experiences, or educational environment adaptation.

The ECE community may gain a thorough understanding of early childhood education concerns by carefully recognizing and acknowledging these challenges, including those that may seem minor or neglected. Recognizing these issues is the first step to solving them. After this topic investigation, ECE teacher groups hold focus group discussions (FGDs) to brainstorm and solve their problems. This collaborative approach ensures well-informed responses that can improve early childhood education.

2. Synergizing School-Home Relationships

This theme has four sub-themes: collaboration between teachers, parents, and the community in education; correcting parents' and the community's perceptions of early childhood education; fostering harmonious and synergistic communication between teachers and parents; and involving parents in planning, implementing, and evaluating distance learning.

The teachers stress the significance of dispelling parents' misconceptions about ECE early childhood education. It shows that many parents think ECE's success depends on its capacity to teach their children early literacy. Teachers argue that this perception needs to be altered and enlarged. It claims that parents may not realize that six important components of child development must be encouraged beyond early reading. The six aspects likely include cognitive, physical, social, emotional, and creative child development. The teachers recommend that teachers offer parents this broad understanding through parenting.

The teachers also stress the importance of early parenting. Parenting is a perfect opportunity to explain the school's educational agenda and cooperatively cultivate these six developmental qualities. Teachers emphasize parenting as a way of communication to emphasize that parents are responsible for education. Parents are portrayed as the child's primary teachers, highlighting their importance in early development.

Teachers also provide practical suggestions on engaging parents. It advises teachers to use Facebook, Instagram, YouTube, and WhatsApp groups to tell parents about ECE activities. It emphasizes the significance of tailored teacher-parent communication about children's activities and growth. This tailored approach helps teachers acquire parental attention, respect, and support for holistic early childhood education.

Eco pedagogy in Early Childhood Education

The theme of "Implementation of Eco pedagogy in Early Childhood Learning" is to extend teachers' viewpoints and increase their environmental awareness in early childhood education. Subthemes include "education for sustainable development (ESD)" and "the implementation of eco pedagogy in early childhood learning."

First, the subject highlights the need to increase teachers' environmental awareness and encourage them to include it in their lessons. It emphasizes that teachers must always remember that humans are part of a wider ecology. This increased awareness helps people realize their interconnectedness with other living things. It questions the long-held belief that humans govern the ecosystem and use nature to satisfy their needs. If human progress peaks while nature is destroyed, what does that mean?

Environmental awareness is expanding, as seen by Adiwiyata schools, according to teachers. However, it highlights the idea that Adiwiyata is only a competition. In contrast, it states that the Adiwiyata program aims to ensure sustainable education. Eco pedagogy in early childhood education involves teaching children about their social and environmental environments. Eco pedagogy involves teachers taking pupils to streets, rivers, forests, mountains, and seas. It also introduces kids to animal and plant views. This immersive method follows eco pedagogy, which uses play and learning to promote social justice, environmental awareness, health, and sustainability.

3. Improving teacher skills in developing an environment-based curriculum

This theme has three major sub-themes:

First, Overview of Independent Curriculum Development. This sub-theme underpins curriculum reorganization. It stresses the necessity for independent, customized curricula for early childhood education. Including environmental topics in the curriculum is vital. In mining-affected areas, the curriculum must incorporate themes of environmental love and the negative effects of environmental destruction. This requires a more holistic and culturally relevant curriculum development method.

Second, Creating Environment-Based Learning Modules: This sub-theme explores curriculum development through the construction of practical learning modules with environmental themes. These lessons give young learners significant environmental awareness and sustainability experiences. The programs encourage early childhood learners to understand the environment and behave responsibly.

Third, Developing the Pancasila Student Profile to Promote Environmental Love. The final sub-theme emphasizes early childhood education's goals, including character and ethical development. According to Indonesia's national philosophy, Pancasila, the Pancasila student profile describes the desired traits of students. This sub-theme emphasizes environmental love and responsibility to build students' character.

This subject emphasizes the necessity to incorporate environmental education into early childhood curricula, especially in environmentally degraded areas. This integration addresses environmental issues like mining proactively. When developing environment-based curricula, institutions should consider geographic diversity, resource potential, facility and infrastructure disparities among educational institutions, socio-cultural differences, and each institution or foundation's unique characteristics. This ensures that curricula are relevant and flexible to their environments.

Evaluation

Evaluation of the community service program with an environment-based curriculum topic aims to improve its design and implementation. Evaluation helps uncover areas for improvement and accelerates goal achievement. The evaluation is also expected to show how the program has helped Kab. Tapin early childhood education (ECE) teachers create environmentally-based curricula and instill a love of nature in their students. Evaluation lets implementers show program success or growth. The information collected can help communicate the program's impact, which is important for community relations.

