CONTENT ANALYSIS OF 6th GRADE NCERT SCIENCE TEXTBOOK TO STUDY THE SCOPE OF DEVELOPING DESIRABLE VALUES IN STUDENTS

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Abstract

A textbook is used for the formal study of a subject as it is written according to the syllabus and gives the outline of the course. It is an imperative reference and resource for students' learning in any educational system therefore it is necessary to analyze this resource. The present paper presents content analysis of NCERT Science textbook of 6th grade to study the scope of developing desirable values in students. Findings reveal that the content of NCERT Science Text Book has many obvious and hidden values in almost all the topics which may be taught while teaching learning process. Science subject has a full scope of recognition of values, ideal acts of valuing, and moral and character education; the only need is, teacher is required to understand the hidden values in given content and find innovative methods to impart the same to students.

Keywords: Science, Text Book, Moral Values

INTRODUCTION

A textbook is used for the formal study of a subject as it is written according to the syllabus and gives the outline of the course. It helps the teacher to decide about the limit and depth of the content to be presented to the students while teaching. A textbook is an imperative reference and resource for students' learning in any educational system therefore it is necessary to analyze this resource. Content Analysis is a type of analysis which is valuable and significant to the authors, curriculum planners and curriculum decision makers to develop a good textbook which meets the requirement of the learners at various stages of learning. Also, content analysis aids in scientific and practical examination of the concepts, needs, rationales, attitudes and all discussed pieces in the educational content of books. Hence, these items can be compared with the curriculum plans in the school education. This research has investigated and analyzed the content of NCERT science textbook of class VI to study the scope of developing desirable values in students.

A value may be defined as something which you consider very dear, which you strive to acquire, preserve or protect and with which you can think and make judgement about the...
alertness of action available in a situation in relation to the value (Dass, 1998). Behaviour of any person is reflection of his values, valueless life is meaningless.

DEVELOPMENT OF VALUES
Real education does not consist of packing the brain with information, facts and figures, or in passing examinations by reading the prescribed number of books, but by developing the right character (Gandhiji).

Education is a process of personality development and has always been linked with society. It has both personal and social dimensions which are inseparable like the two sides of the same coin. The development of knowledge and values starts immediately in the process of socialization. Teachings like prohibition of telling lies and stealing are given in the childhood. Many psychologists believe that the process of representation creates the sense of reward and punishment. They teach small children to differentiate between right and wrong, good or bad etc. This process goes on continuously. They are satisfied with just imposing pseudo-morality of the child which is granted forever. Ultimately, the child has to accept actual moral-values to have all round development of personality.

The stress on value education symbolises the crises of values, and that the present education system has failed in facilitating the process. Education must recognize the multiple dimensions of the human personality- physical, intellectual, aesthetic, emotional and spiritual and then we can dream of an integrated human being living on a harmonious planet.

DEVELOPMENT OF VALUES THROUGH SCIENCE
Science is often equated with facts, knowledge and experiments. The subject matter of Science enables one to develop skills such as critical thinking, decision making and problem solving. While teaching science, developing scientific attitude is the main aim but a variety of human values can also be developed. It may encourage curiosity among children to learn more and develop scientific attitudes. It emphasizes how human beings need to stop exploiting nature to their advantage.

In physical sciences, understanding of the true nature of science and philosophy is value laden as long as development of scientific temper related to science learning precedes the content component. Thus values form implicit and explicit curriculum in teaching of physical sciences. Indian education policies have, therefore, laid adequate emphasis on inculcating scientific temper and removing superstition. Prof. Yashpal Committee of UGC (NCERT, 1986, 1987) provided guidelines for textbook writers, instructional material developers and teachers at secondary school level, included among others, inculcation of abilities to
understand value underlying science course content. Such content on the other hand, has been found to influence attitudes towards science and learning outcomes (Chiapetta et.al., 1991). In a departmental research (DEPFE, 2000) it was demonstrated that it was possible to identify attitudes and values underlying science following a content analysis model (Chiapetta et.al., 1991, 1993).

Science learning should be used as an instrument of social change to reduce the socio-economic divide. It should help to fight prejudice related to gender, caste, religion and region. Science education ought to empower students to question the social beliefs, notions and practices that perpetuate social inequality.

