

The Effect of a Nature-Based Environmental Education of Children: The Importance of Environmental Knowledge and the Connectedness to Nature, Together, are Related to Ecological Behavior and Environmental Attitude

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Abstract:- There is a lack of rigorous research studies investigating the impact of nature-based training on environmental activism, so the outcomes remain uncertain. As a consequence, making statements regarding causation and providing suggestions for actions becomes more difficult. The authors of the paper provide a comprehensive analysis of the results obtained from an experiment that examined the influence of a nature-based environmental education (NBEE) curriculum on the environmental attitudes (EA) and behaviours (EB) of pupils. The control group included the children who participated in the course while continuing their attendance at conventional schools. The venture included seven primary schools in Spain. Classes were randomly allocated to either the NBEE programme or the regular environmental education (EE) curriculum at each school. Our study revealed that the group of youngsters who received NBEE showed a substantial increase in EA growth compared with the control group. The average incidence of EB in both groups of kids remained rather stable throughout time. The results of our research support the notion that including a nature-centered teaching approach within formal educational programmes might be advantageous in cultivating students' awareness and concern for the environment.

Keywords:- Nature Based Environmental Education, Environmental Attitudes, Environmental Behaviour, Environmental Knowledge.

I. INTRODUCTION

In recent years, there has been a significant increase in studies examining the beneficial impacts that children might get from spending time in natural surroundings. Collectively, the research indicates that exposure to nature has a beneficial impact on the physical or mental well-being of children. It reduces their stress levels, enhances their self-discipline, boosts their motivation and engagement in educational activities, and supports personal growth, including improved critical thinking and problem-solving abilities (Dadvand et al., 2015) enhances collaborative relationships among students or academic acquisition. The present research is focused on ecological stewardship, that is regarded as a key

component that correlates with environmental stewardship. Childhood exposure to nature is a significant factor associated with pro-environmental attitudes. Retrospective studies indicate that individuals who prioritise environmental concerns attribute their viewpoint mostly to positive childhood experiences in natural environments (Chawla, 2015). Our research aligns with a longitudinal study that discovered a correlation between early childhood exposures in natural environments and the development of environmental awareness (EA) in adulthood. Regarding pointers, establishing strong bonds with the natural world is associated with a heightened psychological affinity for nature, a deep connection with and enthusiasm for the environment, eco-friendly beliefs, a recognition of the importance of nature in people's lives, and a sense of responsibility towards the environment (Ulset et al., 2017).

The phrase "nature-based learning" (NBL) is described as the process of acquiring understanding, abilities, concepts, perspectives, and behaviours in many areas such as higher education, personal growth, and environmental conservation. Chawla et al. (2014) state that most of the benefits associated with environmental contact may be categorised as nature-based learning. Engaging in environmental education programmes that provide kids the opportunity to experience nature firsthand is one of the several methods by which children may acquire information by directly interacting with natural environments. Empirical research indicates that involvement in environmental education (EE) programmes is linked to favourable enhancements in children's environmental knowledge, affinity towards nature, and overall understanding of the environment. The alterations are a direct consequence of the children's exposure to the programmes (Wells et al., 2015). There is ongoing debate over the comparative effectiveness of EE treatments inside vs outside, with diverse results from the discussion. Providing access to the outside and natural environments seems to enhance EA and EB to a larger degree (Collado & Sorrel, 2019).

➤ Background of the Study:

Through stories and ethics, the environmental education movement instilled in young people a reverence for and commitment to protecting the natural world. The 1911

Handbook for Environmental Studies was authored by Anna Botsford Comstock, a trailblazer in the field. Outdoors is a great place to educate children about ethics and morality, according to the Handbook of Nature Study. Comstock, a trailblazer in the field, oversaw the Cornell University Institute for Nature Study. The scientific curriculum in US schools was altered by Comstock and other leaders of the Nature Study, such as Liberty Hyde Bailey (Ulset et al., 2017).

A new discipline of environmental studies, conservation education, was born out of the Great Depression and the Dust Bowl in the 1930s. Unlike Nature Study, that focuses on environmental history, preservation education prioritises scientific education over a broad introduction to the environment. According to Ulset et al. (2017), the present environmental, social, and economic issues may be effectively addressed via conservation education, which is a crucial component of scientific planning & leadership.

