

A Pedagogical Shift for a Greener Tomorrow- Strengthening Environmental Literacy through Learner-Centric Approaches

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Abstract

This study investigates the effectiveness of a specially designed Learning Package in improving environmental literacy among primary school students. Adopting a quasi-experimental pre-test post-test non-equivalent group design, the study was conducted among 64 students of Standard VII from St. Joseph's U.P. School, Mannanam, Kottayam District, Kerala. One group was taught using the developed Learning Package, while the control group received instruction through the traditional activity-oriented method. Data was collected using a standardized Environmental Literacy Test designed by the investigator and analyzed using statistical techniques. The findings reveal that 60.93% of the total sample exhibited an average level of environmental literacy. However, students exposed to the Learning Package demonstrated significantly higher gains in overall environmental literacy and in specific domains such as ecological knowledge, socio-political awareness, knowledge of environmental issues, and environmentally responsible behaviour. The study underscores the potential of innovative educational interventions in fostering environmental awareness and preparedness among young learners.

Key Words: Pedagogical Shift, Environmental Literacy, Learner-Centric Approaches

INTRODUCTION

Environmental education is a vital component of the educational process, aimed at fostering the values, skills, and attitudes necessary to understand and respect the interconnections between humans and their biophysical surroundings. It involves developing a personal code of conduct and decision-making abilities concerning environmental quality. This form of education should be interdisciplinary, focused on real-world issues, and dedicated to promoting community welfare and the long-term survival of humanity. Its effectiveness relies on active learner participation and should address both present and future environmental concerns. For young learners, who are at a crucial stage of development, environmental education must tap into their curiosity, creativity, and natural energy to build relevant knowledge, skills, and attitudes rooted in their local contexts.

Natural disasters are becoming increasingly severe due to global climate change and greater human exposure, making risk management essential for sustainable development. Education, particularly higher education and research, plays a vital role in disaster mitigation by fostering preparedness, resilience, and informed decision-making. A child-centric, psychologically grounded, and technologically adaptive education system is necessary to develop creativity, critical thinking, and environmental awareness. The NEP 2020 emphasizes integrating environmental education across all levels to cultivate environmentally literate citizens capable of making responsible choices for a sustainable future.

NEED AND SIGNIFICANCE

Understanding our connection to nature is essential for fostering a sustainable environment, as our actions impact both human well-being and ecological health. While progress has brought many benefits, it has also led to pollution, extinction, and environmental degradation. Environmental education plays a critical role in creating environmentally literate citizens by building awareness, responsibility, and preparedness. Natural and manmade hazards can cause significant harm, but their impact can be reduced through proactive measures, awareness, and preparedness. Schools, which host large populations, must integrate disaster management into their curriculum, ensuring that students, staff, and communities are equipped to respond effectively during emergencies. Regular drills, awareness campaigns, and the development of accessible educational resources are vital for cultivating a culture of safety. The National Disaster Management Guidelines on School Safety Policy and the involvement of various organizations underline the importance of integrating disaster education at all levels.

REVIEW OF RELATED LITERATURE

Several studies highlight diverse approaches to enhancing environmental literacy. Angreani (2022) showed virtual labs boost cognitive skills, while Hermawan (2022) stressed aligning knowledge with behavior through policy. Solheri (2022) supported ethno-science integration, and Uyen (2022) linked teachers' awareness to environmental teaching. Akkaya Yilmaz (2021) found moderate literacy in teacher candidates. Astuti & Aminatun (2020) noted Adiwiyata schools perform better. Kuswendi & Arga (2020) showed scrap use improves primary students' literacy. Özer-Keskin & Aksakal (2020) used drawings to assess pollution views. Ulfah (2020) found psychomotor aspects underrepresented globally. Saltan & Faruk (2017) proved blogs and outdoor activities aid literacy. Spínola (2016) linked demographics to literacy, and Fidan & Ay (n.d.) showed project work enhances operational literacy.

