STUDENTS' ENVIRONMENTAL KNOWLEDGE IN INDIA: A SURVEY

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The alarming rate of environmental degradation, caused by human activities, poses an unprecedented threat to the survival of all living beings on Earth. In India, attempts are being made to prepare students to tackle such challenges by integrating environmental education in the curriculum, which is also mandated by the Supreme Court. This comprehensive quantitative study was conducted to examine the environmental knowledge of 1,779 Indian school students. The study took into account various factors such as the state they reside in, their location (rural or urban) and their stage of education. This study uses stage of schooling and school location (independent variables) as demographic factors. A questionnaire with close-ended questions served as the research instrument. Data analysis employed comprehensive descriptive analysis and Kruskal-Wallis's test using SPSS software version 27. The study found notable disparities in knowledge levels among different states and education levels, students in with secondary stage (Classes 11–12) showing better performance ($p < 0.01$). Interestingly, no significant difference was observed based on students' rural or urban location. The findings suggest a need for further investigation into the factors influencing environmental knowledge variations across different states in India.

Keywords: Environmental Education, Environment, Environmental Knowledge, Students, Rural and Urban Area, India

Introduction

The alarming rate of environmental degradation, caused by human activities, poses an unprecedented threat to the survival of all living beings on Earth. As the situation aggravates, nurturing environmentally literate students can never be overemphasised. Such environmental literacy through Environmental Education (EE) will provide students the necessary awareness, knowledge, skill, attitude and opportunities to solve environmental problems and issues of the present and prepare them for the future as well (UNESCO-UNEP, 1976).

Notable decisions have been taken in India with regard to implementation of EE. One such decision is that of the Supreme Court in 1991, mandating teaching about environment in all stages of education. In line with this, the National Council of Educational Research and Training (NCERT) has made significant efforts to integrate EE into the national curriculum framework, syllabi, textbooks, teacher training modules and additional resources. It is worth mentioning that during the development of the

National Curriculum Framework 2005 (NCF-2005) the National Focus Group on Habitat and Learning was formed, which was dedicated to addressing issues pertaining to EE (NCERT, 2006).

After the implementation of NCF-2005, NCERT ensured that environmental concepts and concerns were incorporated into all subjects and classes, as appropriate. Upon examining the syllabi and textbooks created by NCERT, it is evident that environmental topics have been extensively addressed (NCERT, 2008, 2008a).

Environmental Education is also an integral part of the curriculum in many other countries including United States (In October 1970, the Environmental Education Act became law), (Lee *et al*., 2020), Taiwan (Taiwan Environmental Education Law was enacted in 2011), (Lee *et al*., 2020), Australia (Fien and Ferreira, 1997), Korea (Kim, 2000), South Korea (The Ministry of the Environment proposed the 'Environmental Education Promotion Act' in December 2002 and passed it in 2008) (Lee *et al*., 2020), Japan (The Basic Environment Act, endorsed in 1993 and the law of Environmental Conservation and Environmental Education was enacted in 2003 to promote Environmental Education) (Lee *et al*., 2020) and Brazil (in 1988, the Brazilian Constitution establishes that EE in all level of education is a citizenship right and a duty of the state and subsequently in 1999, implementation of the National Environmental Education Policy that determines the inclusion of EE at all educational levels was initiated) (de Moura Carvalho and Frizzo, 2016).

The evaluation of the level of integration of EE in schools is quite simple. When it comes to this aspect, analysing syllabi, textbooks, teaching materials, classroom methods, and instructional approaches can offer valuable insights. Nevertheless, evaluating the efficiency of implementing EE can present considerable difficulties. Developing outcomes such as changes in behaviour and mindset takes time and cannot be easily quantified. In addition, these results may only be apparent in certain circumstances. However, it is essential to have a deep understanding of environmental issues and problems in order to foster awareness, knowledge, skills, attitudes and behaviours.

A solid grasp of knowledge is essential for students to develop a precise understanding of the environmental situation (Tilbury, 1997). Furthermore, multiple studies have consistently shown a positive correlation between students' environmental knowledge and their propensity to take action or express an intention to do so (Roper Starch Worldwide, 1994; Kuhlemeier *et al.*, 1999; Meinhold and Markus 2005, cited in Chawla and Cushing, 2007). Environmental concepts are seamlessly integrated into a wide range of subjects and grade levels in India. Nevertheless, the coverage differs among states and Union Territories (UTs). While some choose to adopt NCERT syllabi and textbooks, others prefer to develop their own to cater to regional requirements (NCERT, 2006). This variation in the integration as well as in the teaching methods can have an impact on the level of environmental knowledge that students acquire.

