

Environmental Knowledge of Secondary School Students: A Topographical Analysis

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Abstract: The human knowledge, behavior, values, attitudes and level of consciousness are the product of both heredity and environment. Again the environment is the composite of nature and its resources, natural events, socio-economic components, education, culture, location, topographical status, opportunities and so on. Among all other environmental factors the localities and topographical regions of individual were assumed to mediate the effects on Environmental Knowledge. The topographical condition in terms of climate, temperature, rain rate throughout the year, humidity, resources available and natural calamities may have more and less impact in forming personality characteristics i.e. behaviour, knowledge, values, etc. The present study has been emerged out of the above considerations. The researchers assumed the localities and gender as factors of Environmental Knowledge. For that purpose, the State, West Bengal has been divided into six topographical zones and a sample of 260 (N = 260) Secondary School Students of different parts of West Bengal has been taken. Environmental Knowledge Scale (EKS) developed by researchers has been used to measure the selected variable. Descriptive statistics along with ANOVA and t-test have been employed to analyze the data. No difference of the Environmental Knowledge was found in case of gender but the significant differences were found in case of localities. It might be concluded that the localities might mediate in Environmental Knowledge of persons.

Keywords: Environmental Knowledge, Topographical region, Secondary School Student.

1. INTRODUCTION

The various hazards and crisis relating to environment created by development are due neither to economic development, nor to the technology that produces pollution, but rather to a lack of proper awareness, lacking the sufficient and authentic information about the environment and resources. The proper level of knowledge and awareness on environment encourage individuals to behave with their surroundings and other species on earth. Each action by an individual must be linked to its consequences in his/her mind, so that a Proper level of Environmental Knowledge is created that strengthens pro-environmental behaviors and prevents anti-environmental actions. The proper selected studies might distinguish and relate environmental awareness and environmental education, and consider the factors fostering the Environmental Knowledge and Awareness in different contexts. The present study emerged out of above considerations and researchers selected one major variable i.e. Environmental Knowledge to assess in relation to other attribute variables i.e. gender (boys and girls), localities (Rural and urban) and Topographical zones categorized on the basis of climate.

What is Environmental Knowledge? : Knowledge is the storage of events, concepts, principles, information etc. which the human mind gets through experiences. With the help of recalling or recognition, anyone can expose his ideas of material phenomena. The environmental knowledge thereby defined as the storage of events, concepts, principles, information etc about the broad environment surrounding, which the individual mind gathers by through experiences. In the book, -“Dictionary of Education.” Carter V. Good defines knowledge as the (a) The accumulated facts, truth, principles and information to which the human mind has access. (b) The out-come of specified rigorous inquiry. The people get experience in the process of environment and depend upon the accumulated facts, truth etc. They expose their

opinions either by recalling or by recognizing. Knowledge is defined as the remembering of previously learned material, this may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required in bringing to mind of the appropriate information (Linn and Ground, 2002). This definition finds its root in Bloom's *Taxonomy of Educational Objectives* and also accordingly knowledge represents the lowest level of learning outcomes in the cognitive domain. As such, knowledge is gained either by experience, learning and perception or through association and reasoning. Consequently, Environmental Knowledge can be defined as remembering of previously learned material regarding the environment. The researchers have considered Environment Knowledge in her present study as the information gained regarding the natural environment (both biotic and abiotic components) through the curriculum.