SIGNIFICANCE OF THE STUDY
It is self-evident that all school curriculum frameworks and thereby textbooks must be drawn exclusively from a framework whose pillars are the Indian Constitution and the National Policy on Education. Individuals, schools and institutions like NCERT involved in the preparation of textual material must have a strong reference point of installing an awareness of constitutional rights and values.

Despite the policy directive that these principles should cut across the textbooks of all subjects used in schools, it is the content of science textbooks that clearly addresses the insight into human relationships, social values and attitudes. These are indispensable to enable the new generations to participate efficiently in the affairs of the community, the state, the country and the world at large. Hence the present paper assessed and analyzed the NCERT science book of 6th grade with respect to identify the underlying values and the scope of developing desirable values in students. Textbook writers may benefit from the results of this investigation as they read and interpret the curriculum while writing the textbooks.

RATIONALE OF THE STUDY
The rationale for this study is to share how the desirable values can be developed in students through science curriculum in order to make sound enrichments by curriculum developers, textbook authors, and science educators.

STATEMENT OF THE PROBLEM
Content Analysis of 6th Grade NCERT Science Text Book to Study the Scope of Developing Desirable Values in Students
OBJECTIVES

1. To analyse the content related to values included in 6th grade science textbook.
2. To study the scope of developing desirable values in students of 6th grade through science curriculum.

METHODOLOGY

Qualitative research method and 6th grade science book of NCERT were taken as sample for the study.

FINDINGS

Cover Page

With a view to attain the research objectives, the investigator focused on the content related to values in NCERT 6th grade science book and initiated the analysis from cover page. The cover page of the book depicts a beautiful collage showing tree protection and plantation, water harvesting, traffic rules, agricultural activities and scientific experiments which shows the importance of sustainable development and development of scientific attitude among students.

Foreword

The cover page is followed by ‘Foreword’ to the book, written by the Director, NCERT seems to be very inspiring and motivating. It describes the nature of the book. It emphasises to follow the recommendations of NCF, 2005. The Director, NCERT appreciated the hard work done by the Text book Development Committee and expressed his gratitude to all the members. He also emphasised on development of reflective thinking among teachers and provision of space, time and freedom to the children for generating new knowledge. Teachers must read and explain the value of cooperation and respect among students.

Preamble

Then they have given the Preamble to the Constitution of India in the book with an important aim of making children understand our national values such as justice, liberty, equality and fraternity. Since value education has to be a planned endeavour by all educational institutions to nurture values among children, teachers must explain these core universal values held upmost by our Constitution. These values will help the budding generation to provide normative principles and a route to live a life based on moral principles that ensure ease of life, shared by all.
A Note for the Students

Further they have given an interesting note to the students which motivate them to question, inquire and explore the important scientific values. It also inspires them to observe, believe only in what they observe, honest and truthful pursuit of knowledge, share knowledge, teamwork and much more. It mentions, “....need to experiment on their own, read books in the library, send questions to scientists. Just dig and dig and dig into all possibilities and see if the questions can be answered.” Thus encouraging honesty, truthfulness, sharing and scientific inquiry.

Fundamental Duties

Another page of the book has been dedicated to Fundamental Duties mentioned in the Constitution of India. Eleven fundamental duties for Indian Citizens are full of values to be followed by us in true spirit. Teachers must dedicate sometime in the beginning of the session to orient about these duties to the children and refer them again and again whenever the opportunities occur.

Chapter wise content analysis

Chapter - 1: “Food: Where Does It Come From”

This title could develop greatness and thankfulness towards farmers who works hard and cultivate variety of food for us. In this chapter children will also understand the importance of necessary nutrients and pollution free air to remain healthy. In this way there is a scope of nurturing dignity of manual work, importance of physical fitness, respect for others, sensitivity towards food wastage and environmental values in students.

Content: On page no. 1, Activity 1: Ask your friends in the school about the items they would be eating during a day. See if you can also get this information from friends staying in different states of India has the scope of developing respect for diversity and other’s point of view. Teacher can explain that there is a lot of variation in the food eaten in different regions of India. Teacher should encourage the students to share their food and respect each other.

On page no. 5, We know that there are many amongst us, who do not get sufficient food. We need to find ways by which more food can be grown in the country. That will not be enough; we will need to find ways to ensure that this food is made easily available to each and every one of us has the scope of developing love and care for others. Teacher can explain that one should not be selfish and we should take care of others also.
Chapter - 2: “Components of Food”

In this chapter children will learn about food diversity in our country and the importance of balanced diet. Through an activity given on page no. 14, there is a scope of developing time management skills and healthy eating habits in students.

