



Original Research Paper

ALTERNATIVE ENVIRONMENTAL EDUCATION PROGRAM FOR SCHOOLS: A NOVEL PEDAGOGY FOR PROMOTING CONNECTEDNESS WITH NATURE AMONG STUDENTS OF GOA-INDIA

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ABSTRACT

Goa is part of the Western Ghats biodiversity hotspot and hosts fragile coastal ecosystems, forests, rivers, wetlands, and agrarian landscapes that have historically shaped local livelihoods, belief systems, and cultural practices. However, rapid urbanization, mass tourism, mining activities, infrastructure expansion, and fast-changing lifestyle and consumption patterns have exerted significant ecological pressures on these areas (Barrable, 2019; Bruni et al., 2017; Singh et al., 2024). The Preliminary field investigation conducted by the investigator with class VII students of Dharbandoda taluka of Goa that nestles 12 Secondary schools of Goa revealed that they exhibited high score in Environmental awareness however, they demonstrated low emotional bonding and responsible environmental behaviour. This knowledge- behaviour gap aligns with previous findings of Sivkumar and Sivanandan (2018) who reported similar trends among middle school students in Indian metropolitan cities, and Louv's (2005) notion of "nature deficit disorder" among contemporary children. The present research study in Environment education addresses the wide gap of "disconnect with nature" due to their more "connection with screen time" by introducing Alternative Environmental education program (AEEP) to these helpless children, which is a Novel- systematically designed and developed Model by the researcher using ADDIE instructional design model which promotes connectedness with Nature (CWN) by using GECI (Goa Environmental Connectedness Inventory) as a tool to be administered as pre -test & post -test among 70 class VII students of Goa through a three weeks long structured intervention program to be implemented based on using six different strategies of experiential learning, emotional learning, collaborative learning, socio-emotional learning, critical inquiry based learning and contemplative learning by using both indoor and outdoor activities with environmental concepts taken from Goa Board's NCERT Science textbook of Class VII. The objectives of the present study are 1) To design and develop Alternative Environmental Education Program in promoting connectedness with nature among students of Goa. 2) To study the effectiveness of Alternative Environmental Education Program's strategies on connectedness with nature of class VII students of Goa. 3) To compare the effectiveness of Alternative Environmental Education Program Strategies and Conventional methods of the teaching-learning process of Environmental education on connectedness with nature of class VII students of Goa 4) To study and find the effect of AEEP strategies on Male and female students on Connectedness with nature of Class VII of Goa. The researcher used True experimental pre-test post-test equivalent group design. The data was collected by using qualitative as well as quantitative methods. The findings of the study demonstrates that there was substantial increase in score in post-test of experimental group as compared to pre-test in cognitive, affective and psychomotor domains of GECI which provided strong empirical evidence supporting the effectiveness of the AEEP strategies in connecting the students with nature administered during the intervention program of the study.

Keywords: *Alternative Environmental Education Program (AEEP), Connectedness with Nature (CWN), Goa Environmental Connectedness Inventory (GECI), Experiential learning, Responsible environmental behaviour (REB)*

1. INTRODUCTION

Environmental Education (EE) in schools of Goa has traditionally been considered as cognitive-component that prioritizes the percolation of ecological knowledge and skills with the assumption that Environmental

awareness will translate into action based responsible environmental behaviour. Contemporary research increasingly demonstrates that values, emotions, identity, and lived experiences play a decisive role in shaping long-term environmental attitudes and behaviours,

