

## Science Textbook

A **textbook** is a book containing a comprehensive compilation of content in a branch of study with the intention of explaining it. Textbooks are produced to meet the needs of educators, usually at educational institutions.

That textbook should be good which is designed or written in accordance with the aims and objectives of science teaching. Such books can provide various kinds of help to the teacher and students. By making use of such book, various advantages are obtained by both learner and learned, some of which are as follows:

a. A good science textbook functions as a guide while framing the syllabus. Such kind of book becomes part of the syllabus because of its important contents. Generally it is seen that textbooks are followed in the situations where other educational aids are not accessible because of different reasons. Thus, course of the science gets a kind of unity through the help of textbooks.

b. To design the syllabus of various subjects, committees are being set up by authorities. Likewise, science syllabus is also designed by the committee set up in the school or educational institution. Textbooks play an important role in supplementing or enriching the science syllabus designed by various experts.

More than one book can be used by science teacher for imparting wide based information and knowledge to the students. Those books which supplement class instructions are recommended by teachers to greater extent in the form of reference books.

Through this, students can get various kinds of additional information, which is not provided in the textbook. Usually students make use of reference books to look up specific information that may not have been understood in the class or which is not described in length in the textbooks.

c. By making use of science textbooks, it becomes possible for the teacher to make students understand fundamental concepts and principles of science easily and quickly. Not only this, textbooks help in making this function in an effective manner.

d. Through good science textbook, students get acquainted with the wide variety of application of the scientific knowledge as various kinds of exercises are being provided usually at the end of every chapter.

e. The information which is imparted through the teacher in practical form can be made understood by the students in written form through textbooks. Not only this, when students acquire information of different kinds from textbooks, then habit of self-study gets developed among them, as a result of which, so their dependency on teacher also gets lower to certain extent.

f. Textbooks help the students in retaining the information provided by teachers for a long period of time as various kinds of exercises are provided in them, answers of which are to be provided by the students, through which teacher can also analyse their level of knowledge. Teacher can assign the task of accomplishing such exercise to the home, by which he can provide the students with meaningful and useful homework.

g. With the help of textbooks, classroom discussion can be directed towards accurate conclusions.

Generally, information of discoveries and thrilling experiences is provided in the textbooks, by which level of knowledge of students gets developed. Not only this, in the textbooks, special chapters or provision is made for the chapters through which students can get information relating to conducting various experiments, through which they can indulged themselves in various practical works even in the absence of teacher. Through this practice, they become self-independent.

h. As all the information provided in the textbook exist in the written form, as a result of which they can revive it at any time, with the help of which, students can make revision of any lesson speedily through such books.

Thus, it is clear from the above discussion that various kinds of advantages are being obtained to the teacher as well as to the students by making use of science textbooks. It is important to mention here that such advantages will accrue only in condition if selection of proper textbook is made by the teacher. If teacher uses the improper kind of textbook, then it will lead to wastage of time as well as the energy of teacher.

For this reason, it is very necessary for a teacher to know the criteria on basis of which a textbook should be selected. Some experts have put forwarded their views regarding the criteria on basis of such function of selection of textbooks should be performed, mention of which are as follows:-

a. Only that textbook should be selected in which subject matter is being compiled properly. Teacher should analyse the matter of textbook to ensure that it is in accordance with the mental capabilities of the students. Information in the book should be provided in such a manner by which curiosity and powers of reasoning can get developed and increased among the students.

b. Although if matter is found to be in accordance with the mental abilities of the students and according to the needs of the students, then book should be selected, but teacher should further analyse the fact that who is the author of the book.