History suggests that nature studies & preservation education, which gave rise to the modern environmental education movement, emerged in the 1960s and 1970s. Distancing Americans from the federal government occurred during the era of Civil Rights, the Vietnam War, and the Cold War. Concern for human and environmental health sprung out as more individuals gained knowledge about radiation, synthetic pesticides, and air pollution. The environmental movement began as a response to public worries about pollution and health.

In 1969, James A. Swan was the first Phi Delta Kappan member to write an article on the new movement in environmental education. The term "Environmental Education" was first used in March 1970 by William Stapp of Educational Digest. Stapp went on to become the first director of environmental education at UNESCO and established the Global Rivers Transnational Network in his senior years.

An environmental teach-in that spanned the country, Earth Day, started on April 22, 1970. Modern environmental education may trace its roots back to this. In the same year, Nixon signed into law the National Environmental Education Act, which mandated the incorporation of environmental education into all levels of schooling. In 1971, the National Association to Education in the Environment rebranded itself as the North American Association of Environmental Investigation (NAEI) with the goal of bolstering environmental education initiatives and equipping educators with tools to foster a more environmentally conscious student body (Chawla, 2015). By 2002, the group had transformed into what is now known as the NAAES, or North American Association of Environmental Studies (Chawla, 2015).

By calling for its implementation in the fight against environmental problems, the 1972 United Nations Convention on the Human Environment in Stockholm, Sweden, gave global environmental education its legitimacy. With this declaration in place, environmental education may be used as a tool to address environmental problems on a

worldwide scale. The three major declarations that regulate environmental education were drafted by UNEP or UNESCO.

➤ *Problem Statement:*

"Some experts argue that environmental education is seen as displaying bias and promoting a one-sided viewpoint".

The welfare of all living beings on Earth, as well as the fundamental existence of life, is intricately linked to the state of the planet's ecosystem. Researchers depend on the outside environment for vital resources like water, air, food, & other important provisions. This is because planet Earth has a wide variety of living organisms. Therefore, it is imperative that each individual takes proactive measures to preserve and restore the natural ecosystem, just as scientists are doing.

Unfortunately, a considerable segment of the public remains uninformed about the crucial environmental issue that now afflicts the globe, as well as the advantages and disadvantages of several potential solutions. As a result, commonplace behaviours that cause damage to the environment have been widely accepted in our society. The degradation of the environment may mostly be attributed to widespread ignorance and a lack of awareness of its inherent value. Therefore, it is essential to educate folks about the significance of preserving the natural environment (Nassén, 2014).

II. LITERATURE REVIEW

The last section of this literature review discusses environmental education and wellbeing and the different methods being utilised to understand how it improves wellbeing. This section shows how most research on wellbeing & environmental education has focused on natural connections. It addressed the main theories under this umbrella and the pros and cons of using nature connection as a wellness theory in environmental education. After that, it examined the ecological and social contexts of environmental education, focusing on challenge, affordances, and social learning aspects. In the last portion of this chapter, researchers discussed the thesis's most essential topic, how to measure and assess youth wellbeing. This has broadened our understanding of youth welfare and how environmental training might help. After discussing the relevant literature, this chapter built the thesis's conceptual framework and concluded with a summary. To contextualise the empirical chapters, literature gaps were identified and discussed how this research addressed them.

A constructivist paradigm guided this research on youth wellness. This led to a process-oriented approach of wellness that emphasises understanding how children develop and grow holistically. This theory holds that wellbeing is socially constructed, context-specific, and changeable. To contextualise this study's constructivist approach, this chapter explores the literature on wellness's several perspectives. Economic perspectives of wellbeing, which use objective indicators to measure wellbeing, and psychological

perspectives, which emphasise young people's social-emotional actions that educators and parents observe most often, were emphasised. Psychological approaches on wellbeing emphasised objective measures as the fundamental criterion (Jones et al., 2010). In addition, a philosophical approach of wellbeing was studied, which draws on theories of human wellbeing that relate to life happiness and uses life happiness measurements. This was done alongside the prior step. However, research that generally employs quantitative surveys has not allowed young people and youngsters to express their perspectives on these philosophical conceptions of wellbeing. These wellbeing perspectives illustrate a constructive approach towards wellbeing research. This paradigm holds that health exists independently of social circumstances and can be recognised and understood using objective, quantitative, value-free, bias-free, and reproducible measures. The constructivist approach to this research goes beyond positivist foundations to focus on wellbeing across various stages or introduce literature on the sociology of childhood to open up the influence of a variety of domains on young people's wellbeing. This helps build a research strategy. Social constructivism, which holds that meaning is constructed from people's interactions and social events, supported this idea. Meaning derives from knowing people's social situation, according to this notion. The research may go beyond adult perceptions of wellbeing and give a framework for understanding young people's wellbeing from their perspective. In the following part, Kaiser et al. (2008) explained this study's conceptual framework.

