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AN ANALYSIS OF VARIOUS ASPECTS OF ENVIRONMENTAL CONCERN PRESENT IN NCERT SCIENCE TEXTBOOK OF CLASS VIII

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Abstract

Environmental education has now become an inseparable part of the school curriculum. Various aspects related with environment are so wide that it is not possible to limit them in the boundaries of a single subject. Moreover keeping in view the burden of syllabus on school children it is essential to impart environmental education through different subject areas. Emphasis on 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 textbook with respect to ten formulated categories of environmental concern helps in the identification of potentiality of this subject for the inclusion of environmental aspects in the form of content, tables, figures and activities.

Key Words: Environmental concern, science textbook, content analysis, infusion model.

Introduction

Education system mainly centers around three mains factors, which include teachers, students and teaching- learning process. Textbooks are the important part of this teaching-learning process and acts as a bond between teacher and the student. Textbooks are such companions of the child, which are ready to satisfy their queries any time they want.

Environmental education has now become an inseparable part of the school curriculum. Need of the today's world is to understand various issues of environmental concern with a scientific attitude. It is a matter of investigation that to what extent the science textbook is successful in the effective presentation of various topics of environmental concerns. A deep analysis of the science textbook with respect to various aspects of environmental concerns provides a global picture of strengths and weaknesses of the textbook. It also highlights the gaps in the knowledge provided by the science textbooks with respect to various environmental issues. Qualitative and quantitative analysis of the textbook can provide direction and guidelines to the efforts which are needed for the improvement of the textbook and enhancement of the communication level of the textbook which is beneficial for both teachers and students.

Related Studies

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 1990s provide information on 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 content in different school subjects.

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Objective

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

Methodology

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 Tbilisi conference (1997), expert opinion from C.E.E. and 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 percentage for quantitative analysis. Both quantitative and qualitative analysis is done with respect to ten formulated categories of environmental concern given below in table 1.

Table 1: Categories and Subcategories of Environmental Concerns

S.No.	Categories	Subcategories
I	Environmental Structure	A. Non – living component – Air / Atmosphere B. Non – living component – Water C. Non – living component – Soil D. Non – living component – Natural elements E. Living component – Plants F. Living component – Animals G. Living component – Micro organisms
II	Environmental Balance	A. Biogeochemical cycles B. Food chains C. Importance of ecosystem & sustenance of life
III	Energy Resources	A. Renewable / Alternate Sources of energy B. Non – renewable sources of energy
IV	Environmental Degradation	A. Air pollution B. Water pollution C. Soil Pollution D. Solid waste pollution E. Noise pollution F. Radioactive pollution G. Indoor pollution H. Soil erosion I. Acid rain J. Ozone depletion K. Global warming L. Disasters
V	Agriculture	A. Various techniques in Agricultural process B. Agricultural practices & Impact on Environment.
VI	Animal Husbandry	A. Animal rearing practices B. Prevention and curative measures

VII	Human health and hygiene	A. Types of diseases and their effect B. Causes and transmission of diseases C. Symptoms of diseases D. Balanced diet and deficiency diseases E. Impact of Env. degradation on Human health F. Prevention and curative measures
VIII	Impact of population on environment	A. Depletion of Natural Resources B. Consumption of Energy
IX	Conservation of Environmental Resources	A. Water conservation B. Soil conservation C. Wild life conservation D. Forest conservation E. Energy conservation
X	Environmental Management and Sustainable Development	A. Control of environmental pollution B. Role of Individual, National and International Agencies in Environmental Management and Sustainable Development.

Sample

Sampling procedure adopted is of 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.