HYPOTHESES OF THE STUDY

The following hypotheses were formulated for the study

- 1) There is no significant difference between mean pre-test scores of environmental literacy of experimental and control groups among primary school students.
- 2) There is no significant difference between mean post-test scores of environmental literacy of experimental and control groups among primary school students.
- 3) There is no significant difference between mean post-test scores of environmental literacy of experimental and control groups among primary school students in terms of Ecological Knowledge

Socio-Political Knowledge

Knowledge of Environmental Issues

Environmentally Responsible Behaviour

- 4) There is no significant difference between adjusted mean scores of environmental literacy of students taught through Learning package and activity oriented method by considering their pre-test scores as covariate.
- 5) There is no significant difference between adjusted mean scores of environmental literacy of students taught through Learning package and activity oriented method by considering their pre-test scores as covariate in terms of Ecological Knowledge

Socio-Political Knowledge

Knowledge of Environmental Issues

Environmentally Responsible Behaviour

OBJECTIVES OF THE STUDY

The objectives of the study are:

1. To study the level of Environmental Literacy among primary school students
2. To compare the mean pre-test scores of environmental literacy of experimental and control groups among primary school students.
3. To compare the mean post-test scores of environmental literacy of experimental and control groups among primary school students.
4. To compare the mean post-test scores of environmental literacy of experimental and control groups among primary school students in terms of

Ecological Knowledge

Socio-Political Knowledge

Knowledge of Environmental Issues

Environmentally Responsible Behaviour

5. To compare the adjusted mean scores of environmental literacy of students taught through Learning package and activity oriented method by considering their pre-test scores as covariate.
6. To compare the adjusted mean scores of environmental literacy of students taught through Learning package and activity oriented method by considering their pre-test scores as covariate in terms of the components.

METHODOLOGY IN BRIEF

The Quasi - Experimental method was found to be most appropriate for the study. The design selected was the Pre-test Post-test Non Equivalent group design. At first a pilot study was conducted for the 100 students of standard VII following SCERT Syllabus, Kerala of different schools at Kottayam district, Kerala. Based on this, tool was standardised. After that the study was conducted on a sample of 64 students of standard VII of two divisions of St. Joseph's U. P. School, Mannanam, Kottayam District. One division was randomly selected as the Experimental Group (N= 31) and the other as the Control group (N=33). The Experimental group was taught using the developed learning package on environmental literacy and the Control Group was taught using the activity-oriented method of teaching.

Environmental Literacy Test was prepared and standardised by the investigator and was administered for both groups before and after the experiment. The Pre-test and Post-test scores of experimental and control groups thus obtained were compared to determine the effectiveness of learning package and further statistical analysis.

TOOLS AND MATERIALS USED FOR THE STUDY

1. Learning Package on environmental literacy
2. Lesson transcripts based on activity- oriented method of teaching
3. Environmental Literacy Test

ANALYSIS OF ENVIRONMENTAL LITERACY TEST SCORES

Environmental Literacy Test scores of experimental and control groups were analysed .

ANALYSIS OF ENVIRONMENTAL LITERACY TEST SCORES OF EXPERIMENTAL AND CONTROL GROUPS BEFORE TREATMENT.

Table 1: Descriptive statistics of Pre total scores of ENVIRONMENTAL LITERACY TEST of sample in experimental and control groups.

Experimental Group		Control Group
N	31	33
Mean	15.3	15.1
Median	15	15
Mode	7	12.0
Standard deviation	5.84	5.16
Skewness	0.404	-.0007
Std. error skewness	0.421	0.409
Kurtosis	-0.883	-0.975
Std. error kurtosis	0.821	0.798

From the table 1, it is clear that the mean value for the pre total scores of environmental literacy test for experimental group(15.3) and control Group(15.1)are much closer. It indicates that the two groups were homogenous before the treatment. The maximum score for the pretest is 30. Also, experimental group skewness is positive, which indicates that most of the student scored below the mean score of the entire group and the scores are distributed in lower end.

To study the level of Environmental Literacy among primary school students

In order to find out the level of Environmental Literacy of the total sample the whole group is given the test and after that the scores were calculated. Mean and Standard Deviation of the scores also obtained. After that Mean + S.D. ($M + \sigma$) and Mean -S. D.($M - \sigma$) were calculated and the score range table is prepared.