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especially during adolescence, a critical developmental stage(Class VII) for identity formation. This shift challenges classroom-based and exam-oriented environmental education in to an action oriented and solution based Paradigm shift pedagogy and hence calls for a novel and alternative pedagogical approaches that displays responsible environmental behaviour, cultivate empathy for nature, sensory engagement, place attachment, and ethical responsibility. Against this backdrop, the introduction of Alternative Environmental Education Programs (AEEP) emerges as a promising practical & solution based structured pedagogical intervention program to foster CWN among middle school students by introducing Goa Environmental Connectedness Inventory (GECI) as the tool to measure changes in cognitive, affective and psychomotor domains for promoting connection with nature by incorporating six different ecological strategies to foster holistic development of learners. The topics and environmental concepts selected for various activities of AEEP were aligned with NCERT's class 7th textbook recommended by Department of Education, Govt. Of Goa. AEEP encompass experiential, participatory, and place-based learning approaches such as field visits, Bird watching, Indigenous tree planting, nature camps, role plays, ecological storytelling, arts-based practices, up-cycling, school gardening, community engagement, intergenerational dialog, contemplative learning and reflective activities conducted beyond the conventional EE classroom. The AEE program goes beyond content delivery creating direct, sensory contact with local ecosystems like Kulagar, emphasizing learning *with* nature rather than merely *about* nature, enabling students to develop sensory awareness, emotional attachment, and ethical reflection through direct encounters with local ecosystems and communities, (Chawla, 2007). The results of Post-test scores showed a statistically significant increase in experimental group in all the three domains of GECI ($t = 10.495$) with corresponding p- value (0.000) is less than the accepted level of significance (0.005) while the control group showed no significant change. Since the obtained P-value (0.000) is less than the accepted level of significance (0.005) the difference between experimental group and control group is statistically significant. Therefore, the null hypothesis stating that there is no significant difference in post test scores of grade VII students in Environment education taught using AEEP strategies and conventional method of teaching is rejected and alternative hypothesis is accepted. The findings of the study indicate that there was a significant difference in the post-test GECI scores between the experimental and control groups after the intervention. Specifically, the experimental group achieved significantly higher overall environmental connectedness scores than the control group, suggesting that the intervention program had a strong positive effect on the student's environmental connectedness. The result of the study reveal that effectiveness of AEEP promoted connectedness with nature among VII class students of

Goa. Environmental education is a critical tool to counter environmental problems with the goal of protecting and conserving the environment (Potter 2010). Different studies are being carried out in Environment education in India and abroad, At International & national level various environmental laws are being implemented, programmes and conferences are carried out to mitigate environmental problems Government of India has introduced the EE subject at formal school at all the levels of educational strata with the objective of creating environment sensitive and responsible citizens with change in attitude & skills to solve the local environmental problems. However, in spite of all these initiatives we are still facing the problems in environmental education. It has been suggested that a positive human-nature relationship is essential for countering today's environmental problems. Therefore the main objectives of the present research studies deal with 1) To design and develop Alternative Environmental Education Program in promoting connectedness with nature among middle school students of Goa. 2) To study the effectiveness of Alternative Environmental Education Program's strategies on connectedness with nature of class VII students of Goa. 3) To compare the effectiveness of Alternative Environmental Education Program Strategies and Conventional methods of the teaching-learning process of Environmental education on connectedness with nature of class VII students of Goa. 4) To study and find the effect of AEEP strategies on Male and female students on Connectedness with Nature of Class VII students of Goa. Connectedness with nature refers to an individual's experiential and emotional sense of belonging to the natural world (Mayer and Frantz, 2004). It encompasses affective, cognitive, and experiential dimensions that link self with nature (Schultz, 2002). Middle school period represents a critical developmental period for forming environmental attitudes and values. Chawla(1999) in her seminal study on life paths into effective environmental action found that direct childhood experiences in natural settings, combined with influential role models, were the most frequently cited factors leading to lifelong environmental commitment. While outdoor educations and EE programs have demonstrated short term positive effects on student attitudes (Rickinson, 2001), most interventions are extracurricular or limited to occasional field trips rather than being integrated into core curriculum. There remains a paucity of research on structured, curriculum based alternative models designed specifically for the Indian middle school context. The present study seeks to design and develop an Alternative EE program model that intentionally embeds such experiences within the regular school schedule for middle school students in Goa. Several theoretical frameworks explain how humans develop connectedness with nature, The Biophilia Hypothesis (Wilson, 1984) proposes that humans possess an innate tendency to seek connections with nature and other forms of life, suggesting an evolutionary basis for environmental affinity. The Inclusion of Nature in self

(INS) theory (Schultz, 2002) conceptualizes connectedness as the extent to which an individual includes nature within their cognitive representation of self, where a greater overlap indicate stronger environmental concern. The theory of Connectedness to Nature Scale(CNS) framework by (Mayer & Frantz, 2004) and the theory of Chawla's (1999) Significant life Experiences framework collectively suggest that connectedness is not merely cognitive awareness but an emotional and experiential bond that can be intentionally fostered during the formative middle school years. Traditional EE model largely relied on knowledge transmission-approaches (Rickinson, 2001). Place-based education (Sobel, 1996) grounds learning in the local community and ecosystem using immediate environment and experiential learning model (Kolb, 1984) emphasises direct contact with local environment. Forest school model (Knight, 2016) from west focuses on regular long term sessions in natural settings where inquiry based learning promotes connectedness. However, these models are often implemented as short term, extracurricular activities rather than sustained curriculum integration approaches (Sharma 2020)

This shift challenges classroom-based and exam-oriented environmental education into an action-oriented and solution-based paradigm-shift pedagogy. At the same time, the increasing influence of technology and technology-mediated decision-making in contemporary life has further transformed the ways in which individuals interact with their environment. For example, artificial intelligence is increasingly transforming agricultural practices by improving resource efficiency, crop management, forecasting, and decision-making; however, its effective adoption also depends on managerial readiness, technological accessibility, organizational support, and appropriate institutional policies (Singh & Kaur, 2025). These broader technological and societal transformations further emphasize the need for educational approaches that maintain meaningful, direct, and experiential connections between learners and the natural environment.

