

A Comparative Study of I.C.S.E., C.B.S.E. and U.P. Board Students regarding Comprehension of Environmental Issues

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Abstract

In the present education system aspects of environmental concerns are introduced in the curriculum in various ways. Children in the school are gaining knowledge and understanding of environmental issues through textbooks, projects and various activities. We need to find out that to what extent the basic knowledge and understanding of various issues of environmental concerns have been imbibed by school children. A comparative analysis of the comprehension regarding different aspects of environmental concerns in students studying in schools affiliated to different Boards of education highlights the positive aspects and the weakness in the environmental education curriculum being followed by these schools. It will help in identifying major areas which need to be worked on for the better understanding of environmental concerns among students. Since environmental concern is a very broad area and various aspects are interlinked with each other, hence students' understanding could only be developed if they are able to establish if-then and cause-effect relationship between various aspects of environmental concerns.

In order to meet the challenges and crisis of the present century, environmental education has been made an integral component of our school curriculum. Each and every school is imparting knowledge about various environ-

mental issues through books, lectures, workshops and eco-club activities, projects etc. Issues of environmental concerns are very comprehensive and interlinked with each other, affecting our life directly or indirectly. It requires

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a basic understanding among the students regarding the interdependence of various environmental aspects.

An understanding of environmental concerns is not merely a generalisation based on certain facts or data, but it is an insight into how it may be applied to other situations in practical life. It is simply, that how easily a student can establish 'if-then' relationship between various environmental issues. In the present context of environmental concerns isolated and meaningless knowledge have no value; it is only when they are given meaning at the level of concepts or understandings that their uses become clear to learner. In the environmental context understanding of cause and effect relationship is important.

A comparative analysis of the basic understanding of environmental issues of students studying in different board of education can highlight the strength and the weaknesses of the pattern of environmental education provided in the school of our country.

Related Studies

Singh (1988) developed a criterion-referenced test in environmental studies and found 20.6 per cent students obtained pass score of 75 per cent and above. Gopalakrishnan (1992) found normal distribution of the total environmental education test scores, which implied that studying environmental education had a very good impact on the children. Su (1993) designed a five-part questionnaire to study middle school interest in

environmental issues as they relate to science instruction. Ramakrishna (2003) concluded that children exposed to environment related activities instill appropriate behaviour. In this respect Talsma (2005) found that well designed artifact (essays, investigative reports and dynamic computer model) provide significant assessment of students understanding across curriculum content. Findings indicate that student's understanding's of the stream ecosystem began as unconnected pieces of knowledge but increased substantially on both breadth and depth across the chemistry, biology, earth science and environmental science domain. Travis (2007) highlights benefit of ecology course on environmental attitude of students. Yadav and Bharati (2007) revealed that 33.09 percent of environmental awareness may be attributed to the scientific attitude. Bhawalkar (2008) found that teaching after formulating specific aims for the cognitive, affective and psychomotor development could enhance the level of environmental awareness among students. Misra and Verma (2008) concluded that organised co-curricular activities programme to enhance the learning of B.Ed. students about the environment was found to be beneficial.

Objective

To compare the environmental concepts grasped by the students of I.C.S.E., C.B.S.E. and U.P. Board with the help of 'Environment Comprehension Test'.*

* The paper is based on the doctoral work of the author conducted during 2004-2009.

Sample

A sample of 300 students of Class VIII from six different schools of Lucknow city affiliated to I.C.S.E., C.B.S.E. and U.P. Board were taken. Disproportionate stratified random sampling method was applied to select two schools affiliated to I.C.S.E. Board, two schools affiliated to C.B.S.E. Board and two schools affiliated to U.P. Board. Then fifty students from each school were randomly selected for the investigation. Thus, total 100 students were selected from each board of education.

Tool

The tool named as "Environment Comprehension Test" consisting of 50 multiple choice objective type items for evaluating student's understanding of environmental concerns was used. The tool is prepared by the investigator. Expert opinion and item analysis procedure was adopted for construction of the test. Items were based on the following ten broad categories.