Topographical Region and Geographical Status of West Bengal: West Bengal as a province of India is a land of heterogeneity in terms of climate which extends between latitude $21^{\circ} 50' N$ and $27^{\circ} 10' N$ and longitudes $85^{\circ} 58' E$ and $89^{\circ} 50' E$. The state covers an area of 88,752 sq.km stretching from the Himalayas in the north to the Bay of Bengal in the south. This state of West Bengal is bounded on the north by Sikkim and Bhutan, on the east by Assam and Bangladesh, on the south by the Bay of Bengal and on the west by Orissa, Jharkhand and Bihar. West Bengal is a land of the great rivers, Great Plains including deltaic hive of massed humidity. The state of West Bengal is divided into 20 districts. The term 'region' is generally applied to an area of any size throughout which there is some kind of homogeneity as specified by the criteria adopted to define it. Such type of homogeneity of geographical conditions in a region is clearly observed only around the core of its territory. On the basis of landforms, structure, climatic characteristics and human activities, the state of West Bengal may be divided into the following regions: 1) Darjeeling Himalayan Region, 2) Tarai Region, 3) North Bengal Plains, 4) Eastern Fringes of the Chhotanagpur Plateau Region, 5) Rargh Region, 6) Coastal Plain, 7) Sunderbans and 8) Ganga Delta. Out of eight regions, only six regions have taken for the present study.

2. OBJECTIVES

The objectives of the study were:

1. To measure the Environmental Knowledge of the secondary students in respect of Gender (Boys and Girls) and Localities (Rural and Urban).
2. To find out the differences of the Environmental Knowledge of the Secondary School Students belonging to different topographical regions.
3. To develop the tool for measuring Environmental Knowledge of the secondary students
4. To suggest for fostering better Environmental Knowledge among the students.
5. To provide valuable findings and offer measures for greater success of environmental studies included in school curriculum.

3. SIGNIFICANCE OF THE STUDY

The proper design of campaigns and programs in a sustainable way may assist the target groups with the acquisition of knowledge, skills and attitudes that are necessary to solve actual and local environmental problems. In this connection, the researchers purposed that environmental knowledge is the variable, which is more responsible for enhancing the pro-environmental behavior. The right kind of studies conducted in such field can prevent our environment, assist for proper utilization of resources and would be helpful in policy making. Many studies proved that, the greater the degree of environmental knowledge and awareness is more positive and high environmental attitudes and behavior of individuals. Students, teachers and parents will be benefited from this study experiencing the knowledge of importance issues related to environment, the art of learning to preserve own atmosphere, setting mass programmes etc. The planers and administrators will be able to assume the effects of some interactive nonintellectual psychological factors in relation to environmental knowledge of secondary school students. Ultimately the study might be helpful for qualitative upliftment of environmental education i.e. in framing curriculum, organizing programmes relating to Protection and Preservation of Environment in West Bengal and India as a whole. The study would be helpful to teachers, educational planners, administrators, further researchers etc. in various ways. The results and findings would help to prepare and plan novel, creative and unique program on environmental issues.

4. HYPOTHESES

For the present study three null-hypotheses were formulated:

H^o₁: There exist no significant differences among Secondary School Students belonging to different topographical zones in respect to their Environmental Knowledge.

H^o₂: There exists no significant difference between Secondary School Girls and Boys in respect to their Environmental Knowledge.

H^o₃: There exists no significant difference between Urban and Rural Secondary School Students in respect to their Environmental Knowledge.

5. PROCEDURE OF THE STUDY

I. Variables Studied: As a multivariate approach, the present study comprised of four Variables such as-

- (a) One dependent variable i.e. Environmental Knowledge
- (b) Three attribute variables i. e. Gender (boys and girl), (c) Localities (Rural and Urban) and Topographical regions (Categorised into six regions).

II. Methods of the Study Employed: The study aims at comprising the level of Environmental Knowledge in respect to persons' localities and gender. The method of the investigation was confined to a descriptive and analytical approach.

III. Tools Used: For the present study the researcher found Environmental Knowledge Scale (EKS) constructed by Sarkar, B. developed on the basis of "*Children's Environmental Attitude and Knowledge Scale*" popularly known as CHEAKS was found to be more suitable for measuring Environmental Knowledge. The psychological basis of the dimensions and the items involved in this test was matched perfectly with the present situation of this investigation.

IV. Statistics Used: The collected data from students were subjected to different statistical techniques. All the statistics used in the study can be divided into four major parts, i.e.

