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The Impact Of A Nature-Based Environmental Education Programme: The Importance Of Environmental Knowledge And The Connection To Nature In Fostering Ecological Behaviour And Attitudes In Children

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ABSTRACT
The available evidence on the influence of nature-based training on pro-environmentalism is equivocal, mostly due to the limited number of controlled studies undertaken on this subject. This complicates the ability to establish causal relationships and provide guidance for treatments. The researchers provide the findings of an experiment that examined the impact of a "nature-based environmental education (NBEE)" programme on children's environmental attitudes (EA) & behaviours (EB) within their school curriculum. The children who took part in the project but traditionally got their education were used as the control group for the project. Spain has a total of seven elementary schools that participated in the scheme. Each school randomly assigned courses to either the NBEE curriculum or the "environmental education (EE)" programme, which was taught using traditional teaching methods. Based on our study's results, the group that took NBEE saw a much higher increase in children's EA compared to the group which received the control. Over time, the occurrence of EB in both groups of children remained rather constant on average. Based on our findings, academics highly advocate for the increased use of nature-based pedagogy in formal education to enhance children's environmental attitudes.

Keywords: *Nature Environmental Education, Environmental Attitudes, Environmental Behaviour, Environmental Knowledge.*

1. INTRODUCTION

Understanding how educational techniques impact ecological behaviour and attitudes is vital in an age when environmental problems are becoming more serious. Environmental education that takes place in natural environments, or "nature-based environmental education," is an exciting new field of study. The idea behind this method is that kids may learn more about the environment and develop a stronger connection with nature if they spend time outside playing (Collado et al., 2020).

You can't put a price on environmental education; it gives people the tools they need to spot and fix environmental problems. A similar correlation exists between more sustainable practices and favourable attitudes towards the environment and a deep feeling of oneness with the natural world, which is often fostered via hands-on learning experiences (Mullenbach et al., 2019). Researchers can learn more about the effects of nature-based education on kids' environmental consciousness and action if researchers investigate these connections. In this article, researchers will explore how teaching children about nature in the classroom may help them develop a deep concern for the environment and a better grasp of environmental concerns (Bhola et al., 2022). Responsible ecological behaviours and attitudes may be fostered via an examination of the relationship between environmental knowledge, a sense of belonging to nature, and these two factors acting together. If researchers want to create educational programmes that encourage environmental sustainability and produce a new generation of ecologically conscious citizens, researchers must have a firm grasp of these processes (DeVille et al., 2021).

In conclusion, our study shows that nature-based education can bring about significant changes in ecological consciousness and action by moulding children's environmental views and actions.

2. BACKGROUND OF THE STUDY

As a whole, educational philosophy or environmental consciousness has changed throughout the last century, and with it, the idea of nature-based environmental education. Environmental education may trace its origins back to the conservation movements of the late 19th and early 20th centuries when people began to realise the critical need to be aware of and manage the world's natural resources (Rosa & Collado, 2019). John Muir and Aldo Leopold were pioneers who emphasised the need to cultivate a strong connection between humans and their natural surroundings and the inherent worth of nature. Environmental education became more structured in the middle of the twentieth century when the environmental movement gained momentum due to publications such as "Silent Spring". At this time, the focus shifted from conservation to a more holistic view of ecosystems and long-term viability. The 1990s saw the rise of environmental

education advocacy groups like the National Environmental Education Foundation, which sought to mainstream environmental studies into school curricula and promote hands-on learning experiences (Yamanoi et al., 2021).

There was an explosion of studies documenting the benefits of outdoor education in the late 90s and early 2000s. Educators and scholars started to notice that kids weren't always adequately engaged with nature in conventional classrooms (Křepelková et al., 2020). As a result, methods of instruction that prioritised outside exploration and practical application in authentic environments began to emerge. According to studies, these approaches not only increased environmental literacy but also helped people develop a deeper affinity for the natural world. Building on these results, further research shows that ecological attitudes and actions are strongly correlated with environmental literacy and a sense of belonging to the natural world. For example, there is a correlation between children's frequent participation in nature-based activities and their later adoption of eco-friendly practices and values. This modern viewpoint highlights the significance of incorporating nature-based education into school programmes to produce ecologically sensitive offspring (Staples et al., 2019).

3. PURPOSE OF THE RESEARCH

This research aims to investigate the effects of nature-based environmental education on children's environmental literacy and sentiments of belonging to the natural world. The study's overarching goal is to ascertain the extent to which these elements influence eco-conscious actions and perspectives. The study's overarching goal is to inform the creation of more effective environmental education policies and practices by illuminating how nature-based education promotes ecologically conscious actions and optimistic views of sustainability.