- I. Environmental Structure
- II. Environmental Balance
- III. Energy Resources
- IV. Environmental Degradation
- V. Agriculture
- VI. Animal Husbandry
- VII. Human Health and Hygiene
- VIII. Impact of Population on Environment
- IX. Conservation of Environmental Resources
- X. Environmental Management and Sustainable Development

Data Collection

After procuring permission from the Principals of the selected secondary school, 'Environment Comprehension Test' consisting of 50 Items was administered on the sample of fifty students from each school. The students were given proper instruction regarding the test. The students were able to complete the test in 45 minutes.

Scoring

The scores of the present test ranged between 0-50. Each item with correct response carries the value of 1 mark and the wrong responses were given zero marks. Total score of each student was obtained. Further category wise score of each student was also obtained by adding the individual scores of the item belonging to that category.

Statistical technique employed

The F-ratio is determined for each of the ten categories of environmental concerns and the F-ratio is also determined for the total scores obtained by the students of I.C.S.E., C.B.S.E. and U.P. Board.

When the F-ratio is found significant t-test is applied to obtain the significant difference between the means.

Results

1. The mean score ($M = 38.56$) of I.C.S.E. students in 'Environment Comprehension Test' is significantly higher than C.B.S.E. students and mean score ($M = 36.76$) of C.B.S.E. students is significantly higher than mean score ($M = 24.33$) of U.P. Board students.
2. There is no significant difference in the scores obtained by I.C.S.E.

and C.B.S.E. students in the categories; Environmental Structure, Energy Resources, Environmental Degradation, Human Health And Hygiene, Impact Of Population On Environment And Environmental Management And Sustainable Development.

3. There is significant difference in the scores of I.C.S.E. and C.B.S.E. students, C.B.S.E. and U.P. Board students and I.C.S.E. and U.P. Board students in the categories, Environmental Balance, Agriculture, Animal Husbandry and Conservation of Environmental Resources.

Result Table

Mean, F-ratio and t-values of the Environmental Concerns and its various dimensions for 3-Boards ($G_1 = \text{I.C.S.E. } N=100$, $G_2 = \text{C.B.S.E. } N = 100$, $G_3 = \text{U.P. Board } N = 100$)

S.No.	Dimensions	Groups	M	F	CR Value / t Value
I	Environmental Structure	1. I.C.S.E.	9.68	89.50**	Group 1-2 1.75
		2. C.B.S.E.	9.26		Group 2-3 10.83**
		3. U.P. Board	6.66		Group 1-3 12.58**
II	Environmental Balance	1. I.C.S.E.	3.50	106.38**	Group 1-2 3.73**
		2. C.B.S.E.	3.03		Group 2-3 10.39**
		3. U.P. Board	1.72		Group 1-3 14.12**
III	Energy Resources	1. I.C.S.E.	0.74	27.95**	Group 1-2 1.16
		2. C.B.S.E.	0.67		Group 2-3 6.16**
		3. U.P. Board	0.30		Group 1-3 7.33**
IV	Environmental Degradation	1. I.C.S.E.	2.42	29.06**	Group 1-2 0.75
		2. C.B.S.E.	2.51		Group 2-3 7.08**
		3. U.P. Board	1.66		Group 1-3 6.33**
V	Agriculture	1. I.C.S.E.	1.04	9.25**	Group 1-2 4.30**
		2. C.B.S.E.	0.67		Group 2-3 2.21*
		3. U.P. Board	0.86		Group 1-3 2.09*
VI	Animal Husbandry	1. I.C.S.E.	0.73	27.56**	Group 1-2 4.20**
		2. C.B.S.E.	0.94		Group 2-3 8.40**
		3. U.P. Board	0.52		Group 1-3 4.20**
VII	Human Health and Hygiene	1. I.C.S.E.	8.42	58.25**	Group 1-2 1.88
		2. C.B.S.E.	7.93		Group 2-3 8.34**
		3. U.P. Board	5.76		Group 1-3 10.23**
VIII	Impact of Population on Environment	1. I.C.S.E.	3.11	59.47**	Group 1-2 1.08
		2. C.B.S.E.	2.97		Group 2-3 9.53**
		3. U.P. Board	1.73		Group 1-3 10.61**

