

A Content-Analysis of Different Aspects of Environmental Concern in NCERT Science Textbook of Class VIII

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Abstract: Education is to be seen as a transformative social practice and it links the school practice to the world. In this regard, the school textbooks have been useful resources for communicating environmental issues by environmentalism. There has been a large number of global issues, environmental and ecological issues. These environmental consequences caused by massive industrialization and urbanization have become an important issue. Hence, more effective and higher-quality environmental education is one of the agendas to promote ecological awareness and desirable actions among students. Moreover, the environmental issues have been included in the curriculum as well as in textbooks. Some of the environmental issues are in an interdisciplinary manner. This study looks at environmental education in the context of secondary education and attempts to explore how environmental issues are represented within NCERT textbook. Environmental education has now become an inseparable part of the school curriculum. Various aspects related to the environment are so wide that it is not possible to limit them to the boundaries of a single subject. Moreover keeping in view the burden of the syllabus on school children it is essential to impart environmental education through different subject areas. Emphasis on the infusion model of environmental education in the school curriculum has brought the necessity for the content analysis of the textbook so that various aspects of environmental concerns could be incorporated in different subject areas. Science is very closely related to environmental issues. Thus, content analysis of science textbooks with respect to ten formulated categories of environmental concern helps in the identification of the potentiality of this subject for the inclusion of environmental aspects in the form of content, tables, figures, and activities. The content analysis included the different aspects like type of subjects, units devoted to environmental issues, number of activities encouraging participation in percentages, and types of participation. This study method was conducted and found that these textbook functions to raise awareness of environmental issues rather than encourage real active participation and transformational practices.

Keywords- Environmental concern, Content analysis

1. INTRODUCTION

Content analysis is a research approach for analyzing text or documents for the presence, intensity or frequency of some characteristic. Generally, content analysis is applied in educational research to examine textbooks, but standards are foundational for textbooks, curricula and assessments. Environment education is aimed at informing people about the environment in order for them to appreciate its values, keep it safe, and support it through contemplation about biological processes. Regarding the increasing environmental environmental education and making the students committed and informed of it has become a great challenge for the curriculum in the Indian schools. Since for environment to be an all-encompassing concern for the public, it should be based on the schools and their curriculum at different levels of education which in turn requires proper programming, fine curriculum, providing textbooks in line with its objectives, and well-trained and informed teachers capable of perceiving the concepts and making them readily understandable for the students. Incorporation of environmental concerns in the curriculum lets the students

consider environment safeguarding not only as a material, but a human responsibility. The students are trained to learn knowledge and values to employ them in their very life; so textbooks can contribute much to this end. Science is among the main part of the curriculum for every level of education and learning them helps the students improve their cognition of their surroundings. To do so, they should acquire concepts which help them associate their experiences. Environmental standards are among the main standards for the science teaching. It is worth mentioning that environment teaching is a multi-disciplinary approach to learning, cultivating knowledge, awareness, attitudes, values, and skills in order for the people to be capable of protecting and improving the environment. Thus, other materials such as social studies can be of great help in the environment education promotion. Various studies have been conducted with regards to the analysis of the textbooks in which, Chandler (1999) found significant difference between the two biology textbooks as to their emphasis in opportunities for student enquiry about natural world. Wilson (2000) found that high school biology text of the 1990s provides information on the environment but

message is too impersonal to motivate students to action. Lee (2007) found that there is a lack of articulation of the goals of environmental sustainability in the curriculum. Bhawalkar (2007) found that science and social science text has greater environmental content than Hindi text and teachers are of the opinion to associate environmental education as a part of the content in different school subjects.

2. OBJECTIVE OF THE STUDY

To analyze NCERT science textbook of class VIII with respect to the weightage given to various categories of environmental concerns present in the form of content, figures, tables, and activities.