All ECE teachers are assessed individually for this community outreach and mentorship activity. A pre-test determines teachers' beginning knowledge and skills about the materials to be acquired, especially in creating and implementing learning activity curricula. Follow-up assessments are also given after each module topic. If a teacher member cannot fulfill the minimal follow-up target, facilitators and the organizing committee will help. Committee help may include deadline extensions and activity relaxation. Facilitators host extensive and individual consultations and conversations. Participants can help by sharing views and follow-up results.

ECE teachers initially questioned this assessment method because they thought it would make participants too dependent on others' results. Facilitators clarified that assessment is not evaluation. Assessment strives to increase individuals' abilities, not explain their developmental bounds. Collaboration is needed for all ECE teachers to meet capacity-building targets. The ultimate goal is a common vision. once the capacity-building phase, the research team will evaluate all ECE teachers once they get the material, complete follow-ups, and take individual evaluations. This evaluation measures teachers' skill growth.

Table 3. Post-test results of teachers' understanding of the concept of eco pedagogy and environment-based curriculum

Statement	Very Low	Low	Medium	High	Very High
Teachers can explain key concepts in eco pedagogy such as natural cycles, biodiversity, and human environmental impacts in depth				45.9	53.1
Teachers can identify the relationship between education, culture, and sustainability in the context of eco-pedagogy.				65.6	34.4
Teachers understand how environmental values and environmental awareness can be integrated into the learning process.				68.8	31.3
Teachers can outline their role in teaching social and environmental responsibility to children.				78.1	21.9
Teachers have in-depth knowledge of sustainable practices relevant to early childhood education.				56.2	43.8
Teachers understand the importance of integrating an eco pedagogical perspective in all aspects of the ECE curriculum				65.9	34.1
Teachers can detail how sustainable education contributes to shaping children's behavior and thinking towards the environment.			3.9	68.2	27.9
Teachers can critically assess environmental problems and provide solutions based on eco pedagogy.				50.4	49.6

Attending a PAR program provides teachers with a holistic and experiential learning opportunity. Through active engagement, collaborative learning, and reflective practice, teachers can develop a deeper and more nuanced understanding of eco-pedagogy concepts and the implementation of an environment-based curriculum. This increased understanding is not only beneficial for their professional growth but also enhances the quality of environmental education in early childhood settings.

Table 4. Post-test Results of Teacher Competency in Designing and Implementing an Environment-Based Curriculum in ECE

Statement	Very Low	Low	Medium	High	Very High
Teachers can integrate eco pedagogical concepts into lesson plans			3.1	68.8	28.1
Teachers can use eco-pedagogy-based teaching methods				52.7	47.3
Teachers can form environmentally friendly thoughts and behavior in children through concrete examples.				28.7	71.3
Teachers can involve children in activities that connect them directly with nature and the environment				44.2	55.8
Teachers can collaborate with local communities or environmental organizations to integrate eco pedagogical perspectives in learning			19.4	68.2	12.4
Teachers can develop and implement continuing education			6.2	55.8	38.0

projects in the ECE curriculum			
Teachers can involve parents and families in efforts to teach social and environmental responsibility to children		59.4	40.6
Teachers can regularly evaluate the effectiveness of the eco-pedagogy-based ECE curriculum used	10.1	55.8	34.1
Teachers actively seek feedback from children and peers to improve the curriculum		55.8	44.2
Teachers can continually improve their understanding of environmental issues and sustainable education.		65.1	34.9

PAR offers teachers a dynamic and experiential learning process that directly enhances their competency in integrating eco pedagogical concepts and environmental education into their teaching practices. By actively engaging in research, experimentation, collaboration, and reflective practice, teachers develop practical skills and a deeper understanding of how to effectively convey eco pedagogical concepts to their students and promote environmentally responsible behaviors. PAR empowers teachers to take ownership of their professional growth and contribute positively to the education and development of young learners.

The evaluation of the teachers' understanding and competence in designing and implementing environment-based curricula and mainstreaming eco-pedagogy in early childhood learning has shown significant progress. However, it is important to note that five participants did not complete their assignments, both in terms of follow-up and the collection of curriculum files. Despite this, the evaluation of the 43 participants resulted in 38 individuals passing the program successfully.

Among the successful participants, an impressive seven individuals received an "excellent" rating. These teachers who received an "excellent" rating represent a highly competent and dedicated group within the program. Their achievements reflect their exemplary understanding, skills, and commitment to environmentally-based curricula and Eco pedagogical principles. These "excellent" teachers hold great potential to become role models for their peers and the broader educational community

Discussion

The research team analyzed environment-based curriculum-based community service program outcomes. The hope tree's main goal was to improve teachers' ability to organize, implement, and assess environmentally-oriented learning activities. The research team first used persuasion to get participants to talk about their teaching strategies. This definition of persuasion means using communication to persuade. Persuasion helped the research team build trust and expectations with participants. Persuasion involved disseminating information and encouraging engagement to ensure that the study team and participants understood and agreed on the importance of their joint efforts.