No consideration to the name or brand of the publisher should be taken, but it should be analysed whether the author is well qualified or not, otherwise, pirated books can be used by the teacher, which will not prove to be successful in achieving the set objectives of education.

c. Only that book should be selected the printing of which is done properly. It should be analysed by the teacher that all the information, whether provided in the written form or in diagrammatic forms, are presented clearly. If the printing of text will be not fine then students will find it difficult to read the matter, with which the task of teacher will become complex and difficult. There should proper space in between the paragraphs and equal space should be given in different words and alphabets. It is only through such kind of printing pattern that matter will become attractive.

d. Teacher should first give attention on the external decoration of the book. It should be born in mind by him that it is the external look of the book which attracts the students. Paper used outside should be thick and should have some shine. Size of the book should not be very long as students will find it difficult to carry it to the school. Proper kind of diagram or figure should be there on the front of book by which students can recognise that for which subject, book is written.

e. Some consideration should be paid by the teacher to the internal decoration of the book. It should be analysed by the teacher that to explain complex topics, proper diagrams, figures and examples are being provided in the book or not. Not only are this, the kind of figures and diagrams provided in the book in accordance with the interest and abilities of the students or not.

f. After the outer looks and attractive, teacher should take into consideration the language in which information is being provided. Teacher should make it sure that all the information is provided in simple languages and if author has used difficult terms, then proper explaining of their meaning has been provided by him. If students will find the language of book difficult, then they will get discourage from making use of such book, for which book having simple language should be used by the teacher.

g. Another important thing which should be born in mind by the teacher while selecting the textbook is it's price. Teacher should make sure that price of book is not very high as generally students belonging to lower strata of society attend the schools, and if price of book will be high, then they will not be able to purchase it as a result of which an atmosphere of inequality will get arise in the classroom. Thus, only that Textbook should be selected by the teacher which should be under the boundaries of purchasing power of all the students.

Thus, while selecting or making choice of textbook, all the above-mentioned points should be born in mind by the teacher. Only that book which possess of all the above-mentioned points can be a good textbook. Only that textbook should be selected by the teacher, by which entire syllabus of the class gets covered.

As said earlier that the task of deciding textbooks for various classes is performed by the NCERT. Some experts have described two approaches of evaluating a textbook. These two approaches are rational and empirical respectively. In rational method, evaluation process is done based on available literature and opinions of experts, while in empirical method, classroom observation is made by the experts, on basis of which they provide their opinions as which book to use.

The procedure followed in our nation at present time to evaluate the science textbook is quiet simple, under which, syllabus of particular class for which book is being evaluated

is studied carefully by the experts and then they analyse the content of the book chapter wise while relating it to the syllabus.

Then the evaluators are asked to note down their observations and to give their suggestions pertaining to content, organisation and illustrations provided in the textbook.

### **Essential Characteristics of a good science textbook**

In the teaching-learning process, the textbook occupies an important place. There is a saying “As is the textbook, so is the teaching and learning”. A good textbook can even replace classroom teaching. The science textbook should aim at aiding the pupils in the development of their personalities, in developing open mindedness, developing appreciation and understanding of nature and not merely stuffing their minds with facts.

### **Characteristics of a good science textbook**

1. The author: A good textbook is judged, at face, by the author, his qualification and experience.

2. Mechanical features of the textbook:

(a) The print and paper used and the binding of the textbook should be attractive. It should be hard and durable.

(b) The printing should be clear, legible and appropriately spaced.

(c) The book should be well-illustrated with diagrams, sketches and pictures.

(d) The size of the print, the language and experiments discussed should suit the age of the child and standard of the child.

3. The subject matter-its nature and organisation:

(a) The subject-matter should be developed as far as possible in psychological sequence. Care must be taken of the mental growth and interest of pupils.

(b) There should be consistency of the subject-matter and the textbook should satisfy the objectives of science teaching.

(c) Each chapter should begin with a brief introduction and end with a summary. ^

(d) Subject-matter should lead to the inculcation of scientific attitudes, disciplinary and cultural values.

(e) Each chapter should contain assignments at the end.

(f) During treatment of subject-matter, numerical examples should find place where necessary.

(g) Headings and sub-headings are given in bold letters.

(h) Each textbook should contain detailed Table of Contents and an index.

(i) The language of the book should be simple, clear, lucid, scientific and precise. The English equivalents of the terms should be always given in brackets.

(j) The textbook should give suggestions for improving scientific apparatus.

(k) Examples in the textbook should be given from local environment and from life experience.

(l) During the treatment of science subject in the textbook, care should be taken to see that it is correlated with other subjects like craft, social environment and physical environment.