IX	Conservation of Environmental Resources	1. I.C.S.E.	2.70	55.92**	Group 1-2	2.61**
		2. C.B.S.E.	2.36		Group 2-3	7.92**
		3. U.P. Board	1.33		Group 1-3	10.53**
X	Environmental Management and Sustainable Development	1. I.C.S.E.	6.28	84.89**	Group 1-2	0.68
		2. C.B.S.E.	6.43		Group 2-3	12.04**
		3. U.P. Board	3.78		Group 1-3	11.36**
XI	Ten dimensions of Environmental concerns	1. I.C.S.E.	38.56	146.54**	Group 1-2	2.00*
		2. C.B.S.E.	36.76		Group 2-3	13.81**
		3. U.P. Board	24.33		Group 1-3	15.81**

*Significant at 0.05 level

** Significant at 0.01 level

Discussion

Results of the total scores of 'Environment Comprehension Test' reveals that performance of U.P. Board students was lower in comparison to I.C.S.E. and C.B.S.E. Board students while I.C.S.E. students performed better than C.B.S.E. and U.P. Board students. The presentation of the matter in the I.C.S.E. textbook *Living Science* series of Physics, Chemistry and Biology (Ratna Sagar Publication) is done in a systematic and well-organised way under various headings and subheadings. This could have facilitated both teachers and students of I.C.S.E. Board to gain knowledge about environmental aspects from books. Clarity and systematic presentation of content in textbook help in building the knowledge in the sequential form in the mind of the students. C.B.S.E. textbook *Science and Technology* (NCERT Publication) are interactive and informative but sometimes do not cover the environmental aspects in a comprehensive manner. This creates gaps in the knowledge and if teachers are unable to satisfy the curiosity and fill the gaps, students may not

comprehend the aspects clearly and this may be the reason that students of C.B.S.E. Board could not perform as good as I.C.S.E. students. On the other hand U.P. Board textbook *Gyan Vigyan* (U.P. Basic Shiksha Parishad) has too much information related to environmental concerns with many related activities but these informations are not accompanied with adequate descriptions and good pictures. Great efforts on the part of teachers need to be taken to explain elaborately the various aspects of environmental concerns with proper illustrations. May be to compensate these drawbacks of the text enough effort are not made by the teachers so the performance of the U.P. Board students is comparatively weak.

The textbooks referred in this study are of older edition as the data is taken from the Ph.D work of the investigator. Although the study lays emphasis on the comprehension of environmental aspects by the students of I.C.S.E, C.B.S.E. and U.P. Board in which various factors are considered including teaching methods, environment related activities, mass media etc. Textbooks prescribed at that time are only one

of the many factors responsible for the comprehension of environmental aspect.

With respect to the category 'Environmental Structure', the results showed that I.C.S.E. and C.B.S.E. students comprehended equally this aspect but U.P. Board student's level of comprehension was weak. Further analysis revealed that more number of I.C.S.E. and C.B.S.E. students scored correct in the Item related with 'Non-living' component of environment and 'ozone layer' than U.P. Board students, this may be because U.P. Board texts do not cover the important non-living component — Air, water and soil in the form of content. The information regarding 'ozone layer' should be provided by the teachers if it is not presented in the text as this is an important aspect of environment. It was also revealed that very less number of C.B.S.E. students scored well in the Item related to 'plant adaptations in the desert area' while better performance was seen in I.C.S.E. and U.P. Board students. U.P. Board text deals separately with the chapter related to 'adaptation' so performance of students was better in this aspect. Concept of plant adaptations to the changing environment is not very clear among C.B.S.E. students. Although I.C.S.E. and C.B.S.E. text do not deal with this aspect but motivating the students to look around the nature and derive their own conclusions can enable them to understand about adaptation. Unawareness of I.C.S.E. students was revealed in the Item related to 'Inhabitation of Gorilla' although the text has separate coloured pages showing pictures of animals

with adequate information under the heading Nature's Pride. This shows that students had overlooked this special feature of the text and had given more emphasis on the written text of the chapters. Performance of U.P. Board students was better in Item related with example of 'microorganism' and useful activity of microorganism but not so good in Item related with role of microorganism in various diseases and even the students do not know why knowledge about microorganisms is essential. The concepts which create confusion in the mind of students should be dealt separately in the text and by the teachers in the class so that clarity about the concept develops in the mind of the students. Results also reveal that students of the three Board know better about 'animal adaptations' in comparison to 'plant adaptations'. This shows general interest of the students to know more about animals and their various adaptive features.