- Descriptive Statistics: In order to find out the nature of sampling distribution, descriptive statistics were carried out for the variable. For this purpose, the statistics such as Mean, Median, S.D. were calculated.
- Inferential Statistics: The 't'-test was adopted to find out whether there was any significant mean difference between gender and students groups within the variables under consideration.

6. DESCRIPTION OF ENVIRONMENTAL KNOWLEDGE SCALE (EKS)

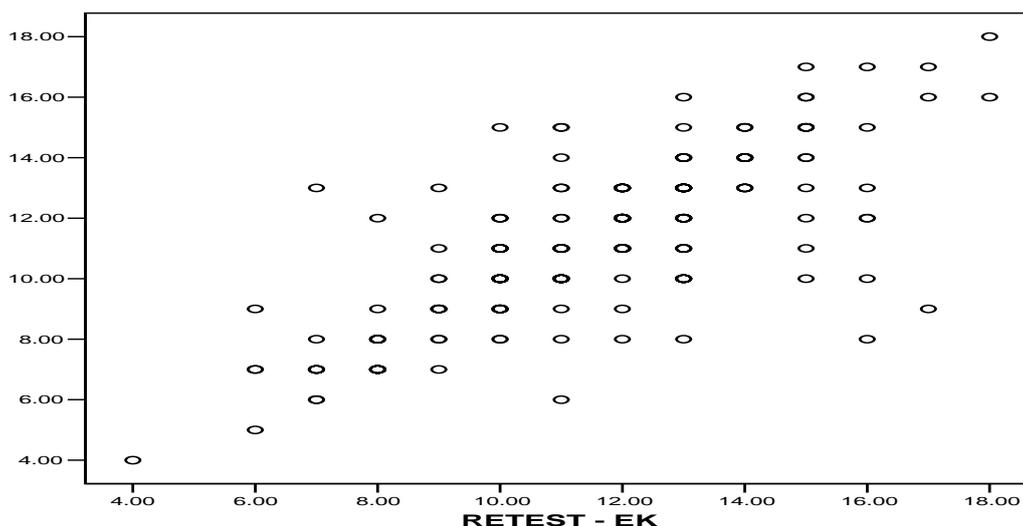
A. Dimensions Considered for Environmental Knowledge Scale : Environment may be broadly classified into two categories natural and manmade. The natural environment consists of physical (abiotic) and biological (biotic) components. The physical environment can be further classified into atmosphere (air), hydrosphere (water) and lithosphere (soil) and the biological environment can be further classified into animals and plants. The researcher had considered Environmental Knowledge in the present study as the information gained regarding the natural environment (both biotic and abiotic components) and also information regarding energy, pollution and other general issues regarding the environment. For the purpose of determining environmental knowledge of secondary students the researcher has considered the Physical (air, water & soil), Biological (animals & plants), Energy, Pollution, General Issues and Recycling as vital aspects of environmental knowledge. For the purpose of the present study, the researcher chose the dimensions – physical (air, water & soil) , biological (animals & plants), energy, pollution and general issues as depicted in the following chart.

Table- 1: Showing the Dimensions cum Item Chart Considered for the EKS.

Sl No.of Dimensions	Dimensions Considered in EKS	No. of Items
D1	Physical (air, water & soil)	6
D2	Biological (animals & plants)	6
D3	Energy	6

D4	Pollution	6
D5	General Issues	6
Total Items		30

B. Reliability of Environmental Knowledge Scale (EKS): Before adopting the EKS, the researcher determined the reliability of the test. For that purpose, the statistical measures for determining the reliability of the test viz., Test-retest was considered. The researchers re-administered the test on a sample of 180 students to calculate the Test-retest reliability. The test was re-administered after an approximate gap of 15 days. Scatter Plot of the Test-retest of the Environmental Knowledge Scale scores were presented in Figure – 1.