For the sample consisting of 64 students. $M = 15.2$, $\sigma = 5.46$

Table 2: Score range for level of Environmental Literacy

Score range	Interpretation
Below 9.74	Below average students
9.74 - 20.66	Average Students
Above 20.66	Above average students.

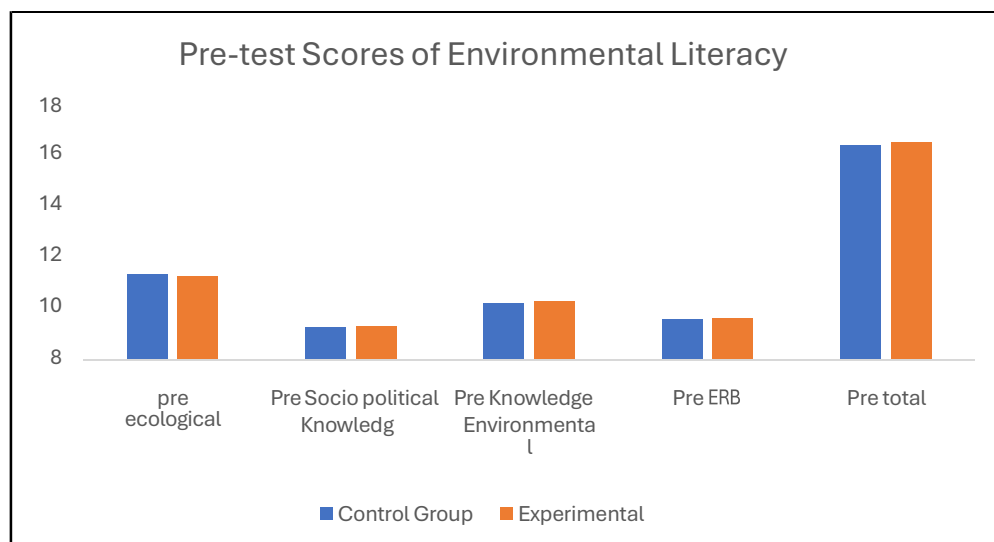
From the above table 2, it is clear that score range of level of Environmental literacy is classified as 3. Those who have obtained score Below 9.74 is classified as Below average students for level of Environmental literacy. Those who obtain a score of 9.74 to 20.66 is classified as average students for level of Environmental literacy. Those who have obtained score Above 20.66 is classified as above average students for level of Environmental literacy. According to the score range table students were again classified and obtained the total level of the sample.

Table 3: *Level of Environmental Literacy of Total Sample*

Sl. No.	Groups	No. of students	Percentage
1	Below average students	11	17.18
2	Average Students	39	60.93
3	Above average students.	14	21.87

From the above table 3, it is clear that 17.18% of students in the sample whose Environmental Literacy is below average level. 69.93 % of students in the sample whose Environmental Literacy is average. 21.87 % of students in the sample whose Environmental Literacy is above average.

Figure 1: *Bar graph showing the Environmental Literacy pre-test scores of Experimental and Control groups.*



From the figure 1, it is clear that the Pre test scores of 4 components of environmental literacy (Ecological Knowledge, Socio-political Knowledge, knowledge of environmental issues and environmentally responsible behaviour) and the total scores of experimental and control groups were more or less similar in their mean scores. (Maximum score for total, Ecological Knowledge, Socio-political Knowledge, knowledge of environmental issues and environmentally responsible behaviour were 30,12, 5, 8, 5 respectively). Hence the two groups can be considered as homogenous.

ANALYSIS OF ENVIRONMENTAL LITERACY TEST SCORES OF EXPERIMENTAL AND CONTROL GROUPS AFTER TREATMENT.