Result

Weightage 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)

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

S.No.	Categories of environmental concerns	Content		Figures		Tables		Activities	
		f	%	f	%	f	%	f	%
I	Environmental Structure	143	29.48	17	34.69	1	20.00	13	59.09
II	Environmental Balance	8	1.65	2	4.08	0	-	0	-
III	Energy Resources	31	6.39	2	4.08	0	-	0	-
IV	Environmental Degradation	57	11.75	1	2.04	0	-	0	-
V	Agriculture	48	9.89	11	22.44	0	-	3	13.63
VI	Animal Husbandry	22	4.53	6	12.24	0	-	0	-
VII	Human Health and Hygiene	129	26.59	7	14.28	1	20.00	5	22.72
VIII	Impact of Population on Environment	12	2.47	0	-	3	60.00	0	-
IX	Conservation of Environmental Resources	16	3.29	2	4.08	0	-	1	4.54
X	Environmental Management and Sustainable Development	19	3.91	1	2.04	0	-	0	-
	Total	**485**		**49**		**5**		**22**	

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 (29.48%) which include both non-living and living component. The content dealing with non-living component, soil gives detail about the importance of soil and also relate to our ancient culture and literature in which the mother earth and soil has 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 micro organism are not harmful rather some are very useful and participate in major life activities. Figural presentation related to category (34.69%) is adequate which include pie chart indicating composition of air in a clear manner so that it becomes easy for the teacher to explain it. (Figure – 1, given below)

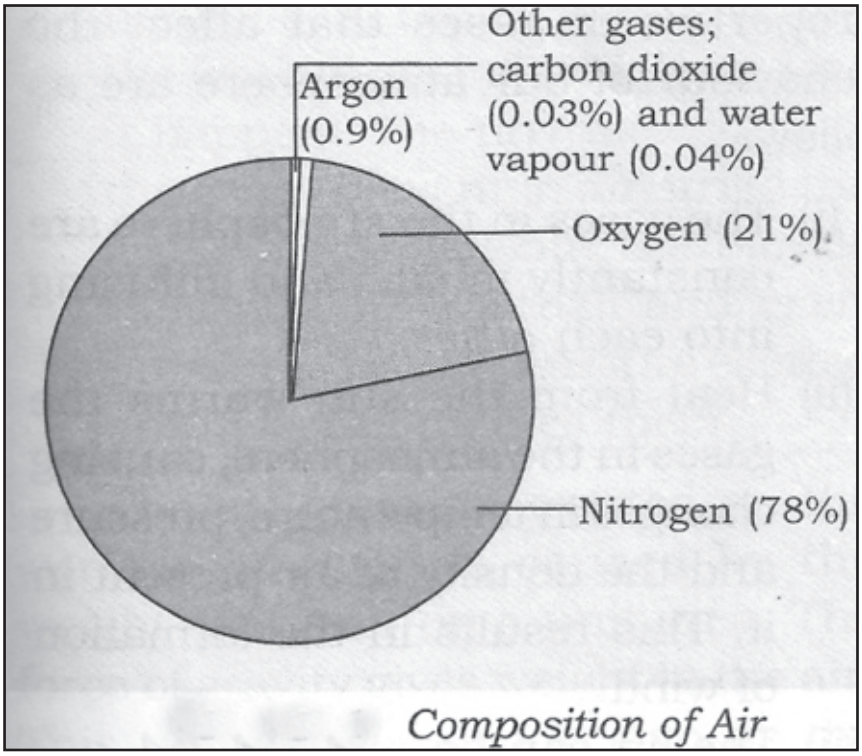

Fig. 1

Pictures of microorganisms present in the text are important as students cannot see them from naked eyes. In addition to this soil, natural elements and animals have been represented in the form of figures in which figure of soil profile is impressive showing various horizons. Among very less tables present in the text single tabular presentation (20%) in this category is done related to comparison of natural elements Graphite and Diamond. Large number of activities (59.09%) related to components of 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 (4.08%) 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. (Figure – 2 given below)