Research on student environmental knowledge yields varying outcomes. A study conducted by Sharma (2018), in India revealed encouraging levels of environmental awareness among students. In a study conducted by Stevenson *et al*. (2014), in the United States, it was

found that students were able to answer 70 per cent of knowledge-based questions correctly, with little variation observed across different grade levels. On the other hand, a contrasting perspective arises when it comes to understanding climate change. Research conducted in various countries, such as Germany, Austria (Kuthe *et al*., 2019), the US (Shepardson *et al*., 2011a, 2011b, 2012a and Australia (Boon, 2010), consistently reveals a widespread lack of comprehension regarding climate change concepts. Similar findings were reported in Greece (Liarakou *et al*., 2011).

In a study by Liarakou *et al*. (2011) among Greek secondary school students (grades 8 and 11), the results suggest that eleventh graders were much better informed than eighth graders although some of the misconceptions reported in the literature (such as the cause-effect relationship between the greenhouse effect and ozone layer depletion) persist, irrespective of educational level.

It is a common perception that environmental issues seem to be more prevalent in urban areas compared to rural areas, especially when it comes to lifestyle-related issues. Keeping this in view, it will be interesting to find out whether students in urban areas are more interested in learning about environmental issues and problems based on their knowledge. There is a dearth of relevant studies in this area.

Also, the breadth and depth at which environmental concepts and concerns are included in the curriculum differ, with deeper concepts and issues addressed at the higher grades. It will be interesting to see whether environmental knowledge of students is influenced by the stages and level of education, i.e., whether students at the higher stages have more knowledge about the environment.

Keeping these in view, this study focuses on the objectives discussed below.

Objectives

The paper focuses on the following objectives:

1. To investigate students' environmental knowledge across Indian states and Union Territories
2. To investigate students' environmental knowledge based on the location of the school (Rural vs Urban)
3. To examine students' environmental knowledge based on their stages (Group 1 = Classes 6–8; Group 2 = Classes 9–10; Group 3 = Classes 11–12)
4. To compare students' environmental knowledge between stages (Group 1 vs Group 2 vs Group 3)

Methodology

The methodologies used for this research were (i) literature review (on the concept of environmental awareness); (ii) collection of data (using questionnaire survey); (iii) quantitative data analysis (descriptive measure for environmental awareness level). The research instrument is the questionnaire using 'Yes' and 'No' sixteen closed-end items (statements) related to environmental concepts.

The research tool consists of a questionnaire which had Section-I as general demographic details and Section-II as Questions pertaining to environmental knowledge. The questionnaire is provided as Appendix-1.

Detail of Questionnaire

The items in the questionnaire have been included keeping in view the basic understanding that students are expected to have about environmental concepts or topics which are necessary to understand environmental issues. Considering the syllabi and textbooks prepared by the National Council of Educational Research and Training (NCERT) as reference for this study, most of the items in the questionnaire relates to the concepts or topics that are in the curriculum for Classes VII (NCERT, 2007), VIII (NCERT, 2008b), IX (NCERT, 2006a) and X (2007a). For example, item Nos. 10, 12, 13, 15, and 19 are part of the curriculum till Class X in some form in the textbooks, or it is expected that teachers would introduce students to such concepts. Table 1 provides detail of inclusion of concepts or contents related to the items in NCERT textbooks.

In addition, students also learn about such topics in Class XII biology (NCERT, 2007b, pp. 280–281), and in some form in geography in different classes up to Class XII.