In the beginning, many program participants were comfortable with their

teaching and learning approaches. In the "comfort zone" psychological state, people feel comfortable and in charge because everything is familiar. Thus, these participants were reluctant to self-reflect or modify their teaching and learning methods[16]. In-depth interviews with these individuals revealed that their discontent with the teaching profession, particularly early childhood education, was one of the main reasons they were reluctant to venture outside their comfort zones. This occupation didn't satisfy their expectations, and the community and government agreed.

Many early childhood teachers experienced severe problems, which affected their teaching quality[17]. Insufficient compensation was a major issue. This meant they were underpaid, which hampered their commitment and excitement for teaching[18]. Educational services for young children suffered because teachers were often demotivated and unable to commit resources to improve learning. The community also misunderstood early childhood teachers. Many community members saw them as caregivers or playmates rather than teachers who shaped early childhood development[19]. This misperception caused a discrepancy between teachers' classroom plans and parents' and children's home activities. Because teachers and parents didn't work together to provide a consistent and effective learning environment, young children's overall development suffered[20].

Early childhood teachers faced additional obstacles due to intermittent capacity-building training programs. Even when such training was provided, teachers faced extensive waiting lists, limited participant quotas, and often personal fees to participate. Many of these teachers could not afford training given their low pay. This lack of professional development prohibited them from improving their skills and expertise, impacting the quality of their instruction for young children[2122].

Participatory Action Research (PAR) transforms early childhood teachers' views on learning. This movement is obvious as they move from Learning Activity Sheets (LKS) to an environment-based curriculum with eco-pedagogy to address

[16] Kathleen Riley and Kathryn Solic, "'Change Happens Beyond the Comfort Zone' Bringing Undergraduate Teacher-Candidates Into Activist Teacher Communities," *Journal of Teacher Education* 68, no. 2 (2017): 179–92.

[17] Fekede Tuli Gemeda, Massimiliano Fiorucci, and Marco Catarci, "Teachers' Professional Development in Schools: Rhetoric versus Reality," *Professional Development in Education* 40, no. 1 (2014): 71–88.

[18] Paula McDonald, Karen Thorpe, and Susan Irvine, "Low Pay but Still We Stay: Retention in Early Childhood Education and Care," *Journal of Industrial Relations* 60, no. 5 (2018): 647–68.

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[20] Janet Goodall and Caroline Montgomery, "Parental Involvement to Parental Engagement: A Continuum," *Educational Review* 66, no. 4 (2014): 399–410.

[21] Marie Paz E Morales, "Participatory Action Research (PAR) Cum Action Research (AR) in Teacher Professional Development: A Literature Review.," *International Journal of Research in Education and Science* 2, no. 1 (2016): 156–65.

[22] Pierre Du Plessis and Raj Mestry, "Teachers for Rural Schools–a Challenge for South Africa," *South African Journal of Education* 39 (2019).

environmental issues in Early Childhood Education (ECE) schools. PAR educates teachers about the environment. They can fully understand the environmental challenges impacting their local ECE institutions. Teachers comprehend their local environmental issues, from pollution to deforestation and habitat deterioration. This understanding motivates teachers to address these difficulties in their teaching techniques. The focus of schooling has changed. After leaving LKS, teachers realize the importance of including environmental themes and sustainability in their lessons. This shift expands instruction beyond academic disciplines. It emphasizes the complex relationship between humans and the environment and the necessity for holistic, environmentally sensitive education[23].

PAR increases teachers' responsibility. They become more committed to teaching young children about the environment. These early experiences shape lifetime environmental attitudes and practices, according to teachers. They must give an environmentally focused education due to this increased duty. The program incorporates eco-pedagogy. Teachers should use holistic, nature-centered strategies. Outdoor classrooms, nature excursions, and hands-on experiences immerse youngsters in nature. This method inspires surprise, curiosity, and ecological awareness in young learners[24][25].

PAR empowers teachers to shape curriculum and pedagogy. They collaborate with the school, local communities, parents, and environmental organizations to create information and educational experiences. This collaborative method enhances learning and helps teachers handle environmental issues. Teachers also see education as a long-term strategy to create responsible, environmentally concerned citizens[26]. They realize their job extends beyond the classroom to society and the environment. This perspective informs their teaching and learning. Tyler's curriculum development process focuses on answering key questions regarding the curriculum's purpose, the experiences it should provide, effective learning experience structuring, and goal-setting criteria. This perspective indicates that teaching and curriculum creation should integrate environmental education in addition to subject-specific information.