Table 4: *Descriptive statistics of Post-total scores of experimental and control groups.*

Experimental Group		Control Group
N	31	33
Mean	27.7	23.2
Median	29	23
Mode	30	21
Standard deviation	3.21	3.52
Skewness	-2.63	-0.197
Std. error skewness	0.421	0.409
Kurtosis	7.48	-0.932
Std. error kurtosis	0.821	0.798

From the table no. 4, it is clear that the Post-total mean scores of control group (23.2) and experimental group(27.7) shows great variation. The mean value for the post total score of experimental group is greater than the control group. It shows an improvement in the scores of experimental group than control group. The experimental group has a more negatively skewed data, which indicates that the scores are distributed over the higher end. Thus the two groups differ in their post test scores of Environmental Literacy Test.

Table 5: *Descriptive statistics of Environmental literacy component-1 Ecological Knowledge post test scores of experimental and control group.*

Experimental Group		Control Group
N	31	33
Mean	11.3	10.4
Median	12	11
Mode	12	12
Standard deviation	1.4	1.54
Skewness	-2.53	-0.938
Std. error skewness	0.421	0.409
Kurtosis	6.77	0.822
Std. error kurtosis	0.821	0.798

Table 6: *Descriptive statistics of Environmental literacy component-2 Socio political Knowledge post test scores of experimental and control group*

Experimental Group		Control Group
N	31	33
Mean	4.58	3.94
Median	5	4
Mode	5	4
Standard deviation	0.720	0.747
Skewness	-2.02	0.100
Std. error skewness	0.421	0.409
Kurtosis	4.58	-1.14
Std. error kurtosis	0.821	0.798

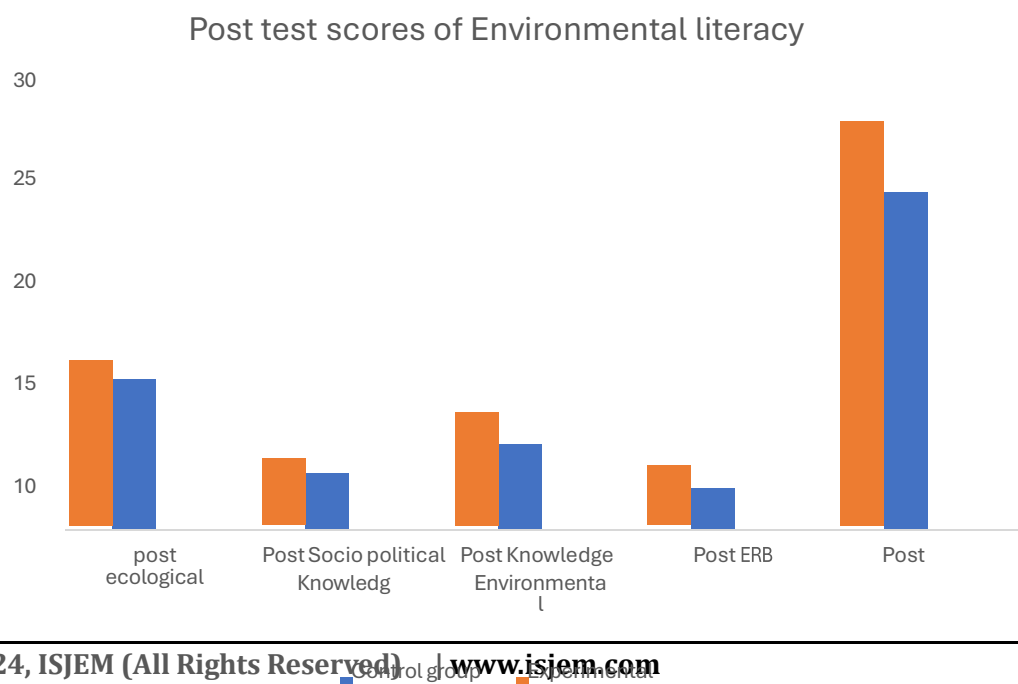
Table 6: *Descriptive statistics of Environmental literacy component-3 Knowledge of environmental issues post test scores of experimental and control groups.*