Table 1: Inclusion of Environmental Concept or Contents Related to the Items in NCERT Textbooks (Pre-Rationalised Course)

S. No.	Item No.	Class	Subject	Page Nos.
1	5	VIII	Science	77
2	6	VII	Science	87
		IX	Science	191
3	7	VII	Science	225
		VIII	Science	23
		IX	Science	185
		X	Science	278
4	8	VIII	Science	73, 240
		IX	Science	192
5	9	VIII	Science	73, 240
		X	Science	279
6	10	VII	Science	216
		VIII	Science	61, 73
		IX	Science	198-200
		X	Science	244
7	12	VII	Science	216
		VIII	Science	61, 73
		IX	Science	198–200
		X	Science	249, 279
8	13	VII	Science	216
		VIII	Science	61, 73
		IX	Science	198–200
		X	Science	249, 279
9	15	VII	Science	68–79
10	19	VII	Science	216
		VIII	Science	61, 73
		IX	Science	198–200
		X	Science	244
11	20	VIII	Science	57, 61
12–16	Item Nos. 11, 14, 16, 17 and 18 are not part of the existing curriculum but have been included since they pertain to basic concepts necessary to understand climate change			

Many of the concepts related to the items have also been used by different researchers in their studies. For example, item Nos. 10 (Boyes *et al.*, 1993; Boyes and Stanisstreet, 1993; Gowda *et al.*, 1997; Papadimitriou, 2004; Harker-Schuch and Bugge-Henriksen, 2013); Item no. 11 (Shepardson *et al.*, 2011b, 2012b); Item no. 13 (Harker-Schuch and Bugge-Henriksen, 2013); Item no. 16 (Sulistyawati *et al.*, 2018); Item No. 19 (Papadimitriou, 2004). In their study about elementary science methods, students' understanding of global climate change in the US, Lambert *et al.* (2012) included questions related to item Nos. 10, 11, 13, 15, 16 and 17. Choi *et al.* (2010) also included many of the concepts related to the questions in their analysis of middle and high school textbooks' coverage such as global warming, climate change, greenhouse effect, major sources and types of greenhouse gases, the mechanisms of the greenhouse effect, distinction between incoming and outgoing solar radiation.

Two options 'Yes' or 'No' were provided to the participants to choose their response to the items (statements). The questionnaire was anonymous. Student participation was voluntary and consent was obtained from all participants in this research.

Sampling

A random sampling method was employed to gather data from the participants. Participants included 1779 students studying in Class VI–XII from different schools located in different States and UTs. Their response was obtained online via the Survey Planet platform (149 students participated) as well as by offline mode, which was administered in schools through different state functionaries based on their feasibility (1630 students participated) during 2018–19.

Hypotheses

The following were the null hypotheses for this study:

$H_0$1 There is no significant difference in the average Total Marks (TM) (scores) between different states and Union Territories.

$H_0$2 There is no statistically significant difference in the distribution of Total Marks between rural and urban categories.

$H_0$3 There is no statistically significant difference in the distribution of Total Marks across the categories of Groups (Group 1 = Classes 6–8; Group 2 = Classes 9–10; Group 3 = Classes 11–12).

$H_0$4 There is no statistically significant difference between the distributions of data in Sample 1 and Sample 2.

Operationalisation of Term

Environmental knowledge: This term refers to a basic understanding that students develop regarding the environment, the various environmental issues and concerns, and their causes and effects.

Results

The results of the study are discussed in the following.

1. Demographic Details

The details of students who participated in the study are provided in Tables 2, 3 and 4 based on the States and UTs, Location of school (Rural/ Urban), and Grades which have been grouped, respectively. Similarly, Figures 1, 2 and 3 provide the graphical representation of the same.

Table 2: Number of Students from Different States / UTs

S. No.	States/UTs	Number of Students	%
1	Missing data	1	0.1
2	Arunachal Pradesh	80	4.5
3	Chhattisgarh	280	15.7
4	Delhi	131	7.4
5	Himachal Pradesh	81	4.6
6	Jammu*	46	2.6
7	Karnataka	28	1.6
8	Kashmir*	15	0.8
9	Kerala	126	7.1
10	Madhya Pradesh	39	2.2
11	Maharashtra	11	0.6
12	Manipur	50	2.8
13	Meghalaya	134	7.5
14	Mizoram	3	0.2
15	Odisha	145	8.2
16	Puducherry	40	2.2
17	Tamil Nadu	401	22.5
18	Telangana	22	1.2
19	Uttarakhand	50	2.8
20	Uttar Pradesh	26	1.5
21	West Bengal	70	3.9
	Total	**1779**	**100**

**Schools in Jammu and Kashmir have separate administration. Hence, they are considered separatily for the purpose of this study.*