2. METHODOLOGY

- **Design:** The present research study adopted true-experimental pre-test post-test design to foster the effectiveness of AEEP in promoting connectedness with nature as it provides highest level of control through random assignment and enables causal conclusions about the program's effectiveness while minimising threats to internal validity. A mixed methods approach was used combining quantitative and qualitative methods of statistical analysis for deeper insight into student's experiences. Alternative Environmental Education Program was Independent Variable, Connectedness with Nature was Dependent variable with student's age, class and school types were Controlled variables. Research was conducted in

Dharbandoda taluka of Goa India on Class VII students (11-12 years) from Government and aided schools.

- **Sample:** A total of 70 students were selected using simple random sampling. Students were equally divided into two groups, experimental group (N=35) who attended AEE Program and Control group (N=35) where conventional method of EE was used. The program was validated by subject of expert from Education environmental studies using three rounds of expert reviews The three week long intervention program was implemented in the schools located along the Western Ghats, which is the biodiversity Hot spots of India. Total 20 sessions, each session consisting of 2hrs. was implemented in school.
- **Tools used:** The data collection method consisted of quantitative data collected from students by using GECI(Goa Environmental connectedness Inventory) developed by the researcher was administered as pre-test and post-test on both the groups. The GECI was subjected to expert validation from panel of experts from education and environmental studies evaluating the tool using Delphi's technique. The validated program was implemented with class VII students of Goa after administering the pre-test. Post test was administered to both the groups to assess the effectiveness of the AEE Program. Data was analysed by using t-test and ANCOVA. The three week long intervention program was implemented in the schools located along the Western Ghats, which is the biodiversity Hot spots of India. Total 20 sessions, each session consisting of 2hrs. was implemented in school. The Program was grounded in Place-based education with six strategies of learning consisted of experiential learning, collaborative learning, Emotional learning, socio-emotional learning, Inquiry based learning & contemplative learning. The instructional design consisted of all three domains of learning; Cognitive, Psychomotor and affective. Students were engaged in practical hands on activities like field visits, bird watching, indigenous tree plantation program, up-cycling, community based project on cleanliness and sanitation of village, deforestation role play, mindfulness, Nature journaling, screening of documentary on success stories of Goan farmers, mindfulness, Intergenerational dialogues with farmers and exhibition of medicinal plants and vegetables.
- **Data Analysis:** The data collection method consisted of quantitative data collected from students by using GECI(Goa Environmental connectedness Inventory) developed by the researcher was administered as pre-test and post-test on both the groups. The GECI was subjected to expert validation from panel of experts from education and environmental studies evaluating the tool using Delphi's technique. The validated program was implemented with class VII students of

Goa after administering the pre-test. Post test was administered to both the groups to assess the effectiveness of the AEE Program. Data was analysed by using t-test and ANCOVA

3. RESULTS

- The research finding indicates that there was a significant difference in the post-test GECI scores between the experimental and control groups after the intervention. Specifically, the experimental group achieved significantly higher overall environmental connectedness scores than the control group,

suggesting that the intervention had a strong positive effect on students' environmental connectedness, suggesting strategies used in AEEP successfully fostered connectedness with nature through activities like field trips, gardening, bird watching, up-cycling, intergenerational dialogues and nature journaling.

- The table no.1 presents the Descriptive and Inferential statistics for Experimental and Control Group Post test scores on the GECI among grade VII students of Goa.

Table no.1

Group	Sample	Mean	SD	t-test	p-value
Experimental	35	80.03	12.13	10.495	0.00
Control	35	54.51	7.74		

The above table presents the descriptive and inferential statistics for the post-test scores of the experimental and control groups on the overall Goa Environmental Connectedness Inventory (GECI) among Grade VII students of Goa. The table indicates that both the experimental group and control group consisted of 35 students each, ensuring equal sample size and facilitating balanced comparison between the groups. The Mean post-test score of the experimental group was 80.03, whereas the control group recorded a substantially lower

Mean score of 54.51. This suggests that students in the experimental group demonstrated considerably higher levels of environmental connectedness than students in the control group following the intervention. Same as depicted in figure No.2. The statistically significant difference ($t = 10.495$, $p = 0.00 < 0.05$) strongly indicates that the intervention was highly effective in improving students' environmental connectedness among Grade VII students of Goa.