($r = 0.749$)

Fig. 1: Scatter Plot of Test vs. Retest Scores of Environmental Knowledge Scale

The Test-retest correlation value of 0.749 significant at 0.01 levels showed satisfactory reliability according to the researcher.

The researchers had determined the dimension- wise Reliability co-efficient of EKS through Test–Retest method, which might be presented in the Table-

Table-2: Showing the Dimension wise Reliability- coefficient of EKS

Method	N	Dimensions of EKS	Reliability Coefficient
Test-Retest	180	Physical	0.603*
		Biological	0.692*
		Energy	0.718*
		Pollution	0.682*
		General Issues	0.617*

*Significant at 0.01 level.

C) Validity of the Environmental Knowledge Scale (EKS): The scale comprised of 30 items which were taken from the curriculum of class VIII under W.B.S.S.E. Therefore, inspite of several methods which existed for determining validity, the researcher considered 'Content Validity' as the most suitable measure of validity of the scale. To determine the 'Content Validity' of the Environmental Knowledge Scale the researcher send the framed items along with the objective of the study, selected dimensions and relevant literature to five experts for their specialised opinion. The experts unanimously gave affirmative response for the framed items. .

IV. Population: The population of the study was secondary schools students of West Bengal. The schools included in the sample were found in seven districts from six topographical zones classified on the basis of climate existing in West Bengal.

V. Sampling Procedure Followed: Purposive sampling method was followed. A sample of 240 (N = 240) students from ten (10) schools were selected, on basis of the main consideration that the schools should be situated in both the rural and urban areas. Moreover, all the schools were categorized into six zones in accordance with the climate existing. The distribution of the simple had been presented in the table – 3

Table - 3: Showing the Sampling Distribution (N = 260)

Topographical zones→		Tarai Region	North Bengal Plains	Plateau region	Rarh Region	Sundarban Region	Ganga Delta	Total	
Localities ↓	Gender ↓								
Rural	Boys	15	15	15	15	15	0	75	150
	Girls	15	15	15	15	15	0	75	
Urban	Boys	0	10	15	15	0	15	55	110
	Girls	0	10	15	15	0	15	55	
Total		30	50	60	60	30	30	N = 260	

Rural = 150 (75 + 75), Urban = 110 (55+55), Boys = 130 (75+55), Girls = 130 (75+55).

VI. Statistics Used: The collected data from students were subjected to different statistical techniques. All the statistics used in the study can be divided into two major parts, i.e.

- i) Descriptive Statistics: Mean, SD, Histogram
- ii) Inferential Statistics: t-test, ANOVA

7. ANALYSIS OF DATA

Descriptive Statistics:

Table-4 : Showing the N, Mean and SD of the strata considered for Environmental Knowledge (EKS) Scores

Strata/Localities	N	M	SD
Tarai Region	30	15.97	4.924
Northern Plains	60	15.76	4.702
Plateau region	30	13.57	3.644
Rarh Region	30	17.70	3.576
Sundarban Region	60	14.17	4.434
Ganga Delta	50	13.57	4.196
Boys(Total)	130	14.26	4.579
Girls(Total)	130	15.13	4.602
Rural (Total)	150	13.97	4.668
Urban (Total)	110	15.91	4.654
TOTAL (N)	260	14.33	4.661

The study of the descriptive statistics for the measure of the Environmental Knowledge in case of secondary students showed that, mean score (17.70) of the Rarh was almost higher, both Plateau and Gangetic Delta's mean score (13.57) was same and it was the lowest among all six regions. In case of gender (boys and girls) the difference of mean scores was very negligible and in case of locality (rural and urban), there revealed a difference in their mean values.