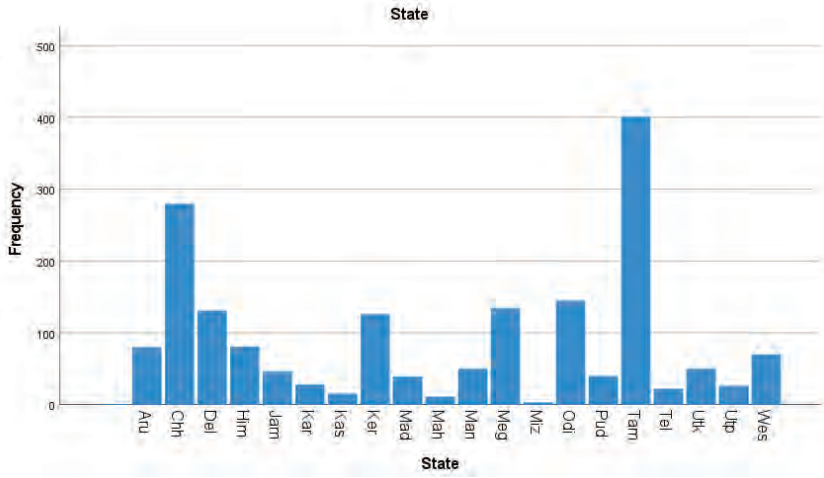

Fig. 1. Number of Students from Different States/ UTs

Table 3: Number of Students from Urban and Rural (UR) Areas

S. No.	U/R	Number of Students	%
1	Missing	5	0.3
2	Rural (R)	415	23.3
3	Urban (U)	1359	76.4
	Total	**1779**	**100**

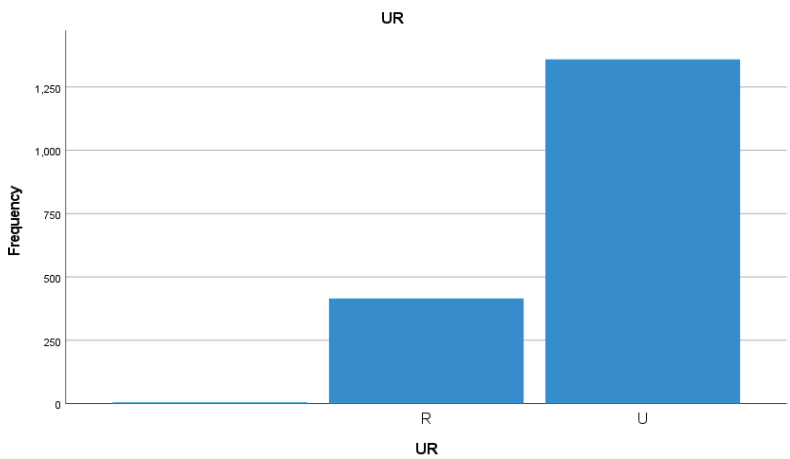

Fig. 2. Number of Students from Urban and Rural (UR) Areas

Table 4: Number of Students in Different Groups (GRP) Based on Class

S. No.	Groups (GRP)	Number of Students	%
1	1 (Classes 6–8)	616	34.6
2	2 (Classes 9–10)	787	44.2
3	3 (Classes 11–12)	376	21.1
	Total	**1779**	**100**

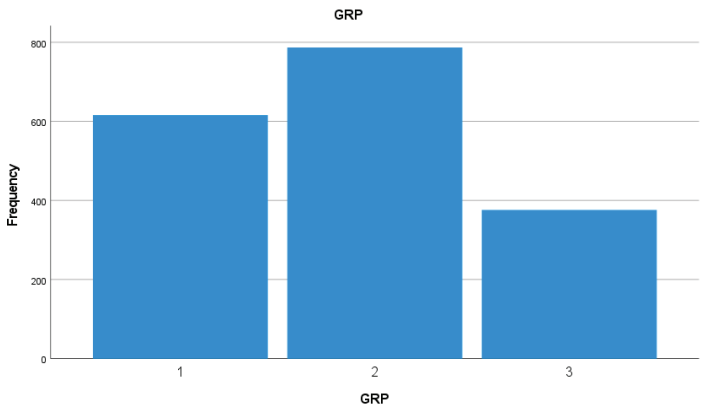

Fig. 3. Number of Students in Different Groups Based on Class

2. Descriptive Statistics

Test of Mean

Table 5: Test of Mean of Data

Particular	N Statistic	Mean		Std. Deviation	Variance Statistics
		Statistic	Std. Error		
TM	1779	9.82	0.050	2.095	4.388