**Content:** Table 2.1 given on page no. 8, *Some common meals of different regions/states* reflects the value of brotherhood. Teacher can explain that there are different cultures and cuisines, but unity in diversity exists in India.

*The major nutrients in our food are named carbohydrates, proteins, fats, vitamins and minerals. In addition, food contains dietary fibers and water which is also needed by our body* (page 9) reflects the importance of nutrients and fitness for us. Teacher can motivate the students to have balanced diet to stay healthy.

Chapter - 3: “Fibre to Fabric”

Chapter three titled “Fibre to Fabric” tells the story of cloth and being thankful to plants and animals. *Paheli and Boojho won the first prize in a Science Quiz competition held at their school. They were very excited and decided to use the prize money to buy clothes for their parents* (page 18) has the scope of developing love, care and respect for parents. Teacher can encourage the students to participate in co-curricular activities as they are necessary for their holistic development. Also, can explain that we should take care of our parents.

*They tried to identify these fabrics as cotton, wool, silk or synthetic* (page 18) develops scientific values like observation, classification and analysis. Teacher can motivate the students to use skill of observation and classification in their daily life tasks for example arranging their books and stationery, cupboards and other things. Since keeping and finding things at proper place helps to reduce our stress level.

On page no. 21, a content about the use of Charkha by Gandhiji during freedom struggle is given; teacher can briefly explain about the ‘Satyagrah’ and ‘Non-violence’ movements led by Gandhiji and nurture truth, self - dependence and patriotism among students.

Chapter - 4: “Sorting Materials into Groups”

Chapter four titled “Sorting Materials into Groups” teaches the skill of systematic arrangement of things. *At home, we usually store things in such a manner that similar objects are placed together. Such an arrangement helps us to locate them easily. Similarly, a grocer usually keeps all type of biscuits at one corner of his shop, all soaps at another while grains and pulses are stored at some other place* (page 27). Teacher can organize such activities
through which students could learn and enhance the skills of sorting and systematic arrangement of different things.

*Water plays an important role in the functioning of our body because it can dissolve a large number of substances* (page 30) has a scope of developing environmental sensitization especially about conservation of water.

**Chapter- 5: “Separation of Substances”**

Chapter five gives a scope of doing lots of hands on experiences and helps in enhancing critical thinking of students. *We see that, before we use a substance, we need to separate harmful or non-useful substances that may be mixed with it* (page 36) may develop critical thinking and decision making among students. Also, teacher should sensitize the students about the substances harmful to us.

_... no more salt can be dissolved in the amount of water we have taken. ... what might have gone wrong when Paheli tried to recover large quantity of salt mixed with sand. Perhaps the quantity of salt was much more than that required to form a saturated solution_ (page 42) develops conscientious use of resources and contentment. Teacher can tell the students that excess of everything is bad so we should use the resources meticulously. Here teacher can correlate this concept with satisfaction and contentment to live a happy life.

**Chapter - 6: “Change Around Us”**

In chapter six titled “Changes around Us”, *Did you realise earlier that so many changes are taking place around you all the time?* (page 46) teacher should explain that change is law of nature so we should accept all the changes around us and develop a positive attitude towards life to rejoice it.

_Paheli wants to know if you have ever seen a blacksmith making some tools. How does a blacksmith change a piece of iron into different tools? A piece of iron is heated till it becomes red-hot. It then becomes soft and is beaten into a desired shape. What change has taken place in iron, on being heated?_ (page 48) Teacher can tell the students that as blacksmith heated a piece of iron till it becomes red-hot to change it into different tools (his goal), we also need to be ready to face challenges, to be determined, and devoted to achieve our goals. Hence the values of determination, hard work and devotion to work can be developed through this example.

**Chapter - 7: “Getting to know Plants”**

Chapter seven titled “Getting to know Plants” has lots of scope to tell the students about variety of plants with their different features. _Let us now go on a Nature walk, make friends_
with many different kinds of plants and examine them closely (Fig. 7.2) (page 52). Teacher may enhance the naturalistic intelligence of students through nature walk and sensitize them to take care of plants in school and at home to save environment. Teacher must encourage the students to grow more and more plants as they release oxygen to breathe and keeps air clean.