Teachers also adjust to environmental deterioration near ECE institutions. They

[23] Paniagua Alejandro and Istance David, *Educational Research and Innovation Teachers as Designers of Learning Environments The Importance of Innovative Pedagogies: The Importance of Innovative Pedagogies* (OECD Publishing, 2018).

[24] Wei-Ta Fang, Arba'at Hassan, and Ben A LePage, "Introduction to Environmental Education," in *The Living Environmental Education: Sound Science Toward a Cleaner, Safer, and Healthier Future* (Springer, 2022), 3–24.

[25] Miren Elorz Hernáez, "Fostering Environmental Preservation through Experiences in Nature in Early Childhood Education," 2022.

[26] Therese Ferguson, Carmel Roofe, and Loraine D Cook, "Teachers' Perspectives on Sustainable Development: The Implications for Education for Sustainable Development," *Environmental Education Research* 27, no. 9 (2021): 1343–59; Deniz Saribas, "Investigating the Relationship between Pre-Service Teachers' Scientific Literacy, Environmental Literacy and Life-Long Learning Tendency.," *Science Education International* 26, no. 1 (2015): 80–100.

innovate to give great education in challenging environments. This versatility helps them overcome obstacles and provide impactful learning experiences. PAR inspires teachers to promote sustainability and environmental education. They participate in school and community awareness programs. Their advocacy efforts aim to inspire environmental protection and leave a lasting influence.

Early childhood environmental education shapes environmentally sensitive and responsible people. Six main aims promote the complete development of young learners. First, it raises awareness of environmental issues among children. Second, it educates about the environment[27]. Thirdly, it encourages ecologically conscious behavior, enabling youngsters to make responsible choices[28]. Fourth, it teaches students environmental problem-solving[29]. Fifth, it encourages children to protect the environment[30]. Finally, it promotes holistic evaluation to improve environmental understanding[31]. Environmental education creates a generation of people who are aware of environmental issues and driven to solve them, assuring a sustainable and ecologically responsible future.

Conclusion

Early Childhood Education holds a pivotal role in shaping a child's educational journey, as it operates during their formative years. However, the effectiveness of these institutions is at risk when they lack quality educators, potentially leading to a wasted critical developmental period. In certain regions, the creativity of Early Childhood Education teachers in designing, executing, and assessing learning activities has been notably lacking. The root cause of this deficiency often lies in the insufficient qualifications and competencies of many Early Childhood Education teachers. Moreover, a fundamental issue within these institutions is the implementation of a curriculum that fails to consider contextual factors.

To address this less-than-ideal situation, a transformative journey was undertaken through Participatory Action Research (PAR). This collaborative effort involved researchers and mentor subjects, who are Early Childhood Education teachers from Hatungun, Binuang, Tapin Selatan, and Salam Babaris Districts. The PAR journey

[27] Deniz Deniz, "Sustainable Thinking and Environmental Awareness through Design Education," *Procedia Environmental Sciences* 34 (2016): 70–79.

[28] Norris I Erhabor and Juliet U Don, "Impact of Environmental Education on the Knowledge and Attitude of Students towards the Environment.," *International Journal of Environmental and Science Education* 11, no. 12 (2016): 5367–75.

[29] Lenny Prastiwi, Diana Vivanti Sigit, and Rizhal Hendi Ristanto, "Ecological Literacy, Environmental Awareness, Academic Ability and Environmental Problem-Solving Skill at Adiwiyata School," *Indonesian Journal of Science and Education* 3, no. 2 (2019): 82–92.

[30] Maria Hedefalk, Jonas Almqvist, and Leif Östman, "Education for Sustainable Development in Early Childhood Education: A Review of the Research Literature," *Environmental Education Research* 21, no. 7 (2015): 975–90.

[31] Siegmar Otto and Pamela Pensini, "Nature-Based Environmental Education of Children: Environmental Knowledge and Connectedness to Nature, Together, Are Related to Ecological Behaviour," *Global Environmental Change* 47 (2017): 88–94.

commenced with an observation of the actual conditions faced by mentor subjects, followed by an inculturation process encouraging them to self-reflect and embrace change willingly. Subsequently, a community was formed by recruiting as many mentor subjects as possible. This community engaged in focused discussions to unearth the core issues plaguing the Early Childhood Education learning process, culminating in the creation of a "tree of hope." The final phase involved community-led actions to bring this vision to fruition. As a result, the PAR activities concluded with the certification of 38 community members equipped with the skills to design, implement, and evaluate environmentally-based Early Childhood Education activities. This achievement signifies a promising step toward nurturing a generation of educators capable of harmoniously integrating education with the environment, ultimately fostering responsible and sustainable educational practices.

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