



Inclusion in Science Textbooks

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One may ask: if science is all about facts, abstract concepts, definitions, theories and laws that explain the natural phenomena, how can science textbooks be inclusive? The social context does enter the textbooks through examples. In physics while explaining push and pull, the examples of someone pushing a cart or pushing a heavy object are presented. The question about inclusiveness here would be to ask 'who' is pushing and 'what'? Through such examples, images, illustrations and explanations whether it is inclusive of all learners of all caste, class, religion, gender and other social markers is the question.

Be it science or mathematics or social science the textbooks need to relate to the learners. The question is, does it relate to all kinds of learners and present perspectives and values? A good and effective textbook is that which represents diversity and differences. There are three different issues "a) relevance, b) silence versus candid acknowledgement of differences, and c) the type of inclusion, with genuine respect and tokenism as the two extremes" according to Majumdar and Mooij (2009, p.136). In this analysis I intend to consider the three issues mentioned above as a lens to look at inclusion and exclusion in science textbooks.

The National Curriculum Framework (NCF) 2005 makes important remarks on inclusion of all learners and the way textbooks ought to be written. The content in the textbook should address multicultural and diverse classrooms, diversity in terms of gender, class, culture, religion, language and geographic location according to it. The NCERT textbooks following NCF 2005 makes an attempt. I did an analysis of EVS textbooks earlier and found that it is inclusive of learners of all geographic regions of India, linguistic backgrounds and gender.

Now I intend to analyse NCERT science textbook of class eight for the purpose of this article.

Relevant to whom?

The 8th standard textbook has about 18 chapters. There are two characters, Paheli and Boojho, who put across questions, help each other to clarify, have confusions and seek clarification and so on. The book is written in a conversational tone and throughout it starts with or addresses readers as 'you must have seen this, you must have come across this, have you found, you must have not seen this...' In this section, I intend to discuss whom it assumes as readers.

In the lesson on microorganisms, it says that '*Boojho has been invited to a party by his friend and he ate variety of foodstuff*'. The question is, which class groups get invited for parties and have the opportunity to taste or eat variety of food? While discussing preservation, the sentence starts as '*Similarly we keep our food in the refrigerator*'- Can and do all learners keep food in the refrigerator? '*In your childhood you must have been given injections and vaccinations*'- how many poor children are vaccinated from diseases or is it assuming that someone is studying in class 8 and not died must have been vaccinated?

In the next chapter on synthetic fibres and plastics the examples used are follows, '*We use many articles made from nylon, such as socks, ropes, tents, toothbrushes, car seat belts, sleeping bags, curtains etc.*' The text goes on as follows '*My mother always buys PET bottles and PET jars for storing rice and sugar. I wonder what PET is!*' PET jars are affordable only for few- the middle and the upper class. Following are some of the images used for plastic.

The children presented in the images are neatly groomed and mostly wear shoes and socks. The above examples are very clear and it is worrisome



Source: NCERT, Class 8 Science textbook

that it is assuming its readers as middle class, urban children.

Silence and stereotyping of gender roles

In the chapter on crop production and management, all the farmers are men- be it sowing, tilling or pesticide control and the cattle in the pictures are pure white (as pure as milk) and healthy! Women's labour in agriculture is completely silenced and not acknowledged, but the fact is that women are taking care of the farms and lands and men are moving out to cities in search of jobs as agriculture is not dependable source of income. Also, I have not seen cattle as white as this in my life. Have you? The chapter is also silent on various problems in crop production and storage.

In many of the chapters there are names and sometimes images of men scientists- Pasteur,



Source: NCERT, Class8, Science textbook

Fleming and Jenner etc. There is not mention of women scientists contributing to science.

The examples given below stereotypes gendered roles and it is shocking the way the text is written. 'You must have observed your mother boiling milk before it is stored or used.' 'Oh! Now I understand

why my mother never wears polyester clothes while working in the kitchen'.



A feminine hand kneading the dough
Source: NCERT, Class8, Science textbook

Bhog's analysis of textbooks reveal that in nearly 50% of the 75 lessons reviewed, men were the only actors. Women appear in marginal roles in science textbooks and there is an absence of positive female role models for girls to identify with. Women were presented in traditional roles as mothers and sisters (Bhog 2002, p. 1640). She argues that Marie Curie's portrayal (who is the only women scientist represented in the textbooks) is also treated through a gender lens as the narrative highlights Marie's domestic responsibilities and the 'achievements of women need to be reined in and normalized through their participation in household activities in contrast to stories of men scientists like Vikram Sarabhai and J.C. Bose' (2002, p. 1641).

In the chapter on synthetic fibers and plastic- all the materials are 'man-made'. Following is the image of a man climbing rock using nylon rope:



Source: NCERT, Class8, Science textbook

The characters introduced to talk about conservation of plants and animals are all men and they are Professor Ahmad and Tibu and Madhavji-the forest guide. The chapter on force and pressure has only images of men and boys exerting pressure. Boys are playing football, hockey and stopping a ball etc. and images of man pushing a vehicle, pulling his cattle, a boy pushing a box, boy pushing a tyre and girls 'playing' merry go around are presented. The driver in the car is also a man.



Source: NCERT, Class8, Science textbook

Science and society

"It appears that for the new generation of students from marginalized backgrounds, textbooks present more a window through which to look at the realities of the dominant group than a mirror reflecting their own realities." (Majumdar & Mooij, 2009). When water itself is a limited source, the textbooks assume that '*Many households use boiling as a method for obtaining safe drinking water*'. The textbook does not seem to problematise many issues and does not bring in the linkages between science and society though there are several chapters in which it can bring the discourse. This textbook is completely silent and neglects the illustration of their lives, it only presents the lives of the middle class, urban male students.

References

- Bhog, D. (2002). Gender and Curriculum, Economic and Political Weekly, 37(17), pp. 1638-1642.
- Majumdar, M., & Mooij, J. (2011). Education and Inequality in India: a classroom view, London: Routledge.
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Presenting multiple views, bringing in contrary views in science would help develop critical thinking, reasoning and analyzing various issues. Learning science should also help learners to be scientifically literate and help to take part in democracy actively as citizens. Textbooks should play such a role wherein it should contribute to development of intellectual faculties and enhance equity by presenting conflicting view and multiple realities (Majumdar & Mooij, 2009). One can conclude that this class eight science textbook is not one of this kind.

It is also possible that students do not accept the knowledge presented in the text as it is. They bring in their own interpretations, teachers also play an important role in presenting the text. But textbook is the only source or reading material available for many students in India and they play a vital role and hence there should be care to represent diverse learners and commitment to equity. It is surprising that EVS textbooks till class five present multiple views and take care of diverse learners by giving various examples. Sadly as one moves to higher classes and focuses more on disciplinary subjects, textbooks are not inclusive and this leaves us to wonder whether the nature of discipline and disciplinary boundaries makes it difficult to be inclusive as the focus turns more towards presenting abstract concepts!

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