Chapter - 8: “Body Movements”
Chapter eight titled “Body Movements” tells the importance of coordination of different body parts. Teacher can explain the importance of physical exercise to be fit and value of coordination and cooperation among students. Do you enjoy doing physical exercise at school? How do you move your hands and legs while doing different exercises? (page 66).

Chapter - 9: “The Living Organisms and Their Surroundings”
Chapter nine tells about the habitats and adaptation of plants, animals and other objects. Teacher can explain these concepts with the help of daily life examples and inculcate the values of respect for nature, integrity and nurture adjustment among students. Different animals are adapted to their surroundings in different ways (page 81). We find that organisms exist in very cold as well as very hot climates and surroundings, isn’t it? How do they manage to survive? That is where, adaptation comes in (page 82-83). Teacher may inculcate the value of adaptability among students as it is very important to adjust oneself according to the environment. Better adaptability will reduce maladjustments and ensure a successful life.

It may not be very easy to answer our question — “what then is life”? However, looking at all the diversity of living beings around us, we can conclude that “life is beautiful”! (page 92). Teacher may explain the students to be thankful to God who gave us beautiful life and a beautiful world to live. He / She should discourage negative attitude and habit of complaining in students and encourage them to develop positive outlook towards life. Values of gratitude and optimism can be developed through this content.

Chapter - 10: “Motion and Measurement of Distances”
Chapter ten has a scope to develop the values of equality, sharing, cooperation, creativity and skill of measurement and observation among students. Paheli and Boojho share one desk, but, frequently end up fighting that the other is using a larger share of the desk. On the teacher’s suggestion, they decided to measure the length of the desk, make a mark exactly in the middle of it and draw a line to separate the two halves of the desk (page 96). Through this suggestion teacher can explain the application of measurement and our democratic values like equity and equality can also be elucidate practically.
Work in a group and each of you use your handspan as a unit to measure the width of a table or a desk in the classroom (Fig. 10.5) (page 98). Teacher can help the students to choose or divide the group work through deliberation and freedom of thoughts and action which in turn help to promote the democratic values, team spirit and cooperation. The child works with full agreement of the group and works for the group as well. Hence he learns responsibility, understanding, mutual agreement, and sense of social cooperation.

Activity 6: Spread a large sheet of white paper on the ground and keep a little sugar on it. Ants are likely to be attracted to the sugar and you will find many ants crawling on the sheet of paper soon. For any one ant, try and make a small mark with a pencil near its position when it has just crawled onto the sheet of paper (Fig. 10.11). Keep marking its position after a few seconds as it moves along on the sheet of paper. After some time, shake the paper free of the sugar and the ants. Connect the different points you have marked, with arrows, to show the direction in which the ant was moving. Each point you have marked shows where the ant moved to, in intervals of a few seconds (page 102-103). While doing this activity, teacher may tell about the nature of ants that in-spite of so many hurdles or failures how they always move in a group and determine to reach their goal. So along with the concept of direction and measurement students will learn about the values of unity and determination.

Chapter - 11: “Light, Shadows and Reflections”
Chapter eleven titled “Light, Shadows and Reflections” tells about the transparent, opaque and translucent objects. Teacher can correlate the features of transparent objects with transparency in our relationships. It also has a scope of inculcating the values like reflection of our thoughts through actions. We all use mirrors at home. You look into the mirror and see your own face inside the mirror. What you see is a reflection of your face in the mirror. We also see reflections of other objects that are in front of the mirror (page 112). Here, teacher can correlate this activity with our personality. As mirror reflects the object, our personality is reflected through our thoughts and actions.

Chapter - 12: “Electricity and Circuits”
Chapter twelve titled “Electricity and Circuits” has a scope to inculcate the values such as integrity and foundation of character. Teacher can explain that as electric circuits needs to be integrated to work appropriately, we also need to be integrated to enhance the quality of life. Also, as electricity removes darkness, we should also help the needy, spread happiness and try to remove sufferings of others. In activity 2 you connected one terminal of the electric cell to other terminals through wires passing to and from the electric bulb. Note that in the
arrangement shown in Fig 12.5 (a) and (f), the two terminals of electric cell were connected to two terminals of bulb. Such an arrangement is an example of an electric circuit (page 119). Teacher can explain that like electric circuits, we also needs to live integrated to enhance quality of life.