Experimental Group		Control Group
N	31	33
Mean	7.74	5.94
Median	8	6
Mode	8	5
Standard deviation	0.773	1.30
Skewness	-3.21	-0.0639
Std. error skewness	0.421	0.409
Kurtosis	9.64	-0.699
Std. error kurtosis	0.821	0.798

Table 7: Descriptive statistics of Environmental literacy component-4Environmentally Responsible Behaviour post test scores of experimental and control group

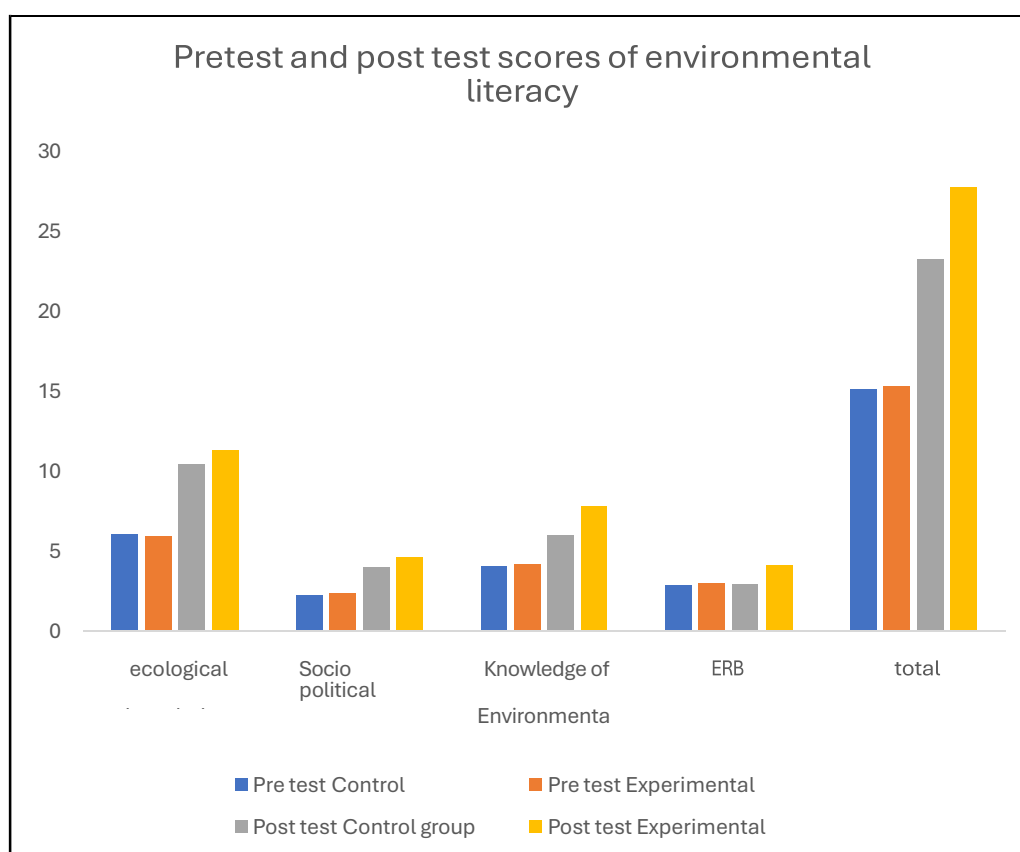
Experimental Group		Control Group
N	31	33
Mean	4.10	2.88
Median	4	3
Mode	4	3
Standard deviation	0.944	1.34
Skewness	-1.48	-0.346
Std. error skewness	0.421	0.409
Kurtosis	2.99	-0.726
Std. error kurtosis	0.821	0.798

Figure 2: Bar graph showing the Environmental Literacy post-test scores of Experimental group and Control group.



From Figure 2 it is clear that there is great variation in the mean scores of experimental group and control group for environmental literacy total scores and its component (Ecological Knowledge, Socio-political Knowledge, knowledge of environmental issues and environmentally responsible behaviour) post test scores. Maximum score for total, Ecological Knowledge, Socio-political Knowledge, knowledge of environmental issues and environmentally responsible behaviour were 30,12, 5, 8, 5 respectively. When compared to the control group experiment group students scored more in the post test conducted after the treatment with learning package. Thus the two groups differ in their post test scores of Environmental Literacy Test.