Test of Normality:

Table 6: Tests of Normality of the Data

Particular	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
TM	0.102	1779	0.000	0.974	1779	0.000
a. Lilliefors Significance Correction						

The mean (m) of 9.82 indicates that on average, students scored 9.82 out of 16 possible points on the questionnaire consisting of 16 questions or statements. The standard deviation (SD) of 2.095 suggests that there is a moderate spread of scores around the mean (Table 5). Students' scores likely ranged from several points below the mean to several points above it.

The normality of the data was assessed using the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests to see whether the total marks obtained by students are normally distributed. It was found that the K-S test statistic was non-significant (K-S = 0.102, $p < .000$ which is less than 0.05). Similarly, the Shapiro-Wilk test also yielded a non-significant result (S-W = 0.974, $p < 0.000$ which is less than 0.05), (Table 6). The test results indicate that total marks obtained by students are not normally distributed. Hence, non-parametric analysis was recommended.

3. Objective-wise Results

Objective 1: To investigate students, environmental knowledge across Indian states and Union Territories

Table 7: Kruskal-Wallis Test Summary for Students' Environmental Knowledge Based on their State

Total N	Test Statistic	Degree of Freedom	Asymptotic Sig. (2-sided test)
1779	209.791[a]	20	0.000
a. The test statistic is adjusted for ties			

Table 8: Hypothesis Test Summary for Students' Environmental Knowledge across Indian States and Union Territories

S. No.	Null Hypothesis	Sig.[a,b]	Decision
1	There is no significant difference in the average TM scores between different states and Union Territories.	0.000	Reject the null hypothesis.
a. The significance level is 0.010.			
b. Asymptotic significance is displayed.			

After Normality test, A Kruskal-Wallis H test revealed a significant difference in total marks obtained by the students across the 20 states, x^2 (df = 20, N = 1779, test statistics = 209.791 and p = 0.00) based on which the null hypothesis was rejected as provided in Table 7 and Table 8.

Objective 2: To investigate students' environmental knowledge based on the location of the school (Rural vs Urban)

Table 9: Kruskal-Wallis Test Summary for Students' Environmental Knowledge Based on the Location of the School (Rural vs Urban)

Total N	Test Statistic	Degree of Freedom	Asymptotic Sig. (2-sided test)
1779	5.239[a, b]	2	0.073
a. The test statistic is adjusted for ties.			
b. Multiple comparisons are not performed because the overall test does not show significant differences across samples.			

Table 10: Hypothesis Test Summary for Students' Environmental Knowledge Based on the Location of the School (Rural vs Urban)

S. No.	Null Hypothesis	Sig.[a,b]	Decision
1	There is no statistically significant difference in the distribution of Total Marks between rural and urban categories.	0.073	Retain the null hypothesis.
a. The significance level is 0.050.			
b. Asymptotic significance is displayed.			

A Kruskal-Wallis H test revealed a non-significant difference in total marks obtained by the students across the Urban and Rural areas, x^2 (df = 2, N = 1779, test statistics = 5.239 and p = 0.073). Hence, the null hypothesis is retained as provided in Table 9 and Table 10.

Objective 3: To compare students' environmental knowledge based on their stages (Group 1 = Classes 6–8; Group 2 = Classes 9–10; Group 3 = Classes 11–12)

A Kruskal-Wallis H test revealed a significant difference in total marks obtained by the students across the 03 different set of Groups, x^2 (df = 2, N = 1779, test statistics = 22.009 and p = 0.00). Hence, the null hypothesis is rejected (Table 11 and 12).

Table 11: Kruskal-Wallis Test Summary for Students' Environmental Knowledge Based on their Stages (Group 1 = Classes 6–8; Group 2 = Classes 9–10; Group 3 = Classes 11–12)

Total N	Test Statistic	Degree of Freedom	Asymptotic Sig. (2-sided test)
1779	22.009[a]	2	0.000
a. The test statistic is adjusted for ties.			