Chapter - 13: “Fun with Magnets”
Chapter thirteen titled “Fun with Magnets” has a scope to discuss about the attraction towards good things in our life. Teacher can explain that as the magnet attracts only iron objects, we should also be attracted towards only good company, good literature, good food etc. Students can be motivated to choose good to be good. What do we find from this activity? Do two similar poles attract or repel each other? What about opposite poles- they attract or repel each other? (page 132). Teacher must sensitize the students to attract towards good things and repulsion from bad things. Students can take guidance from teachers/parents or elders to avoid bad company and habits.

Chapter - 14: “Water”
Chapter fourteen titled “Water” has a lots of scope to discuss value of saving water since water is very precious. The teacher must sensitize learners about not to overuse or misuse it. They must be told about rainwater harvesting, recycling water and other measures to save water. Suppose for some reason your family gets only one bucket of water every day for a week. Imagine what would happen? Would you be able to cook, clean utensils, wash clothes or bathe? What are the other activities you would not be able to do? What would happen if we do not have easy access to water for a long period of time? Apart from drinking, there are so many activities for which we use water (Fig. 14.1). Do you have an idea about the quantity of water we use in a single day (page 136)? Teacher must counsel the students to save water and other natural resources for sustainable development. Teacher can also explain about rainwater harvesting (pg. 144).

In drought conditions, it is difficult to get food and fodder. You might have heard about droughts occurring in some parts of our country or the world. Are you aware of the difficulties faced by the people living in these areas? What happens to the animals and the vegetation in these conditions (page 143)? Values of empathy and social service can be developed here. Teacher should encourage the students to understand the difficulties of the victims of natural calamities and orient them about the ways to help them.
Chapter - 15: “Air Around Us”

Chapter fifteen titled “Air Around Us” has a scope for discussing importance of clean and fresh air for all living organisms. Ways to prevent air pollution can also be discussed during learning process thus acknowledging the necessity of each other and developing the value of interdependence. *It is obvious that animals cannot live without plants. Similarly, plants cannot survive for long without animals. They would consume all the carbon dioxide in the atmosphere. We can see that both need each other, as the balance of oxygen and carbon dioxide in the atmosphere is thus maintained. This shows the interdependence of plants and animals* (page 152). Teacher may explain about the interdependence between human beings, animals, plants and nature and encourage students to take care of our ecosystem.

Chapter - 16: “Garbage in Garbage Out”

Chapter sixteen titled “Garbage in Garbage Out” has a scope to make students environmentally sensitive and realize economic value of recycling waste. Students can be encouraged to participate in school driven activities related to environment like; Eco Club, Best out of Waste, Cleanliness drive, Green drive, etc. *Once Nanu went to his aunt’s village, along with his mother. He was amazed at the variety of things his cousin Shyam had made. Files from old charts, greeting cards decorated with flowers made from pencil shavings, mats from old clothes, baskets from used old charts, greeting cards decorated with flowers made from pencil shavings, mats from old clothes, baskets from used old polythene bags were some of the items Nanu liked. Shyam had even made a diary from invitation cards* (page 160). Teacher can explain about the economic value of recycling waste and various opportunities to go green by Reducing, Reusing and Recycling. Also, he/she can encourage the students to buy eco-friendly products.

*The use of plastics in itself might not create so much of a problem. Problems arise when we use plastics excessively and are ignorant about ways of disposing their waste. We might even be acting irresponsibly, knowing well about its harmful effects* (page 162). Teacher can explain the ways to minimize overuse of plastic and deal with garbage (given on page 163) and create awareness about pollution free environment to make students sensitized towards environment.

CONCLUSION

It is true that family is the prime agency for development of values but efforts must also be focused at the school site. How effectively the objectives are fulfilled depends on how various systems, resources and processes are organized and managed in the school. The
National Education Policy (1986) has drawn our attention towards several new facets of education, and value education is one of them. Education Commissions since 1948, National Education Policy (1986), NCF (2005 & 2014) had the recommendations of integrated education for the awareness of social, moral and spiritual values. The goals of science education at school level should be acquisition of academic freedom, rational spirits of inquiry, commitment to excellence and attainment of moral values. After analyzing the content of NCERT Science Text Book of grade 6th, it has revealed that in almost all the topics many obvious and hidden values are given which may be taught while teaching learning process. Science subject has a full scope of recognition of values, ideal acts of valuing, and moral and character education; only need is, teacher required to understand the hidden values in given content and find innovative methods to impart the same to students.

REFERENCES