4. LITERATURE REVIEW

In recent years, environmental education (EE) that takes place in natural settings has grown in popularity as a strategy to teach kids about the environment and encourage them to live more sustainably. There is strong evidence that educational programmes that immerse students in nature have a profound effect on students' environmental literacy (Tiberio & Du Mérac, 2023), sense of belonging in the natural world, and eco-conscious actions. The importance of environmental education in fostering ecological literacy has been highlighted by earlier research. As an example, compared to more conventional classroom methods, children's environmental knowledge is significantly enhanced by experience learning in natural environments. To take educated action on environmental challenges, it is essential to have this knowledge, which includes an understanding of ecological systems (Yılmaz et al., 2020).

A sense of oneness with the natural world is also important. An individual's emotional connection to the natural world has been shown to impact their attitudes and behaviours towards the environment. A deeper connection to nature is often developed in children who participate in outdoor activities regularly. More pro-environmental activities and a smaller ecological impact are associated with this correlation to better environmental attitudes and behaviours (Wilkie & Trotter, 2022). More recent research has expanded upon these results by investigating the relationship between environmental literacy and a sense of belonging in the natural world. More sustainable behaviours in youngsters are associated, for instance, with both more environmental literacy and a deep connection to nature. It follows that programmes aimed at educating people about nature that include both of these aspects are likely to have better success. Also, several studies stress how important it is for kids to develop a strong mental and emotional connection to nature in the classroom. In addition to improving environmental attitudes, these kinds of interactions pave the way for the formation of environmentally conscious habits that last a lifetime (Kosta et al., 2022).

It is concluded from the research that environmental education that takes place in natural settings increases students' understanding of the environment and their emotional investment in protecting it. The importance of educational methods that include children in meaningful, nature-rich learning experiences is highlighted by the fact that these elements together impact ecological behaviour and attitudes (Whitburn, 2020).

5. RESEARCH QUESTION

i. How to understand the importance of environmental knowledge and the connectedness to nature?

6. METHODOLOGY

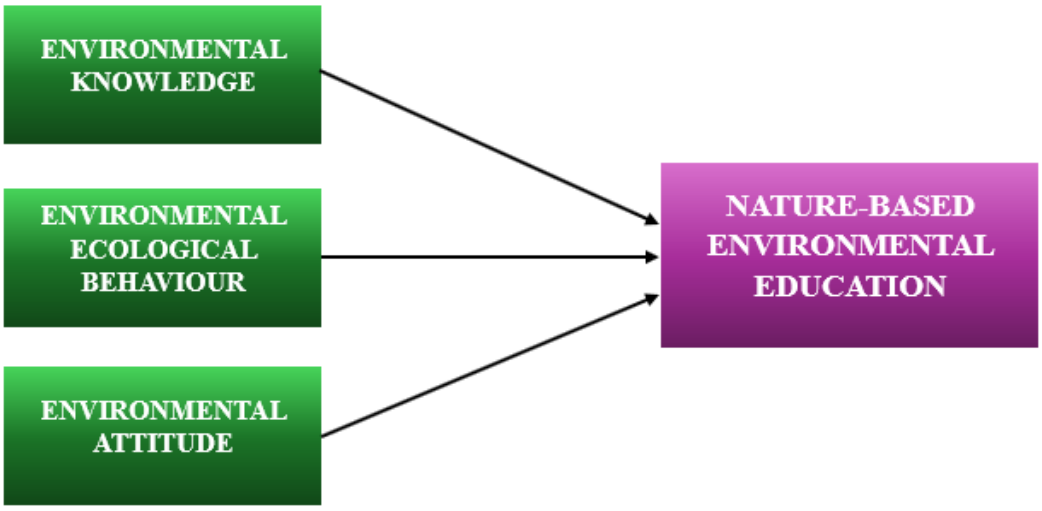
Method and sampling: During the experiment, representatives from the Eco-organization reached out to twenty different primary schools throughout Spain to gauge their level of interest in taking part in the NBEE initiative. Seven schools were ultimately selected after meeting the qualifying standards, which included a school's proximity to an easily accessible natural environment and the enthusiasm of the principal or instructors for the curriculum. The students received the EE intervention in the classroom. There were 516 students in the experimental group (mean=8.23, standard deviation=1.71) and 218 students in the waitlist control group (mean=9.47, standard deviation=1.39, 50% males) in the school. The students were randomly allocated to their groups. In comparison to the control group that waited, the experimental group

had a much lower mean score. Involving as many children as possible from the start of the project was the primary objective of the Eco-organization, although conducting an empirical investigation to determine the impact of their NBEE programme on children's "environmental awareness (EA)" and "environmental behaviour (EB)" was also crucial. This is because serving on a waitlist control committee is typically met with resistance from administrators and teachers. Both the experimental and control groups were randomly assigned to different classes, with a ratio of 2:1. Facts and Quantification: Researchers used two questionnaires to get insight into children's views on environmental issues. These evaluations were designed to capture children's cognitive and emotional responses to environmental challenges. The New Ecology Model scale was used for the former, while the Child Environmental Impressions Survey was used for the latter. The perspectives of children on the environment were recorded using these two tools. This was done because prior research has shown that people's mental and emotional attitudes greatly influence their level of eco-consciousness. Evaluation Using the NEP As a Measurement Tool: The children were asked to fill out the NEP scale in Spanish so that the researchers could measure their perspectives on the environment. One of the eleven statements included in the text, "If things don't change, researchers will soon have a large environmental disaster" is also included.

a) The Children's Environment Perspectives Survey is a sixteen-item instrument that assesses children's perspectives on nature, including their emotions, curiosity, and understanding of the advantages of being in natural settings. The results from the last administration of young people in Spain showed clear psychometric features.