Table 12: Hypothesis test Summary for Students' Environmental Knowledge Based on their Stages (Group 1= Classes 6–8; Group 2= Classes 9–10; Group 3= Classes 11–12)

S. No.	Null Hypothesis	Sig.[a,b]	Decision
1	There is no statistically significant difference in the distribution of Total Marks across the categories of Groups.	0.000	Reject the null hypothesis.
a. The significance level is 0.010.			

Objective 4: To compare students' environmental knowledge between stages (Group 1 = Classes 6–8; Group 2 = Classes 9–10; Group 3 = Classes 11–12)

Table 13: Comparison of Performance of Students in Different Stages (Group wise)

	Classes	Count	Mean	Variance	SD
Group 1	6–8	616	9.78	4.7	2.16
Group 2	9–10	787	10.02	3.84	1.96
Group 3	11–12	376	9.4	4.82	2.19

Table 14: Pair-wise Comparisons of Environmental Knowledge Between Stages

Sample 1–2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
3–1	88.118	33.260	2.649	0.008	0.024
3–2	148.645	31.861	4.665	0.000	0.000
1–2	-60.527	27.340	-2.214	0.027	0.081
Each row tests the null hypothesis that there's no statistically significant difference between the distributions of data in Sample 1 and Sample 2. Asymptotic significances (2-sided tests) are displayed. The significance level is 0.010. a. Significance values have been adjusted by the Bonferroni correction for multiple tests.					

As pointed out in the Objective 3, a Kruskal-Wallis H test revealed a statistically significant difference in environmental knowledge scores among the three stages (groups), H (2) = [22.009], $p < 0.001$. To further explore these differences, post-hoc comparisons were conducted using Dunn's test with a Bonferroni correction for multiple comparisons.

The comprehensive descriptive statistics for different Groups are presented in Table 13 and the results of the pair-wise comparisons are presented in Table 14. Interestingly, although the mean score (M = 9.4, SD = 2.19) for students in Group 3 appeared lower than the means for Group 1 (M = 9.78, SD = 2.16) and Group 2 (M = 10.02, SD = 1.96 (Table 13),

they still scored significantly higher on the environmental knowledge test compared to both Groups, Z = [88.118 and 148.645], p = [0.24 and 0.000] (Table 14). No significant differences were found between students in Group 1 and Group 2 (p = 0.81).

Discussions

The study revealed that the average score on the 16-question environmental knowledge test was 9.82 (61%), suggesting an appreciable comprehension of the concepts, although not necessarily reaching the level of academic excellence. It is evident that students acquire knowledge from a wide range of sources outside of the curriculum, such as educational media or even discussions with their family. Research conducted in South Korea (Bakkensen, 2007) and Singapore (Chang, 2014), support this.

With respect to the present study, the findings are consistent with that of Sharma (2018) Stevenson *et al.* (2014). Although there have been various studies that reveal significant findings regarding students' understanding of climate change (Liarakou *et al.,* 2011; Boon, 2012; Sah and Bellad, 2015; Kuthe *et al.,* 2019; Shepardson *et al.,* 2011a, 2011b, 2012a; Shimray and Shirol, 2020), the average score of 61 per cent indicates a positive beginning for environmental education. Nevertheless, the complex nature of environmental literacy underscores the importance of enhancing curriculum development and refining teaching methods to empower students with the essential knowledge and skills.

The present survey also found that there were notable variations in student performance between the various states and union territories (UTs). This disparity may be explained by the different ways that environmental issues are covered in the curricula of the various states and UTs. A detailed and comprehensive analysis is needed before state-level curriculum are further investigated.

Surprisingly, the findings showed that scores in urban and rural areas did not differ significantly. Students in both areas seem to be interested in environmental topics to a similar extent. Although environmental issues were historically mostly concentrated on cities, population migration and rapid urbanisation have caused urban and rural areas to merge, underscoring the significance of having a general understanding of the environment.

The outcomes of the study supported the expected variation in the three groups' performance. Compared to Groups 1 and 2 students in Group 3—which is made up of students in higher classes—achieved noticeably higher marks on the environmental knowledge test. In a research published in 2011, Liarakou *et al.* found that on comparable tests, eleventh pupils in Greece outperformed eighth graders. This highlights the relationship between the curriculum's coverage and pupils' increasing understanding of environmental issues as they move up in the grades. It is noteworthy that certain misconceptions may persist even at upper grade levels, as demonstrated by the research on the greenhouse effect and ozone depletion carried out by Liarakou *et al.* (2011).