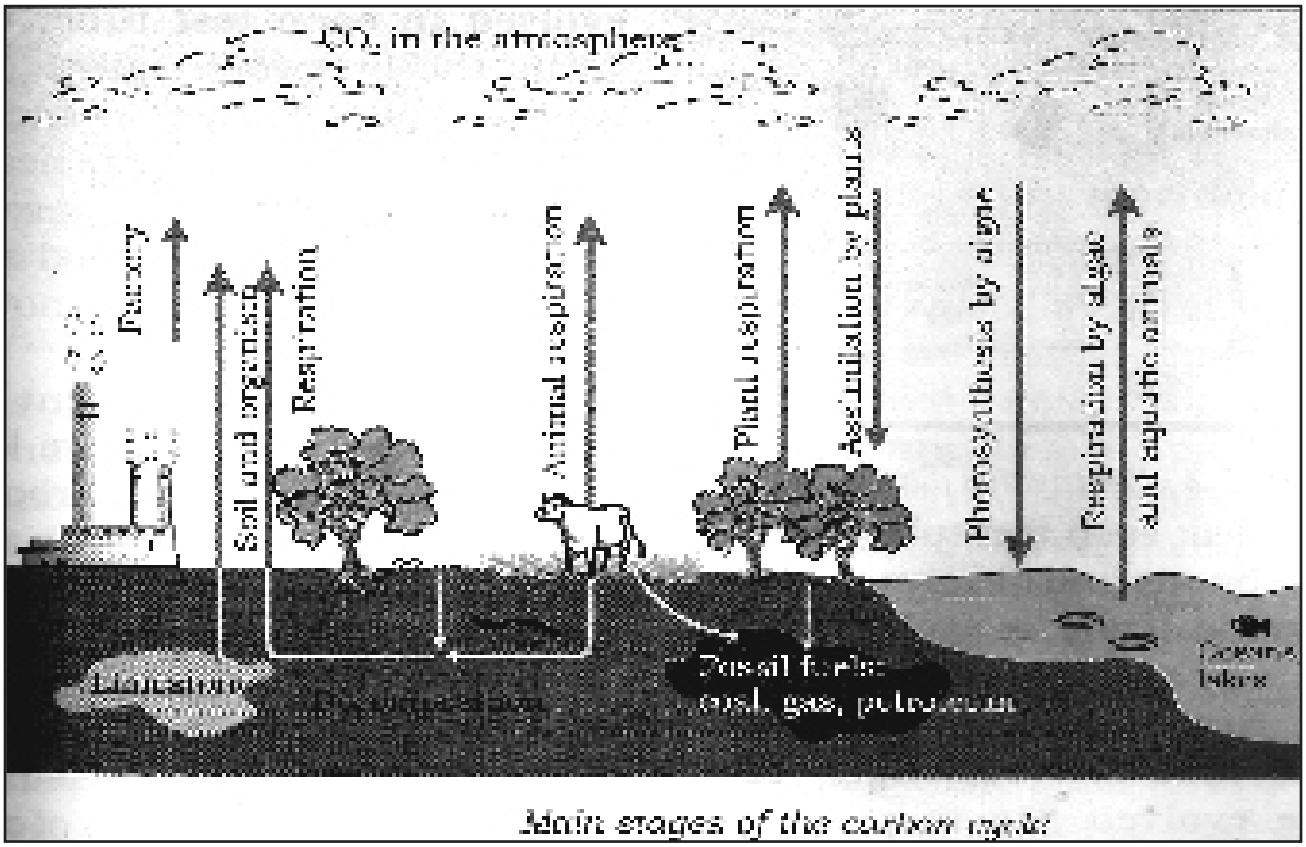

Fig. 2

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 (11.75%) 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 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.