3. METHODOLOGY

The sampling procedure adopted is purposive sampling. Class VIII textbook Science and Technology' of NCERT publication prescribed by various schools affiliated to Central Board of

Secondary Education was selected for the study. The methodology is based on the content analysis approach. 'Theme' has been taken as the basic unit for content analysis. 'Theme' is an independent piece of information about any aspect of environmental concerns classified into ten categories, which was meaningful even when separated from its context. Ten categories of environmental concern were formulated according to guidelines given by the Tbilisi conference (1997), expert opinion from C.E.E., and the environmental education syllabus prescribed by NCERT for Class VIII. The categories and subcategories were formulated in terms of analyzable indicators. These indicators are certain points of environmental concerns, which clearly indicate a specific area or category in which the content falls. Frequency has been taken as the unit of enumeration. Later these frequencies were converted into percentages for quantitative analysis.

Both quantitative and qualitative analysis is done with respect to ten formulated categories of environmental concerns given below in table 1.

Table 1: Categories and Subcategories of Environmental Concerns

S.N	Categories	Sub- Categories
1	Energy Resources	- Renewable / Alternate Sources of energy - Nonrenewable sources of energy
2	Environmental Balance	- Biogeochemical cycles - Food chains - Importance of ecosystem & sustenance of life
3.	Environmental Structure	- Non-living component Air / Atmosphere - Non-living component Water - Non-living component Soil - Non-living component Natural elements - Living component Plants - Living component Animals - Living component Micro organisms
4.	Environmental Degradation	- Air pollution G. Indoor pollution - Water pollution H. Soil erosion - Soil Pollution I. Acid rain - Solid waste pollution J. Ozone depletion - Noise pollution K. Global warming - Radioactive pollution L. Disasters
5	Agriculture	➤ Various techniques in Agricultural process ➤ Agricultural practices & Impact on Environment
6	Human health and hygiene	- Types of diseases and their effect .Causes and transmission of diseases - Symptoms of diseases - Balanced diet and deficiency diseases - Impact of Env. degradation on Human health - Prevention and curative measures
7	Animal Husbandry	- Animal rearing practices - Prevention and curative measures
8	Impact of population on environment	- Depletion of Natural Resources - Consumption of Energy

9	Environmental Management and Sustainable Development	• Control of environmental pollution • Role of Individual, National and International Agencies in Environmental Management and Sustainable Development
10	Conservation of Environmental Resources	➤ Water conservation ➤ Soil conservation ➤ Wild life conservation ➤ Forest conservation ➤ Energy conservation

4. RESULTS

Weightage is given to various categories of environmental concerns in the form of content,

figures, tables, and activities present in the textbook is determined in terms of percentage.

Table 2: Weightage given to various categories of environmental concern in the form of content, figures, tables, and activities present in the Class VIII NCERT science textbook.

S.No.	Categories of Env concerns	Content		Figure		Table		Activities	
		f	%	f	%	f	%	f	%
1	Environmental Structure	120	28.01	16	34.2	1.5	19	12	39.03
2	Impact of Population on Environment	10.9	2.34	0	-	3	49	0	-
3	Conservation of Environmental Resources	16	2.29	2	4.08	0	-	0	-
4	Environmental Management and Sustainable Development	17	3.91	1	2.05	0	-	0	-
5	Environmental Balance	8	1.65	2	3.09	0	-	0	-
6	Energy Resources	29	6.39	2	4.08	0	-	0	-
7	Agriculture	36	8.78	10	20.33	0	-	3	11.54
8	Animal Husbandary	21	4.52	6.2	13.21	0	-	0	-
9	Human Health & Hygiene	120	25.23	8	15.4	1	19	4	23
10	Environmental Degradation	38	10.55	1	2.04	0	-	0	-
	Total	415.9		48.2		5.5		19	