Comprehension of I.C.S.E. students was better than C.B.S.E. students and understanding of C.B.S.E. students was better than U.P. Board students in the aspect 'Environmental Balance'. Less number of students scored correct in the Item related with 'role of eagle in food chain' which shows that students of three boards do not have adequate concept of role of various organisms in food chain. This weakness is of much concern as students of this age group should understand the importance of each and every organism in the maintenance of balance in the environment. A result also revealed that concept of 'water cycle' is better achieved by I.C.S.E. than C.B.S.E.

students. U.P. Board student's concept of ecosystem is better than other aspects of environmental balance including water cycle. This may be due to the fact that U.P. Board text has activities related to observation of nature and various type of ecosystem. Ramakrishna (2003) also concluded that children exposed to environment related activities instill appropriate behaviour. The results of the category 'Energy Resources' revealed that I.C.S.E. and C.B.S.E. students have better concept of 'renewable and non-renewable energy resources' than U.P. Board students. The striking feature is that U.P. Board text has separate chapter dealing with this aspect with many examples but if the content is not explained in the classroom giving daily life examples students are unable to relate these aspects with their day to day life.

I.C.S.E. and C.B.S.E. students equally comprehended the aspect 'Environmental Degradation' but U.P. Board student's comprehension is weak in this aspect. Further analysis revealed that students of all the three Boards do not have good concept of air pollutants and acid rain although the concept of water pollution and disasters are better gained by them. Knowledge about pollution is not enough until and unless students understand about the cause and effects of pollution which include aspects like air pollutants and acid rain. Teacher should explain environmental problems highlighting cause-effect relationship to students.

'Agriculture' is the only aspect in which comprehension of U.P. Board students is better than C.B.S.E. students. I.C.S.E. students also comprehended

well this aspect. All the three textbooks deals separately the chapter related with agricultural practices in detail but U.P. Board text deals with many activities related to observation and collection of informations from the farmers in the field. This may be the reason of good performance of U.P. Board students in this category. Students of all the three board scored comparatively higher in the item related with harmful effect of insecticide with respect to Item related with use of compost as a fertiliser. This shows that students know about harmful impact of some agricultural practices on our environment but they do not have a better understanding of what kind of agricultural practices are safe and good for us and why farmers should adopt these practices.

Results of 'Animal Husbandry' showed that C.B.S.E. students have a better understanding of revolution associated with animal rearing practices than I.C.S.E. and U.P. Board students content of animal rearing practices is accompanied with beautiful picture in I.C.S.E. and C.B.S.E. text while lack of related picture is seen in U.P. Board text which could not motivate the students to know more about this aspect.

The results showed that I.C.S.E. and C.B.S.E. students comprehended equally the aspect of 'Human Health and Hygiene' but comprehension of U.P. Board students was weak in this aspect. The awareness and knowledge on such issues could be developed by organizing awareness programme in the school and encouraging student's participation. Further analysis revealed that students studying in different boards have knowledge about noise pollution and

its adverse effects on human health. This shows that students are sensitive towards the environmental problems faced by them in day to day life. C.B.S.E. and U.P. Board students have better understanding of various vaccines used against different diseases than I.C.S.E. students while students of U.P. Board do not have the concept of radioactive pollution and its effect on human health in comparison to I.C.S.E. and C.B.S.E. students. Results show that U.P. Board students have better understanding on how to prevent themselves from electric shock than the students of the other two boards. Sufficient number of students of the three boards know about common medicines. Sufficiently large numbers of U.P. Board students know about various symptoms of AIDs as their text cover this aspect in comprehensive manner. On the other hand I.C.S.E and C.B.S.E. text do not cover this aspect but the students of these boards know about AIDs, this may be due to excessive media coverage of this issue. Knowledge about various factors affecting human health, difference between communicable and non-communicable diseases, prevention of diseases and role of vitamins in our life is more in I.C.S.E. and C.B.S.E. students than U.P. Board students. Since these health issues are of immediate concern of students belonging to the growing age group, they need to be made more knowledgeable and aware about health issues.