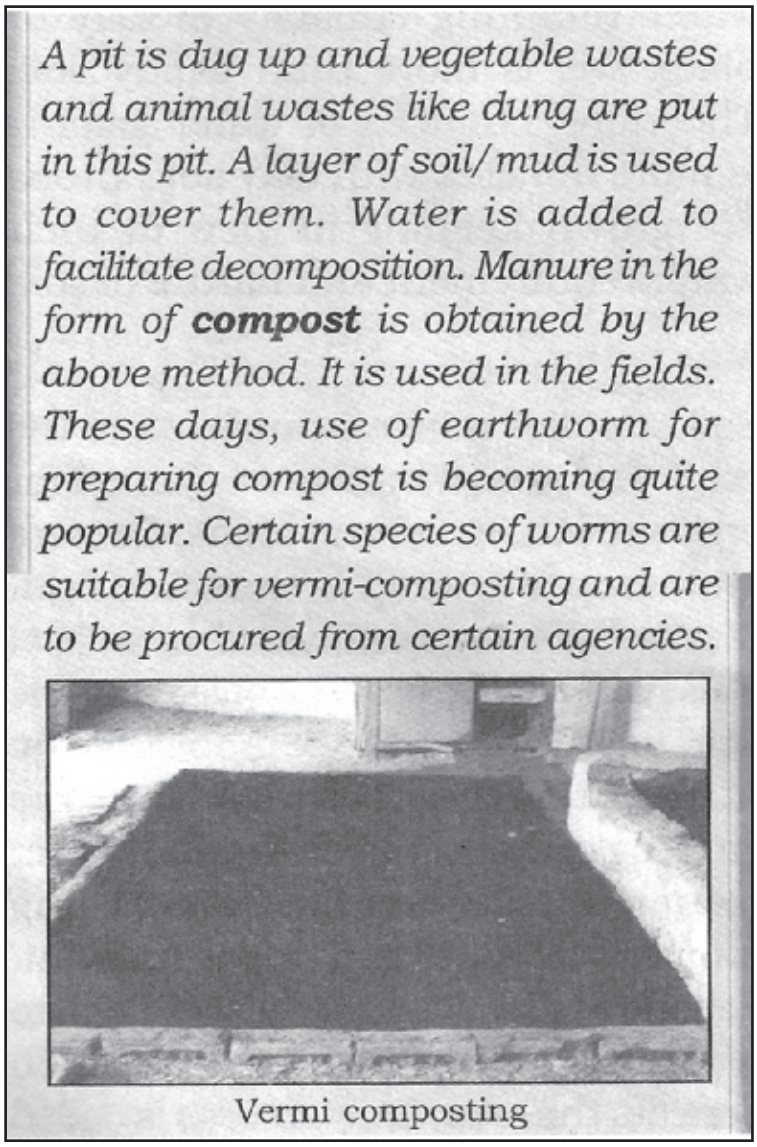

Fig. 3

In Agriculture both techniques in agricultural process and impact on environment has been given weightage in the form of content (9.89%) while weightage in the form of figures (22.44%) and activities (13.63%) is given only to techniques in agricultural process. The phenomena of vermi composting for enhanced crop production is well represented in a coloured format with pictorial presentation. (Fig. 3) The positive aspect of the text is that firstly the information related to innovative technique of 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 causes 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 (4.53%) and figures (12.24%) 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 (26.59%), figures (14.28%), tables (20%) and activities (22.72%). 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 fire fighting 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 labelling 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 (2.47%) and tables (60%). 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. Figures related to depletion of natural resources should be included.

Conservation of environmental resources is represented in the form of content (3.29%), figures (4.08%) and activities (4.54%). More emphasis is given to energy conservation with respect to water, soil or forest conservation while wild life conservation is neglected. Under the heading 'Energy, Development and Environment', a comprehensive view regarding energy conservation is given. Water conservation strategies in both rural and urban areas are highlighted. Various ways of preventing soil erosion should be dealt in detail. The figure related to conservation of energy through improved chullahas is very effective and support the content. Activity given related to soil conservation is simple and is able to explain the phenomena that how plants help to prevent soil erosion, thus it compensates the inadequate content matter of soil conservation. (Figure 4 given here)

