Chapter-1

Introduction

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1.1 PROLOGUE

Textbooks constitute an inseparable part of any system of education today. Even in the most developed countries where a variety of teaching learning tools and techniques are available in the classrooms, textbooks continue to enjoy their respectful place. In a developing country like ours, where even the minimum essential requirements of a classroom are hardly provided, the need for quality textbooks cannot be over emphasized. In fact, the text book is the one useful instructional tool which is available both to the teachers and the pupils—the two principal users of textbooks. To the teacher, it provides useful guidelines along which he plans his day-to-day teaching, serves as a reference book which actually teaching in the classroom; provides suggestions for some assignments, suggests activities to be taken up in the classroom and outside. To the pupil, it is the most accessible guide, a dependable reference book and an all time companion. The pupil makes use of the textbook to prepare himself in advance for learning in the classroom refers to it during the course of learning in the classroom; revises and reinforces the classroom learning; does assignments at home; prepares for the examination; reads for pleasure; and seeks guidance and references for further studies.

The theme of this project is to analyze the textbook of science prescribed for VI Class as a part of compulsory discipline in the schools of Madhya Pradesh. This book has been published by the M.P. Textbook Corporation, Bhopal for use throughout the state. This has been analyzed on certain parameters and the assessment has been quantified on the basis

of the suggestion given by William D. Romey for science textbooks and on the basis of a check-list suggested by NCERT for evaluation of textbooks on general science. Attempts were made to bring as much objectivity as possible to get the realistic picture of the book in science and to suggest an appropriate line of action to make them up-to-date.

1.1.1 IMPORTANCE OF TEXTBOOKS

Text books are normally prescribed for school goers with certain educational goals to be achieved through them. But writing of a good textbook is a challenging task, especially when the formal system of schooling has to be learner centered. The learner requirements, his psychology and interests—all have to be taken into account by a writer.

The term 'textbook' is variously understood but the highest common factor amongst all the interpretations remains that its basic purpose is to impart instructions. It is normally prepared for a predetermined course of study or syllabus. The **Kothari Commission** made the alarming observation that "***in most school subjects there is proliferation of low quality, sub-standard and badly produced books particularly in the regional languages.***"

According to **NCERT guidelines** for preparation and evaluation of textbooks on general science—"***The importance of text books in the prevailing system of education can be rightly judged by the fact that a textbook is sometimes regarded as the assistant teacher in print.***" These are considered as crutches for the teachers as well as for the students. Textbook is one of the important aids in the teaching-learning process and has occupied a pivotal role in educating the school children. The process of

education in most of the schools in India, and even abroad, can be summed up in one phrase—"*As the text-book, so the teaching and learning.*"

1.1.2 Relationship between Text and Learning

Little if any research has been done on the effectiveness of learning from conventional textbooks. Research on programmed textbooks has centered on the comparison of these teaching media with other methods of instruction. The results indicate (1) that programmed texts often teach as well as teachers (and sometimes better), (2) that usually they can do this in the same amount of time (and sometimes faster), and (3) that programmed texts and the teacher working together produce better results than either working separately.

As printing technology has advanced the use of graphics, illustrations and colour in textbooks has increased. However more expensive use of colour and graphics not only makes textbooks more expensive but can contribute to inefficient learning. Although colours and picture are used for motivation, the degree of motivation attributed to their effects is related to age and the level of education.

Guthrie (1981) points out that a recurring theme in recent research is that of interaction between the reader and the text, that is, the form of a textbook should vary with the purpose for which it will be used.

1.1.3 Selection of a textbook

Selection of textbook is of crucial concern for educators because textbooks not only function as a prime medium for dispensing information but also provide students with an academic lifeline. Although a textbook should provide only basic instructional information that is supplemented

liberally from other sources, in reality, texts in elementary and secondary schools account for 80 percent of the information to which students are exposed in a given subject (English 1980). Basically, the textbook is the sole source of instructional material exercising control over students intellectual development.

To crown it all there is the problem of keeping pace with the widening horizons and changing patterns of knowledge characteristically described as 'explosion of knowledge'. More and more has to be put in the textbooks, and fairly fast. The subject matter already there has to be revised to suit with the latest changes. Unless there is done, the gap or backlog continues to increase.

1.1.4 FUNCTIONS OF A TEXTBOOK.

Before touching the pin-pointed problem of evaluating school textbook in science, it would not be out of context to bring forth the fundamental objectives of textbook as well. It will provide a take off point for deep investigation. Given below are some of the objectives, which a textbook is normally expected to realize.