Regarding the category 'Impact of Population on Environment' the results showed that I.C.S.E. and C.B.S.E. students comprehended equally this aspect and better than U.P. Board students. Further analysis revealed that

less number of students know that 80% of the total energy consumed depends on petroleum products. On the other hand large number of I.C.S.E. and C.B.S.E. students scored well in the item related with cutting of trees, which leads to soil erosion, while U.P. Board students do not have comprehensive knowledge about various effects of depletion of natural resources. More number of C.B.S.E. students were aware that the Tiger is an endangered species in comparison to I.C.S.E. and U.P. Board students although recently wide media coverage and campaigns are done on this issue.

The results showed that comprehension of I.C.S.E. students was better than C.B.S.E. students while performance of U.P. Board students was weak in the aspect 'Conservation of Environmental Resources'. Large number of I.C.S.E. students are aware that which source of energy they should use minimum and aim of establishing Dudhwa National Park than C.B.S.E. and U.P. Board students. Sufficient numbers of students belonging to three boards know about the method of energy conservation in kitchen and contribution of afforestation. This is a good fact that students know about this as they could contribute in conservation of environment by taking small measures in day to day life.

The results showed that I.C.S.E. and C.B.S.E. students comprehended equally the aspect of 'Environmental Management and Sustainable Development' while U.P. Board students comprehension was weak. Students of the three board were aware about the advantages of a green park in the locality,

use of lead free petrol in the vehicle, Chipko movement and prohibition of polythene bags as these issues are related to common man's daily life experiences. Large number of C.B.S.E. students knew about organisations working in the area of conservation of natural resources as compared to I.C.S.E. and U.P. Board students. Striking feature that was revealed from the analysis is that more number of U.P. Board students knew how to reduce the increasing concentration of green house gases than I.C.S.E. and C.B.S.E. students. U.P. Board students might have been given exposure on this issue by environment related programmes. However, sufficient number of I.C.S.E. and C.B.S.E. students knew how to keep the environment of their locality safe and healthy for several years than U.P. Board students. Results reveal that students generally did not know much about Environmental Planning and Management. Thus, it shows that there are gaps in knowledge and awareness about environmental issues among students and if efforts are made in the right direction by teachers and curriculum planners it will enhance their knowledge enabling future citizens to make positive efforts to save their environment.

Conclusions

1. I.C.S.E. students comprehended well the various aspects of environmental concerns than C.B.S.E. students and C.B.S.E. student's comprehension was better than U.P. Board students.
2. I.C.S.E. and C.B.S.E. students equally comprehended the aspects of Environmental Structure, Energy Resources, Environmental Degradation, Human Health and Hygiene, Impact of Population on Environment and Environmental Management and Sustainable Development.
3. Comprehension of I.C.S.E. students was better than C.B.S.E. and U.P. Board students in Environmental Balance, Agriculture and Conservation of Environmental Resources.
4. Comprehension of C.B.S.E. students was better than I.C.S.E. and U.P. Board students in Animal Husbandry.
5. Only in the aspect agriculture, the comprehension of U.P. Board students was better than C.B.S.E. students but still weaker than I.C.S.E. students.

Educational Implications

1. Comparative analysis of comprehension of environmental aspects on one hand bring forward the positive aspects of environmental education programmes and on the other hand also help in identifying the gaps in the knowledge imparted to students regarding environment and related issues.
2. Evaluation of environmental education can be done by thought provoking and understanding based questions. Further, evaluation can be done by providing a situation or a problem related to environment and obtaining views

- and solutions of students with respect to it. Judgment could be done on the basis of eco-friendly solutions provided by the students.
3. Comparative study of students regarding comprehension of environmental aspects highlights the changes which need to be brought in the curriculum, textbooks, teaching methods and co-curricular activities adopted in the school for the understanding of various aspects of environmental concerns.
 4. Teachers can select environment related topics and organise debate and discussion in the class so that students can gain better understanding of environment related issues given in the textbook.
 5. Teachers while teaching their own subject can also stress on the environmental aspects related to the topics and give necessary explanations wherever required. For giving such explanations teachers should up-date their own knowledge regarding various environmental issues.

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