5. DISCUSSION

The detailed analysis of the NCERT science textbook (Science and Technology) revealed some Major aspects related to environmental concerns in the textbook. In the science textbook Environmental structure has been well presented in the form of content (28.01%) which include both non-living and living component. The content dealing with the non-living component, soil gives detail about the importance of soil and also relates to our ancient culture and literature in which the mother earth and soil have been given much

importance. Natural elements are given much weightage in the form of content. Non-living component Water is not given weightage in the form of content which is the drawback of the text as water is the basic necessity of life. From the content given in the text students came to know that all microorganisms are not harmful rather some are very useful and participate in major life activities. Figural presentation related to category (34.2%) is adequate which includes pie chart indicating the composition of air in a clear manner so that it becomes easy for the teacher to explain it. Pictures of microorganisms present in the text are important as students cannot see them with naked

eyes. In addition to this soil, natural elements and animals have been represented in the form of figures in which figure of the soil profile is impressive showing various horizons. Among very less tables present in the text single tabular presentation (19%) in this category is done related to the comparison of natural elements Graphite and Diamond. A large number of activities (49.06%) related to components of the environment are given. Activity related to staining of bacterial cell is slightly difficult. Care should be taken that activity included is according to age and mental level of the pupil. The activities related to animal product are also given which are related to students' daily life experience. Environmental balance has been represented in the form of content (1.65%) and figures (3.09%) only. With respect to biogeochemical cycle information about Nitrogen cycle and carbon cycle is given but factual information about the process of nitrogen cycle is insufficient if it is not related to the environmental context. Similarly various process of carbon cycle is not presented adequately in the content. Important aspect of food chain is also missing in the content. In figural form various stages of nitrogen cycle is well presented. Figure of carbon cycle is very clear, big and comprehensive but is not supported with content, so student might find difficulty in understanding the concept.

Energy resources have been represented in the form of content (6.39%) and figures (4.08%) only. Renewable sources of energy is given more weightage than non-renewable but there should be clear demarcation between renewable and non-renewable sources so that there is no confusion in the mind of students regarding energy resources. Information related to geothermal and tidal energy should be included. Nuclear energy as an alternate form of energy is given but the fact should be highlighted that it should be used for constructive purpose only and not for destructive purpose. Only two pictures related to renewable sources of energy are included which should be more in number. Tabular presentations and activities related to classification of various sources of energy should be included.

Environmental degradation is mainly represented in the form of content (10.05%) while only one picture (2.04%) related to air pollution is given which is not sufficient. In the form of content maximum emphasis is given to air pollution while comparatively less information is given about water pollution. No information is given related to

solid waste pollution, noise pollution, radioactive pollution and disasters. In the text under the heading 'Ozone' information is given in a confusing manner which tries to convey that ozone is regarded as a pollutant when at the ground level but when present in upper layers of the atmosphere it saves us from harmful ultraviolet rays. Since ozone depletion is a major global environmental problem it should be dealt under separate heading. Similarly concept of soil pollution and soil erosion are also intermingled which should be given under separate sub heading although indirect effect of soil erosion are well highlighted in the text. The concept of inclusion of Indoor pollution is praiseworthy as this type of pollution is increasing day by day and is becoming a serious problem. The content involving difficult concept needs to be supported with figures such as global warming, ozone depletion and acid rain. Some activities, which inspire students to inquire about environmental problems, could be included.

In Agriculture both techniques in agricultural process and impact on environment has been given weightage in the form of content (8.78%) while weightage in the form of figures (20.33%) and activities (11.54%) is given only to techniques in agricultural process. The phenomena of vermin composting for enhanced crop production is well represented in a colored format with pictorial presentation. The positive aspect of the text is that firstly the information related to innovative technique of at agricultural process is given then it highlights their positive and negative impact on environment. The text also advice farmers to avoid burning of crop remains as it cause air pollution and field fires. Students are asked to discuss this aspect with elders, this is positive approach of building environmental concerns among people. Text also highlights the aspects that due to increasing population there is need for increased food production, in this respect reference of green revolution is also given. Various techniques adopted for improving crop production both quality and quantity wise are highlighted. Agricultural process is represented in form of large impressive pictures. Some aspects related to adverse impact of use of chemical fertilizers, pesticides and weedicides should also be represented in figural form. Activities related to agriculture are interesting and students learn through these activities that it is essential to prepare the soil for agricultural practices and sow the seeds at the right depth in soil.