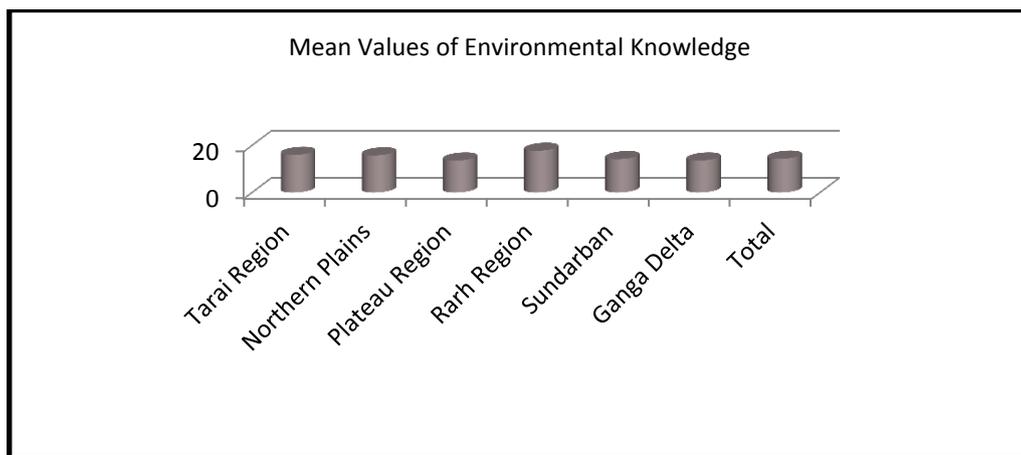


Fig.-2: Showing the Mean Values of Environmental Knowledge for Secondary School Students (Topographical Region wise)

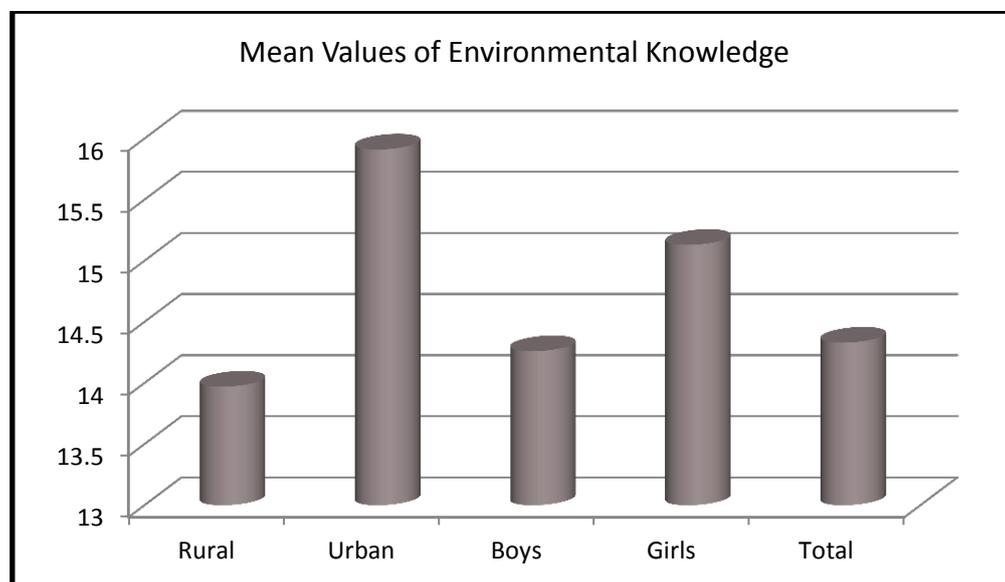


Fig.-3: Showing the Mean Values of Environmental Knowledge of Secondary Students (Gender & Location wise)

The Fig.-3 showed that, the urban students at secondary level were better than their rural counterparts in Environmental Knowledge and it also showed as a little difference between boys and girls in their Environmental Knowledge.

Inferential Statistics: To draw the better and more reliable conclusion for the study, researchers used ANOVA and t-tests.