- The textbook seeks to concretize the syllabus by furnishing a good outline of a course in the form of a common body of subject matter pertinent and basic to it. In a way, it offers a workable interpretation of the course outline. To an experienced teacher, the textbook offers guidance in planning his lessons.
- The textbook provides a systematically summarized and organized body of knowledge which would otherwise appear scattered and diffused to students. This helps them to organize the ideas and visualize their scope in a unit.

- The textbook helps the dissemination of knowledge through its compactness, communicability comprehensiveness and reference worthiness.
- Since the textbook is a widely and intensively used instructional material, it can be employed as an instrument of change in a planned and deliberate manner.
- Above all, the textbook facilitates pupil's learning and does so in a variety of ways—individual and collective, independent and directed, before and during the lesson, and the like depending upon their nature and the manner of their use. Here it may not be forgotten that it is must for each and all students possess the textbook.
- Further textbook keep the readers up-to-date in their disciplines. That is to incorporate latest developments in the subject areas.
- Apart from its use as a teaching-learning aid, a textbook as an instrument of change, can help in cultivating desired attitudes and values.

1.1.5 THE CONCEPT OF A TEXT BOOK

* According to Longman, Active study Dictionary of English, Ed.4 – "A standard printed book for the study of a subject, specially used in schools."
* (a) "Any manual of instruction";

  (b) "A book dealing with a definite subject of study, systematically arranged, intended for use at a principal source of study material for a given course and prescribed by certain authorities."

* Textbooks command attention because they not only provide the basic source of school instruction but also transmit culture, reflect values and serve as spring-boards for the intellectual development of individuals and the nation providing the source of 90 percent of instruction (**Soloman, 1978**). Textbooks revealed powerful influence, both cognitive and affective, upon individuals, families, communities and the nation. Historically, textbooks have changed in response to the prevailing educational philosophy and curriculum reform movements of the times as well as to pressures from both the liberal and the right wing elements of society and from vocal minorities.

Textbooks perform very important functions. They provide logical and appealing organization, they indicate the minimum content of the subject, they furnish a common basis for the pupils; while they seldom blaze completely new traits, they do provide a high way for carrying better practices to all the schools. Their pictures, and other illustrative materials are convenient and usually well interpreted with the context.

1.1.6 BASIC PRINCIPLES IN TEXT BOOK PREPARATION

According **NCERT guidelines** given in the book '***Preparation and Evaluation of Textbooks on General Science***"—

Preparation of a textbook involves two major issues: the selection of a proper subject matter and its effective presentation in a particular teaching learning situation. It is, therefore necessary that in case the writer of a textbook is expert only in one aspect he should consult some one who is expert in other aspect. The subject matter of a textbook should contain what is fundamental to the subject and should contribute to the pupil's

education. The choice of material, its magnitude, grading, placement and authenticity are the features worth considering under the content of the textbook. As regards effective presentation of the subject matter, it requires the pedagogic skill of the writer to communicate effectively what he intends to. For this, characteristics of learners, their interests, vocabulary, mode of communication, approach in developing concepts etc., are the features to be taken care of.

While writing a textbook on science there are certain basic principles which have to be observed in selection and presentation of the subject-matter keeping in view the teaching-learning situation. These principles would represent the broad statements that encompass a number of criteria to be observed. These principles refer to the conditions that determine the quality of good textbook. There are certain absolute conditions like conformity to the aims of education, conformity to the prescribed curriculum and impartiality of standpoint. Other conditions which may be considered necessary are suitability of content for a specific grade, accuracy of text and illustrations, standard terminology, effective organization, comprehensible language, etc. All these features can be categorized under the following heads:

- Meeting the needs of the learner.
- Fulfillment of requirements of the subject.
- Accordance with teaching-learning process.

1.1.7 The Role of Textbooks in Science Teaching:

William D. Romey in his book "***Inquiry Techniques for Teaching Science***" given the importance of textbook in science teaching as-

"*In science there is no absolute truth. The degree of truth of a proposition usually is proportional to the number of pieces of supporting data that serve as evidence in favour of the proposition.*" Even the great "laws" of physics are periodically doubted. Newtonian physics was considered adequate for many years to explain the behaviour of important segments of our world. Then Einstein and others theorized about curved space. The old 'truths' although they still can be used as models to help explain many physical phenomena, are not universal.