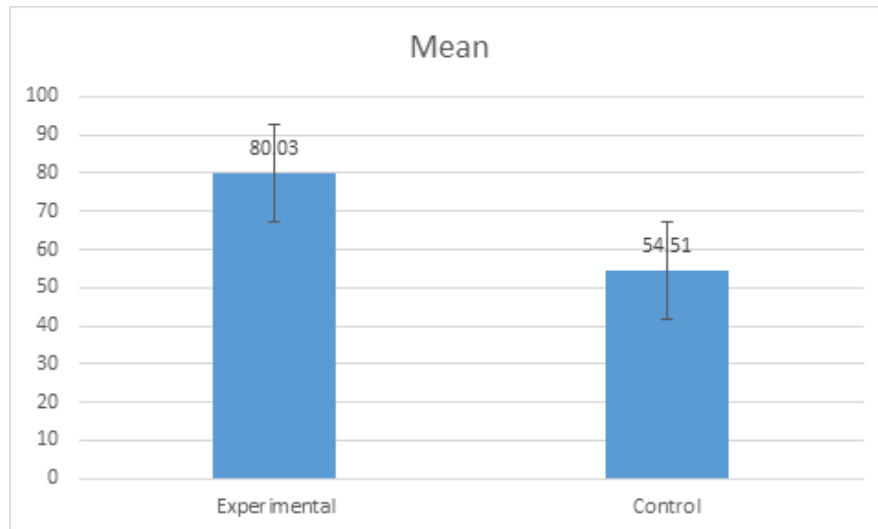


Figure No.2 shows the Mean difference between Experimental and Control Group Post test scores on the GECI among grade VII students of Goa

The standard deviation (SD) for the experimental group was 12.13, while the control group recorded a standard deviation of 7.74. This indicates that the experimental group exhibited greater variability in post-test GECI scores, reflecting wider differences in students' environmental connectedness after intervention. In contrast, the control group showed comparatively lower variability and greater consistency in performance.

- To determine whether the observed difference between the two groups was statistically significant, an independent samples t-test was conducted. The

obtained t-value was 10.495, with a corresponding p-value of 0.00. Since the obtained p-value (0.00) is less than the accepted level of significance (0.05), the difference between the experimental and control groups is statistically significant. Therefore, the null hypothesis stating that There is no significant difference in post-test scores of grade VII students in Environmental education taught using AEEP strategies and conventional method of teaching is rejected and alternative hypothesis is accepted.

- **Limitations of the study:** 1) Limited sample size: Since the study is limited to Dharbandoda taluka of Goa results may not generalize to other states. 2) Short duration: Since the AEE program ran for 3 week duration long term effects on connectedness with nature cannot be confirmed. 3) Focus on one dimension: Since the study focuses on Connectedness with nature it does not measure pro-environmental behaviour or academic achievement.

5. CONCLUSION

- Alternative Environmental Education Programs (AEEP) systematically designed and developed by the researcher using ADDIE instructional design model which have ability to move beyond formal EE curricula and foster deeper, emotional connections between middle school students and their ecological surroundings. It is an effective intervention program aligning with NEP 2020's call for experiential learning. To overcome the "nature deficit disorders" and "nature disconnect" among middle school students of Goa in specific and rest of India in general, it is recommended that such pedagogical model should be integrated in to regular science textbooks curriculum of Goa's schools through teacher training and community partnership with implementation of NEP 2020 across all middle schools of Goa. Future studies may extend this intervention to other grades and conduct longitudinal follow ups and explore its effectiveness mode.

• Recommendations for the future research :

1. For Schools: Schools should include AEP strategies like nature walks, journaling, and field activities in regular EE curriculum.
2. For Teachers: Teachers should be trained to use alternative EE methods instead of only textbook teaching.
3. For Curriculum Designers: NCERT and SCERT should revise EE textbooks to include more experiential learning components.
4. For Policy Makers: Government should provide funds and support for outdoor learning and environmental clubs in schools.

• Suggestions for Further Research:

1. The study can be replicated with larger sample across different states of India.
2. Longitudinal study can be done to check retention effect of AEEP after 6 months or 1 year.
3. Effect of AEEP can be studied on other variables like Environmental Attitude, Pro-environmental Behaviour, and Academic Achievement.
4. AEP can be developed and tested for Primary and Higher Secondary students.
5. Qualitative study using interviews and case studies can provide deeper insights into students' experiences with AEEP.

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