Table-5: Showing the ANOVA Summary

Source of Variation	SS	df	MSS	F
Between	$SS_b = 183.796$	5	$MS_b = 36.759$	$F = \frac{MS_b}{MS_w} = \frac{36.7592}{2.3841} = 15.418$
Within	$SS_w = 605.554$	254	$MS_w = 2.384$	
Total	$SS_t = 789.35$	259		

$F = 15.418$ with $df (5, 254)$

From the Table F values with $df 5/254$ at 0.05 level is 2.249 and at 0.01 level is 3.089. The variance ratio or F is 15.418. The df for between means is 5 and the df for within groups is 254. Entering the table – F with these dfs it reads the column 5 and row 254 that the 0.05 level is 2.249 and 0.01 level is 3.089. The calculated F of 15.418 is highly greater than 3.089. Hence F is significant. The Null hypothesis (H_0) is rejected with a conclusion that the six means differ

significantly at both 0.05 and 0.01 level. It may be strongly stated that, there is a significant differences among students of six zones in their Environmental Knowledge.

When the F-Value becomes significant, the calculation of “t” value is essential to study where the actual difference between which groups is existed. For this purpose, the investigators computed $[\frac{K \times K - 1}{2} = \frac{6 \times 6 - 1}{2} = \frac{6 \times 5}{2} = \frac{30}{2} = 15]$ 15 “t” values.

Table-6: Showing ‘t’ –Value for the scores of Environmental Knowledge Scale between the each groups of six Topographical Zones

Sl. No.	Group	N	M	SD	SE _D	‘t’- value
1	Tarai Region	30	15.97	4.924	1.084	0.194
	Northern Plains	60	15.76	4.702		
2	Tarai Region	30	15.97	4.924	1.118	0.903
	Plateau region	30	14.96	3.644		
3	Tarai Region	30	15.97	4.924	1.110	1.559
	Rarh Region	30	17.7	3.567		
4	Tarai Region	30	15.97	4.924	1.066	0.427
	Sundarban Region	60	16.4	4.434		
5	Tarai Region	30	15.97	4.924	1.077	1.421
	Ganga Delta	50	14.44	4.196		
6	Northern Plains	60	15.76	4.702	0.901	0.932
	Plateau region	30	14.96	3.644		
7	Northern Plains	60	15.76	4.702	0.891	2.17
	Rarh Region	30	17.7	3.576		
8	Northern Plains	60	15.8	4.702	0.834	0.719
	Sundarban Region	60	16.4	4.434		
9	Northern Plains	60	15.76	4.702	0.849	1.555
	Ganga Delta	50	14.44	4.196		
10	Plateau region	30	14.96	3.644	0.932	2.94*
	Rarh Region	30	17.7	3.567		
11	Plateau region	30	14.96	3.644	0.878	1.44
	Sundarban Region	60	16.4	4.434		
12	Plateau region	30	14.96	3.644	0.892	0.583
	Ganga Delta	50	14.44	4.196		
13	Rarh Region	30	17.7	3.576	0.868	1.498
	Sundarban Region	60	16.4	4.434		
14	Rarh Region	30	17.7	3.576	0.882	3.696*
	Ganga Delta	50	14.44	4.196		
15	Sundarban Region	60	16.4	4.434	0.825	2.376*
	Ganga Delta	50	14.44	4.196		

*Significant at 0.01 level

The 't' table showed that, out of 15 calculations determining the differences among the group means, only 3 (three) differences were found significant. The students of Plateau region differed to Rarh Region, students in Rarh Region differed to students of Ganga Delta and students of Sundarban Region differed to students of Ganga Delta in their Environmental Knowledge.

Table-7 : Showing 't'-value of Environmental Knowledge of Secondary School Boys (SSB) and Secondary School Girls (SSG)

VARIABLE	Difference Between	N	M	SD	SE _D	t-value	df
Environmental Knowledge	SSB	130	14.26	4.579	0.569	1.529**	258
	SSG	130	15.13	4.602			

** Insignificant at both 0.01 and 0.05 levels.

The table showed that, the 't' value between secondary boys and secondary girls in Environmental Knowledge was insignificant at 0.01 and 0.05 levels. Hence, the Null-hypothesis (H_0) was retained. Thus it might be concluded that, there was no significant difference between secondary boys and secondary girls in relation to their Environmental Knowledge. The mean score of the secondary girls were slightly higher than the mean score of boys; it was due to chance error. So it might be interpreted that, the gender would not be the predictor in case of Environmental Knowledge.