(m) Each textbook should be accompanied by a laboratory manual.

Besides these characteristics, the UNESCO Planning Mission has given some principles of writing textbooks in U.S.S.R. and other countries. They are as follows:

- (i) It should be first of all according to the requirements of the syllabus. It should also help in the improvement of the syllabus.
- (ii) The facts, concepts etc., should be modern and within the comprehension of the pupils.
- (iii) The contents should contain not only the established facts but also the problems which are being researched and thereby, arousing the interest in the pupils in these problems.
- (iv) It should help in linking up science with life and practice. The pupils should be equipped with 'know-how' utilizing the knowledge in everyday life.
- (u) The whole content of the textbook should be aimed at shaping the integrated modern scientific outlook which ensures success in mastering scientific knowledge and solution of the problems of vital issues. The content should be simple, brief, exact, definite and accessible.

## **Evaluation of a Science Textbook**

According to the American Association for the Advancement of Science (AAAS), there is evidence that science teachers use textbooks as the primary teaching tool. For science textbooks to fulfill their functions as primary educational resources, they must have a certain set of qualities and characteristics. Textbooks that are poorly designed can inhibit learning and turn children off. The whole content of the textbook should be aimed at shaping the integrated modern scientific outlook which ensures success in mastering scientific knowledge and solution of the problems of vital issues. The content should be simple, brief, exact, definite, and accessible. There are different ways to evaluate the text of any class. Here few evaluation Criteria as given by different educationist has been given.

### **A. Vogel's Criteria**

1. Qualification of author:
  - a. The author has taught the subject about which he is writing ( )
  - b. The author has received assistance from specialists in preparing his manuscripts ( )
  - c. The author holds advanced degrees in related fields. ( )

d. The author's point of view, theory, or philosophy is in harmony with that of my school. ( )

2. Organization: [see table contents, the preface, the section headings through one unit, and the end of one chapter]

a) There is a central theme which correlates the whole textbook. ( )

b) The textbook is organized into units which are based on student's interest and probability of use in everyday life. ( )

c) The organization makes use of topics already taught in my school ( )

d) Questions and/or problems graded at the end of chapter are graded explicit in difficulty order. ( )

3. Content: [see table of content, index, and five text chapters]

a) The inductive approach is used wherever possible in introducing a new

b) Topic. ( )

c) The problem-solving aspect of science method is stressed. ( )

d) The author's style is formal and interesting. ( )

e) Unfamiliar scientific terms are set in italics or boldface. ( )

4. Accuracy: [select any five topics in the index and look them up in the text]

a. All items are on the pages indicated in the index. ( )

b. The item given are scientifically corrected. ( )

c. Teleological expressions are avoided. ( )

d. personification is avoided. ( )

e. No ambiguity is apparent. ( )

5. Readability: [see any one text page]

a) The average number of words per sentences is below 21. ( )

b) 60% of the sentence are simple or compound as opposed to complex. ( )

c) There at least four personal references per 100 words. ( )

d) There is at least one application for each abstract principle. ( )

e) There are not more than 42 affixes per 100 words. ( )

6. Adaptability: [see table of contents and any five text pages]



- a) The textbook is satisfactory is low, average and brilliant students. ( )
- b) Students with rural and city background will find the text useful. ( )
- c) The textbook is arranged so that certain sections can be readily omitted. ( )
- d) The authors treat controversial subjects impartially. ( )
- e) In general the text fits my particular community needs( )

7. Teaching Aids: [see end of chapters and appendix]

- a) summaries, questions and problems at the end of chapters are adequate. ( )
- b) References for teachers and students are annotated. ( )
- c) Appendix material is pertinent and useful. ( )
- d) The teacher's manual is more than an answer book. ( )
- e) An annotated up-to –date film list is provided. ( )

Partial score [ ]

8. Illustrations:[see any ten illustrations]

- a. The illustrations are relatively modern. ( )
- b. The photographic reproductions are large and clear. ( )
- c. The line cuts are well-drawn and adequately labelled. ( )
- d. The figures are tied into the material by the direct reference. ( )
- e. The legends under the illustrations are useful learning devices. ( )

Partial scores [ ]