Statistical tools: Descriptive analysis was applied to understand the basic nature of the data. Validity and reliability were tested through regression coefficients and t-tests.

6.1 Conceptual Framework



7. RESULTS

Table 1: Stepwise regression coefficients (CI, R2, t, p, & residual df)

Post-Test	Regression Step [1]	Regression Coefficient (CI)	R^2	t	p	Residual df
CEPS mean	1	−0.26 (−0.35, −0.17)	0.04	−5.76	<0.001	732
	2	−0.24 (−0.32, −0.15)	0.16	−5.54	<0.001	731
NEP mean	1	−0.33 (−0.43, −0.22)	0.05	−6.08	<0.001	732
	2	−0.32 (−0.42, −0.21)	0.07	−5.94	<0.001	731
CEP mean	1	0.009 (−0.09, 0.11)	0.00	0.19	0.848	732
	2	0.001 (−0.09, 0.10)	0.04	0.03	0.978	731

In the first stage of our regression analysis, researchers predicted all of the outcome variables by simply adding the variable group, where 1 represented the experimental group and 2 represented the comparison group. A t-test with independent samples is a good analogy for this initial step. The second step of the regression analysis was feeding the model the interpretation of the pre-intervention outcome. The purpose of this was to take into consideration the possibility of baseline disparities. Performing a covariance analysis is a good metaphor for this second stage.

The model is in charge of the connections between R2, t, and p and the remaining df. Because the regression coefficient is associated with our grouping variable (i.e., experimental/control), there is a link between the two variables and the

dissimilarity in the means of the two groups' post-test scores. First, there is the Children's Environment Perceptions Survey (CEPS), second, there is the Emerging Ecological Paradigm (NEP), and third, there is the Survey of "Children's Ecological Behaviour (CEP)". Pair t-tests showed that although NBEE programme participation did raise students' academic achievement (EA), it had almost no effect on their academic progress (EB). The results of the data analysis showed this. While the NEP found an increase of 0.20 (equivalent to 5%) in children's EA, the CEPS found an increase of 0.25 (equivalent to 6%). According to the data collected by the CEPS, there was an average of 0.25-point change in EA for children between T0 & T1. Also, the placebo group did not show any statistically significant impacts for any of the measures (Table 3 has the full set of variables used in the study).

Table 2: Pairwise t-tests for the experimental and control group results gave CI, t, p, df, or Hedges

Experimental Group					
Outcomes [1]	Mean Change from Baseline (*CI*)	*t*	*p*	*df*	g_{av}
CEPS	0.25 (0.20, 0.30)	9.36	<0.001	515	0.46
NEP	0.20 (0.13, 0.27)	5.72	<0.001	515	0.32
CEP	−0.01 (−0.08, 0.06)	−0.28	0.782	515	0.02
Control Group					
Outcomes	Mean Change from Baseline (*CI*)	*t*	*p*	*df*	g_{av}
CEPS	0.06 (−0.04, 0.17)	1.17	0.242	217	0.09
NEP	−0.06 (−0.19, 0.06)	−0.97	0.332	217	0.09
CEP	−0.04 (−0.12, 0.04)	−0.91	0.362	217	0.07

1 CEPS = Children's Environmental Perceptions Survey; NEP = New Ecological Paradigm; CEP = Children's Ecological Behavior. Hedges gave was reported as recommended by (Lakens, 2013) and calculated using the spreadsheet provided by the author.

8. DISCUSSION

Children benefit enormously from environmental education initiatives that have their roots in nature because they get a deeper knowledge of the environment and develop a stronger connection with nature. Research shows that people have a more positive outlook on the environment and a stronger sense of duty to preserve it after having an immersive outdoor experience. This bond serves to foster a lifelong commitment to environmental sustainability in children who spend time in nature every day. Researchers are hopeful that incorporating nature-based learning into school curricula would help raise environmental awareness and encourage ethical conduct. In order to cultivate a lifelong commitment to sustainability & environmental preservation, the research suggests that experiential learning is essential.

9. CONCLUSION

Environmental education that focuses on nature helps children develop a deeper connection to the natural world and a better awareness of environmental issues. This connection is crucial for fostering eco-aware mindsets and spreading sustainable habits. Students' ecological awareness and their desire to become environmental stewards are more likely to be enhanced by classes that include outdoors, experiential learning. According to studies, nature-based education is an essential part of effective environmental education programmes because it gives children hands-on interactions with the natural world, which are vital in raising ecologically conscious and responsible citizens.

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