In a similar vein, Brody (1996), discovered that students' environmental knowledge increases with grade level when examining environmental science knowledge among students in the Class IV, VIII and XI. College students whose understanding of climate change improved from year one to year

four also showed this tendency of growing knowledge with increasing grade (Zhao and Ewert, 2021).

There is flexibility in curriculum development, even though all states adhere, to an extent, to the National Council of Educational Research and Training's (NCERT) requirements. While some states develop their own curricula based on the National Curriculum Framework (NCF), others adopt or adapt to NCERT textbooks and curricula. For students in Classes IX–XII, the Central Board of Secondary Education (CBSE) suggests using NCERT textbooks (Press Information Bureau, 2015). Additional investigation into the precise environmental content included in different state curricula may yield insightful information about these disparities in performance.

Limitations

There are certain limitations to consider in this study:

1. Sampling bias: The findings of the study may be influenced by sampling bias as a result of not using systematic sampling methods to select students from various grade levels. This sampling method may not provide a comprehensive representation of the entire student population.
2. Geographic limitations: The choice of schools for convenience may have led to an unequal representation of participants from rural and urban areas. The findings may have limited applicability to a wider audience.
3. Instrumental restriction: The environmental knowledge questionnaire utilised in the study might not have encompassed all the essential environmental concepts. For example, students' knowledge about solving environmental issues have not been considered in this study. There is a possibility that this may result in an underestimation of students' overall environmental knowledge.

Conclusion and Recommendations

Inspite of its limitations, the survey findings offer valuable insights for existing research and can inform policy makers and curriculum developers. Here are some potential areas of focus based on the study:

- A thorough examination of syllabi and textbooks can be undertaken to evaluate the extent to which environmental concepts are incorporated into K-12 curricula across different educational boards. This analysis may aim to assess the coverage of environmental topics across various grades and subjects, providing insights into the breadth and depth of the content.
- After analysing the curriculum, an in-depth study can be carried out to assess students' comprehension of the environmental concepts covered in the curricula. This study will offer valuable insights into the sufficiency and efficiency of existing Environmental Education implementation methods. These findings can be used to develop recommendations for curriculum developers, helping them include environmental topics and concerns in a meaningful and age-appropriate manner.

- It is essential to grasp these aspects in order to devise effective strategies for equipping future generations with the knowledge and skills needed to tackle environmental challenges of the present as well as the future.

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Appendix-1

Questionnaire on Students' Knowledge about the Environment and Climate Change

I. General information

1. Which class do you study in?

2. In which state or UT is your school located?

3. Is your school located in rural or urban area?

   Rural ◯ ◯ Urban

4. Is your school a private or a government school?

   Private ◯ ◯ Government

II. Environmental knowledge

1. Overgrasing and deforestation can eventually lead to desertification.

   Yes ◯ ◯ No

2. Dust, water vapour and clouds can impact atmospheric temperature.

   Yes ◯ ◯ No

3. Running waters such as rivers and streams are most appropriate for mosquito breeding.

   Yes ◯ ◯ No

4. The finer the particulate matters of air pollutants, the more harmful they are to the respiratory system.

   Yes ◯ ◯ No

5. Carbon dioxide is more harmful to our lungs than carbon monoxide.

   Yes ◯ ◯ No

6. Global warming is caused due to increase in the size of ozone hole.

   Yes ◯ ◯ No

7. The incoming solar radiation have longer wavelength than the reflected solar radiation.

Yes ◯ ◯ No

8. Carbon monoxide released from vehicular exhaust contributes in climate change.

Yes ◯ ◯ No

9. Chlorofluorocarbon (CFC) and water vapor are both greenhouse gases.

Yes ◯ ◯ No

10. Oceans are important carbon sinks.

Yes ◯ ◯ No

11. Changes in temperature over a week is due to climate change.

Yes ◯ ◯ No

12. Increase in temperature contributes in sea level rise.

Yes ◯ ◯ No

13. Position of the earth with respect to the sun contributes in climate change.

Yes ◯ ◯ No

14. Tsunamis are caused by climate change.

Yes ◯ ◯ No

15. Greenhouse gases in the atmosphere absorb solar radiation and cause global warming.

Yes ◯ ◯ No

16. Fossil fuel contains high amount of organic matters.

Yes ◯ ◯ No