➤ *Research Objectives:*

- To identify the effects of nature based environmental education on children.
- To understand the importance of environmental knowledge and the connectedness to nature.
- To evaluate the ecological behaviour of environmental education of children.
- To explore the environmental attitude of environmental education of children.
- To determine the importance of environmental knowledge and the connectedness to nature based environmental education of children.

III. RESEARCH 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. The seven schools that made the cut were those that met the qualifying standards, which included a teacher or principal's enthusiasm for the programme and proximity to an easily accessible natural environment. The EE intervention was given to the students in their class. 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. The experimental group's mean score was much lower than the control group's while they waited. Although the Eco-organization recognised the importance of conducting an empirical study to determine how their NBEE programme affected children's environmental awareness (EA) or environmental behaviour (EB), their primary objective was to involve the maximum number of children from the outset of the project. Reason being, being a member of a waitlist management committee is not without its share of hostility for administrators and teachers. The experimental group and the control group were each given a random number, and the ratio of students in each group was 2:1.

➤ *Data and Measurement:*

Likert scale, rating system, used in questionnaires, that is designed to measure people's attitudes, opinions, or perceptions. Subjects choose from a range of possible responses to a specific question or statement; responses typically include "strongly agree," "agree," "did not answer," "disagree," and "strongly disagree." Often, the categories of response are coded numerically, in which case the numerical values must be defined for that specific study, such as 5 = strongly agree, 4 = agree, and so on.

➤ *Statistical Software:*

MS-Excel and SPSS 25 were used for Statistical analysis.

➤ *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.

➤ *Conceptual Framework:*

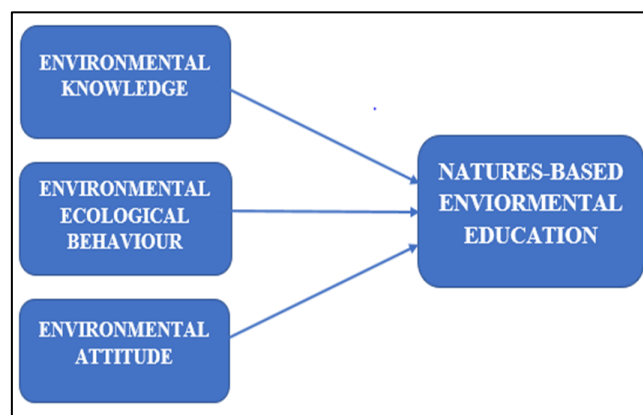


Fig 1 Conceptual Framework

IV. RESULT

Table 1 presents a comparison between our T0 and T1 results and a control group, specifically for descriptive data. Generally, the youngsters exhibited high levels of emotional intelligence and actively engaged in extracurricular activities. Table 2 displays the results of the three stepwise regression investigations, each corresponding to a different dependent variable, in order to ascertain if there are any disparities in children's EA and EB among different groups. Our research

indicates that the NBEE programme, also known as the study group, enhances children's executive function more effectively than traditional schooling throughout the critical early childhood education period, as assessed by the NEP measurement. This was determined by a comparison between the experimental group, who participated in the study, and the control group, who received traditional schooling. This is applicable regardless of the categorization of children. The CEPS post-intervention research discovered a mean difference of 0.24 between the experimental and control groups, after accounting for the initial average values. According to the CEPS, the NBEE trial increased students' EA by 6% compared to traditional teaching methods.

By normalising the mean value of each group prior to the start of the intervention, it was found that the average difference in NEP scores between the experimental & control groups was 0.32. Therefore, the individuals in the NBEE group had a 9% larger growth in their executive abilities compared to the participants in the standard instruction group. The data was given by the NEP. Upon considering the initial reported evidence-based beliefs (EBs), it was found that both the trial group and the control group had comparable post-intervention EBs as stated by the participants.