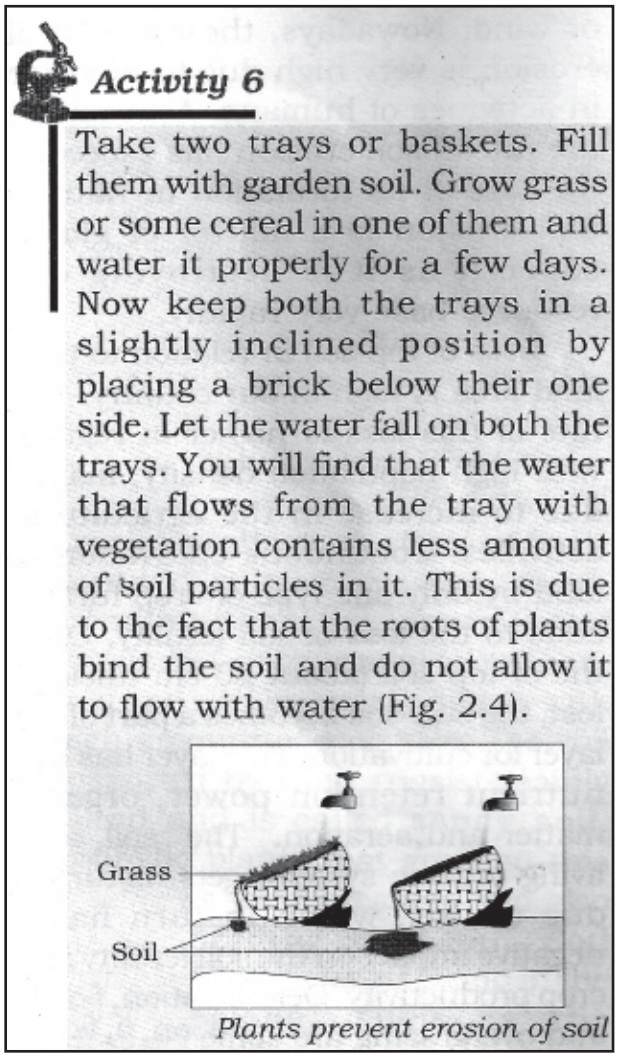

Fig. 4

Environmental Management and Sustainable Development is given in the form of content (3.91%) and figures (2.04%) In the text role of individual in controlling various kinds of pollution is highlighted but role of national and international agencies are not given. Single picture related to control of air pollution showing CNG filling station is given. Some activities must be included related to this aspect so that students realize the importance of environment and its preservation.

Conclusions

1. 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.
2. 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.
3. Figures present in the text are big and colourful including labelled diagrams, graphical representations and realistic pictures, which are able to hold attention of the child.

4. Maximum numbers of figures are given related to environmental structure and agriculture aspect. No figure is given related with impact of population on environment.
5. Very less tabular presentation of environmental concerns is the greatest drawback of the text.
6. 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.

Implications

1. Textbook analysis is essential to identify the potentialities of each subject area for the inclusion of environmental education in the curriculum.
2. Balanced presentation of the content, figures and tables of environmental concern is necessary to enhance the comprehension level of the students.
3. Content analysis of the text help the textbook planners to have revolutionary, creative and dynamic ideas about presentation of the content in an effective manner.
4. Analysis of the activities of environmental concern helps to make them interesting, approachable and economic for students.
5. School management and teachers while selecting the textbook should also analyze them from environmental point of view so that students are encouraged to know and feel about their environment.

References

1. Berelson, B. (1952). **Content Analysis in Communication Research. Glencoe**: The Free Press
2. 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
3. Chandler, P.M. (1999). Conveying the vision of science: metalessons on inquiry found in a content analysis of two high school biology textbooks. **Dissertation Abstracts International, 61(10)**, April 2001, p. 3871-A
4. 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
5. Pant et.al (2004). Science and Technology. New Delhi : NCERT Publication Division
6. Raghunathan, M. and Pandya, M. (Eds) (1999). **The Green Reader : An Introduction to Environmental Concerns and Issues**. Ahmedabad : Centre for Environment Education.
7. Sutar, B. (Ed.) (2004). **Environmental Education in Schools**. New Delhi : NCERT Publication Division.
8. 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