Figure 3: Bar graph showing the Environmental Literacy pre-test scores and post test scores of Experimental group and Control group.



COMPARISON OF POST-ENVIRONMENTAL LITERCY TEST SCORES OF EXPERIMENTAL AND CONTROL GROUPS .

Post environmental literacy test scores of control group and experimental group were compared using the independent t test. The t value obtained from the analysis for the Total score, Ecological knowledge score, socio-political knowledge scores, Knowledge of environmental issues, environmentally responsible behaviour of two different groups that is the experimental group and the control group is given in the following table.

Table 8: Results of Independent Samples t-Test for the post test scores of control group and experimental group.

		Statistic	df	p
Knowledge	Post Ecological	Student's t	2.35	62.0
				0.022
Knowledge	Post Socio political	Student's t	3.49	62.0
				< .001
Environmental issues	Post Knowledge of	Student's t	6.70	62.0
				< .001
	Post ERB	Student's t	4.18	62.0
				< .001
	Post total	Student's t	5.37	62.0
				< .001

COMPARISON OF THE ADJUSTED MEAN SCORES OF ENVIRONMENTAL LITERACY OF EXPERIMENTAL AND CONTROL GROUPS

The effectiveness of the package was analysed by finding out the F ratio.

Table 9: Summary of ANCOVA – Post-test total scores of Environmental literacy with pre test score as a covariate.

Category	N	Pre-test		Post-test	
		M	SD	M	SD
Experimental	31	15.29	5.160	27.71	3.206
Control	33	15.06	5.838	23.18	3.522
	df	SS	MS	F	P
Pre test	1	311	310.58	93.3	< .001
Learning package	1	502	502.27	150.9	< .001
Condition					
Residuals	61	203	3.33		
Corrected Total	63	1016			

It is obvious from the table 25 that, the mean post test total scores for environmental literacy of both experimental and control groups differ significantly. After adjusting for pre-test scores, $F(1,61) = 150.9 > 4$ table value at 0.05 level of significance with df (1,61). F ratio obtained is significant at 0.05 level. The p value obtained is < 0.001 , indicates the significant difference in environmental literacy post test scores of students. It can be

interpreted that learning package prepared is effective than the activity oriented method of teaching for improving the environmental literacy of primary school students.

FINDINGS EMERGED

- 60.93 % of total sample is found to have average level of Environmental literacy.
- The Learning Package on Environmental Literacy is effective in enhancing the Environmental Literacy among Primary School students.
- The Learning Package on Environmental Literacy is effective in enhancing the Environmental Literacy among Primary School students compared to the Activity Oriented Method of Teaching.
- The Learning Package on Environmental Literacy is effective in enhancing the Environmental Literacy in terms of the components of the test among Primary School students compared to the Activity Oriented Method of Teaching.

EDUCATIONAL IMPLICATIONS

The study highlights the need to integrate structured, research-based environmental literacy packages into the primary school curriculum to enhance students' understanding and responsible behaviour towards the environment. It emphasizes the effectiveness of learner-centered approaches over conventional methods, encouraging interactive and engaging teaching practices. Teacher training programs should incorporate modules on environmental literacy and disaster preparedness. Aligned with the NEP 2020's vision of holistic and multidisciplinary education, the findings suggest that such models can be scaled nationally. Schools, as key platforms, play a vital role in promoting disaster education through awareness campaigns, drills, and contextual learning, empowering students as safety ambassadors.

CONCLUSION

The study concludes that the Learning Package developed for environmental literacy is an effective educational tool for enhancing the environmental understanding, awareness, and responsible behaviour of primary school students. Compared to traditional activity-oriented methods, the package resulted in significantly better outcomes in various dimensions of environmental literacy. These findings reaffirm the importance of child-centered, research-based pedagogical interventions in education for sustainable development. By embedding such methodologies within school curricula, we can foster a generation of environmentally responsible citizens equipped to face the challenges of a changing world.

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