Table 1 Pre-& Post-Intervention Outcome Indicators mean (SD), Skewness, & Kurtosis by Group
(Experimental: N = 516; and Control: N = 218)

Experimental Group				Control Group		
Pre-Intervention (T0)						
	Mean (SD)	Skewness	Kurtosis	Mean (SD)	Skewness	Kurtosis
CEPS ¹	4.07 (0.60)	−0.85	0.69	3.99 (0.64)	−0.91	0.65
NEP	3.71 (0.65)	−0.64	0.27	3.65 (0.59)	−0.48	0.34
CEP	3.91 (0.59)	−0.74	0.10	3.95 (0.52)	−0.59	0.66
Post-Intervention (T1)						
	Mean (SD)	Skewness	Kurtosis	Mean (SD)	Skewness	Kurtosis
CEPS	4.31 (0.48)	−0.84	1.25	4.05 (0.72)	−1.18	0.81
NEP	3.91 (0.58)	−0.68	0.42	3.58 (0.84)	−0.87	0.09
CEP	3.90 (0.61)	−0.65	0.16	3.91 (0.57)	−0.94	1.03

1 CEPS = Children’s Environmental Perceptions Survey; NEP = New Ecological Paradigm; CEP = Children’s Ecological Behavior.

Table 2 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

The regression analysis was started by including the variable "category" into the model, where the values 1 and 2 were assigned to represent the experimental and comparative categories respectively. This variable was used to predict each result variable. The first stage has resemblance to an

independent samples t-test. The average pre-intervention result was included into this regression model during the second phase. This was conducted to account for disparities in the initial conditions. This second step has a resemblance to covariance analysis.

This model governs the associations among R², t, p, & the remaining degrees of freedom (df). The regression coefficient is associated with our grouping variable (experimental/control), and hence it is correlated with the difference in mean post-test outcomes between the two groups. The abbreviations for the Children's Environment Perceptions Survey, the developing Ecological Paradigm, & the Survey of Children's Ecological Behaviour are CEPS, NEP, and CEP, respectively. Pairwise t-tests revealed that

the inclusion of NBEE significantly enhanced children's academic achievement (EA), although it did not have any impact on academic progress. Findings from the data analysis indicated this. The CEPS documented a 6% rise in children's educational attainment, whereas the NEP recorded a 5% increase. The mean change in CEPS EA between T0 & T1 for children was 0.25. The placebo group did not have a meaningful effect on any of those categories examined. Please refer to Table 3 for a full list of factors.

Table 3 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 g_{av} was reported as recommended by (Lakens, 2013) and calculated using the spreadsheet provided by the author.

V. CONCLUSIONS

This empirical investigation on a school science curriculum-based environmental learning programme showed that nature is better than teaching environmental attitudes. This was discovered by comparing pre- or post-course sentiments. This study is crucial to understanding nature-based environmental education's benefits since its strong design supports causal conclusions. Researchers found that experts propose adopting nature-based pedagogy in Spanish formal education to enhance children's environmental perspectives. Improve nature-based educational programmes by understanding how different equates of nature contact affect kids' pro-environmentalism, how nature-based learning programmes affect other important results like environmental knowledge and health, and the barriers to implementing them.

Children must learn about nature in a way that encourages sustainable conduct given the climate crisis. Three factors determine kids' environmental conduct. The age at which youngsters learn about nature, nature time, and compassionate environmental education are examples. Naturalist youngsters are more likely to be environmentally conscious. Nature connection inspires kids to live sustainably. Early exposure to serious topics may cause environmental

apathy. For 4-7-year-olds, environmental education requires empathy. Like nature, empathy drives kids to care for the environment. Every component of environmental education needs further research, especially age. Walker found that children need more family freedom to embrace good environmental practices, whereas Sobel suggested introducing social responsibility at age twelve. Thus, educational research matters. This research teaches kids about nature to become climate leaders. Many world leaders believe climate change requires a new leadership style. When questioned about her leadership style, Jacinda Arden responded "researchers reject accepting the idea that people cannot be both caring & strong". Arden leads climate policy. Researchers must teach youngsters empathy and environmental awareness to combat climate change.

VI. LIMITATION

Research is required to illustrate that environmental literacy and a sense of belonging in nature motivate sustainable behaviour. A large population sample is needed for quantitative investigations. Researchers' findings are instantly generalised to the whole population since they examine a small portion of society. To adequately represent the population, many people must be polled. Quantitative research is arduous because, unlike qualitative research, it

entails actively discovering and accumulating relevant data before translating it into numbers for analysis. Quite long. Distributing surveys & waiting for results may be time-consuming since many people respond slowly or not at all. Thus, quantitative research takes time. Thus, this might not be the best emergency research method.

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