Animal husbandry is represented only in the form of content (4.52%) and figures (13.21%) Good aspect of the text is that firstly the importance of the animal as a living component and food product obtained from them is given and then detailed information about animal rearing practices is given. The emphasis is given about feeding habits, types of diseases, their prevention and breeding techniques of animals. Various pictures related with animal rearing practices create interest among students. More interest can be inculcated if content is supported in the form of tables or activities also. Human health and hygiene have been covered in a comprehensive way in the form of content (25.53%), figures (15.4%), tables (19%) and activities (23%). Maximum weightage in health aspect is given to preventive and curative measures. In the introductory paragraph of the chapter 'Common Diseases' general information classifying communicable and non-communicable diseases with examples should be given. In the text the type of diseases, symptoms of diseases which helps in the identification of diseases along with preventive and curative measures are also dealt in detail, which help students to take immediate measures to cure the disease. Knowledge about vaccination programme and health awareness governed by Govt. of India are also given. Knowledge about firefighting is well given in the text. The drawback of the content is that no information is given related to balanced diet and deficiency diseases. Figures related to disease causing organism without labeling and reference is not fruitful. On the other hand figure showing modes of transmission of T.B. is very effective & self-explanatory. Tabular presentation of dosage, method and site of administration of vaccines is given but it could be more informative if name of related diseases and age of administration is also mentioned. The activity given related to the survey of the nearby area from health point of view is very important as it makes the student aware of the fact that unhealthy environmental conditions are main causes of the disease. Other activity about preparation of ORS is also very useful for students. Impact of population on environment is represented in the form of content (2.34%) and tables (59.0%). The information has been very well given as how from primitive man to modern man the requirement of energy has increased due to increasing population, industrialization and urbanization.

Tabular presentations of calorific values of fuels are given which represent consumption of energy.

6. CONCLUSIONS

Content of the text is informative and interactive but some difficult and new aspects of environmental concerns could be covered in comprehensive manner. Content is presented in sequential manner but at some places separate subheadings are required to distinguish between important aspects. In the content more weightage is given to environmental structure and human health and hygiene aspect while comparatively less weightage is given to environmental balance aspect. Figures present in the text are big and colorful including labeled diagrams, graphical representations and realistic pictures, which are able to hold attention of the child. Maximum numbers of figures are given related to environmental structure and agriculture aspect. No figure is given related with impact of population on environment. Very less tabular presentation of environmental concerns is the greatest drawback of the text. Activities of environmental concern are not evenly distributed, many aspects need to be represented in activity form. Although most of the activities are encouraging and useful, only few are difficult for students.

REFERENCES

- [1] Bhawalkar, S. (2007). Analysis of School Syllabus in Context of Environmental Education. Indian Journal of Educational Research, Vol 26, No. 1 Jan-June 2007, pp 5-13
- [2] Chandler, P.M. (1999). Conveying the vision of science: Meta lessons on inquiry found in a content analysis of two high school biology textbooks. Dissertation Abstracts International, 61(10), April 2001, p. 3871-A
- [3] Lee, Y.H. (2007). How do the high school biology textbooks introduce the nature of science? Dissertation Abstracts International, 68(11), May 2008, p. 4654-A
- [4] Raghunathan, M. and Pandya, M. (Eds) (1999). The Green Reader: An Introduction to Environmental Concerns and Issues. Ahmedabad: Centre for Environment Education.
- [5] Sutar, B. (Ed.) (2004). Environmental Education in Schools. New Delhi: NCERT Publication Division.
- [6] Wilson, A.H. (2000). A content analysis of environmental education as presented in selected



high school biology textbooks: 1910-1994.
Dissertation Abstracts International, 62 (01) July,
2001, 121-122 A.