Table-8 : Showing 't'-value of Environmental Knowledge of Rural Secondary School Students (RSSS) and Urban Secondary School Students (USSS).

VARIABLE	Difference Between	N	M	SD	SE _D	t-value	df
Environmental Knowledge	RSSS	150	13.97	4.668	0.585	3.316*	258
	USSS	110	15.91	4.654			

* Significant at both 0.01 and 0.05 levels.

A perusal of Table-8 showed that "t" value between Rural Secondary School Students and Urban Secondary Students in Environmental Knowledge was significant at 0.01 level. Thus, the Null-hypothesis (i.e. H_0) was rejected. It was established that, "there existed a significant difference between Rural Secondary School Students and Urban Secondary School Students regarding to their Environmental Knowledge." Since the mean score of Rural Secondary School Students was lesser than the mean score of Urban Secondary School Students, it might be interpreted that, the Urban Secondary School Students had better in Environmental Knowledge than Rural Secondary School Students

8. MAJOR FINDINGS

On the basis of above analysis of data, the major findings were found as followings:

1. There exists no significant difference between boys and girls in relation to their Environmental Knowledge. Gender is no way a factor of Environmental Knowledge of Secondary School going students.
2. There exists a significant difference between Rural and Urban Secondary School Students in relation to their Environmental Knowledge. Localities are a contributing factor in Environmental Knowledge of Secondary School going students.
3. There exists significant difference among Secondary School Students belonging six topographical zones of West Bengal in relation to their Environmental Knowledge. Topographical region is a factor of Environmental Knowledge of Secondary School going students.
4. With regard to environmental knowledge (EKS), it was found (with reference to Table-6 showing the Descriptive statistics) that, secondary students belonging to Rarh area had higher in environmental knowledge than students of

other parts and the students of Ganga Delta and Plateau were poor among all six classified zones in environmental knowledge.

- The students of Plateau region differed to Rarh Region, students in Rarh Region differed to students of Ganga Delta and students of Sundarban Region differed to students of Ganga Delta significantly in their Environmental Knowledge.

9. IMPLICATIONS OF THE STUDY

The findings and discussions of present study proved that, both gender and the localities are contributing factors in Environmental Knowledge. The students belonging to rural area showed very high having more informed on environment and on the contrary, the group of individuals belonging to urban region was lacking better knowledge on environment issues. So the present study was of vital concern for teachers in particular and curriculum framers along with educational policy makers in general. The findings of the present study on environmental knowledge would be utilized in various ways:-

- Survey the area based programmes and inculcate the environmental values
- Both pattern of curriculum and methods of instruction will be in such a way that assist students to Translate the their thoughts from localized to globalised in issuers of environment.
- Assignments like field work, nature study, visits and project works to promote maximum intellectual growth and develop the environmentally responsible citizen.
- Programmes for developing both knowledge and skills in preservation of the natural resources, waste management, techniques of recycling, etc.
- Supplying the day to day information to students.
- Synthesis of Theory and Practice in school curriculum consisting the sufficient and authentic information on environmental issues.
- Inclusion of local, national and global issues in curriculum
- Conducting various action oriented programmes like Swachha Bharat Abhiyan, Clining Drives, Deforestation, etc. by the students.
- Conducting environment literacy programmes.

10. CONCLUSIONS

Without saving the environment, nature and its recourses, planning education for sustainable development may be proved as myth. Among all the planning, programmes, policies and laws in present day society, the planning and programmes for the protection and preservation of environment should be got top priority. Students at all levels must be aware of such programmes and policies. They should be highly informed in environmental issues. The students must actively participate and take initiative to save their own life by saving their own natural world.

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