The average textbook is a compendium of scientific conclusions, with few supporting data and few references to the original scientific work that led to the conclusions. Following such a textbook chapter by chapter, question by question commonly leads to authoritarianism on the part of the teacher and to blind acceptance and role learning on the part of the student. Strict adherence to a textbook leads students to think that science comes from textbooks rather than from observation, experimentation, data analysis, and conclusion. The uncertainties built into scientific conclusions are generally only casually mentioned.

Textbooks, of course, have their uses, but they must be used intelligently. The teacher must analyze exactly what the role of the textbook will be in his course, and he must re-evaluate periodically just how well textbook is serving him.

In this age of computers and elaborate, inexpensive copying machine the whole nature of the publishing industry may shortly be undergoing a drastic change. Most textbooks contain some good material and some that is of little value. Furthermore, what is useful text material for one teacher is less useful for another. Copyright laws have made it difficult to use parts of several different textbooks without making a large

investment in a huge number of books. The new technology and copyright law revisions may soon make it possible for a teacher to select the best chapters or pages from several different books and also original articles from the scientific literature and have all of these bound into textbooks that are custom-built for each teacher.

1.1.8 TEXTBOOK EVALUATION

Evaluation is a process of determining the value of an attribute or a thing in relation to the pre-determined objectives. Hence evaluation includes value judgment besides the act of measurement. When applied to textbooks, it means finding out the worthwhileness of textbooks as an instructional tool in relation to the course of study and the objectives of the course.

According to Lindquist, measurement involves class of objects, hereto referred as aspects of the textbook, class of numerals hereto referred as evidence about those aspects and the rules for assigning the numerals hereto referred as scientific interpretation of the evidence accrued by the use of various types of instruments of evaluation. Therefore whenever we are going to evaluate a textbook, we aim at judging the extent to which it meets the needs of the pupils, the requirements of the subject and the teaching learning situation.

Selection of textbooks and their improvement are two main purposes of evaluating the science textbooks. Selection of suitable books involves inviting manuscripts from the authors or publishers through open competition. Here the main purpose is to judge whether a textbook comes upto the standards laid down by the selecting agency in terms of the criteria of a good textbook.

The other important purpose of the textbook evaluation is the improvement of the textbook. What is emphasized here is the highlighting of the strengths and weaknesses of the textbook that provide guidance for improvement of the text. Such an evaluation is very useful in introducing new ideas about the content and form of the textbook.

Evaluation is useful for revision of the text material when specific weaknesses are pointed out in certain areas. Textbook evaluation also provides data about the suitability or otherwise of the content.

1.1.9 The Concept of Science: A Historical Perspective

Since the very dawn of civilization, man was curious to know the things around him. This curiosity of man to know about nature and unevil its mysteries led to the establishment of certain knowledge based upon facts. He also tried to understand its laws and utilize them to his daily life. Genius persons, by their persistent efforts, careful experimentation and exact reasoning have collected a mass of tested information which we call science. In other words, science is a classified knowledge gained from a systematic study of the behaviour of nature.

Not many years back, science was recognized to be one of the subjects in the school curriculum. The realization by the general public of the need for General Science to be taught in schools due to the great advances in science made during the last few decades, and to the writing of such men as Faraday, Spencer and T.H. Huxley, all of whom advocated the utilitarian and disciplinary values of science teaching.

Though India made a pioneer headway in the field of Medicine, Astronomy, Agriculture, Mathematics etc. in ancient times, yet science could not develop beyond a certain stage in our country, the reason of

which is still not known for certain. It might be due to the peculiar social structure prevailing at that time, which separated the craftsmen from the intellectuals. It is, therefore, we have to look to the west for studying the history of teaching science because whatever went on the west was followed in India though at a slower pace.

1.1.10 Changed Status of Science

Teaching of science in the present form as a compulsory subject at the school stage was not well known up to the middle of this century in this country. This subject was generally taught as elementary science, and nature study, rural science, hygiene and physiology or as physics and chemistry. In certain states this subject was not even taught as a compulsory subject. It is during the last two decades that this subject especially at the elementary and junior secondary stage has emerged as an important discipline. Obvious reason is the tremendous growth of scientific knowledge and its impact on social life. It was considered inevitable to equip all students at the school stage with broad fundamentals of different branches of science which form the part of their physical and social environments. It is now considered necessary to educate every individual, irrespective to his career motives, in science to make him a good citizen.

1.1.11 Qualities of a Good Science Textbook

We are in dire need of good textbooks in all the regional languages but it is sad to note that excepting a very few books we come across books of low standard. Not only the mechanical features such as the get up, the paper, the printing etc., are below the standard but also the method of treatment of the subject-matter and the flow of language is faulty. This shows a certain amount of apathy and lack of social consciousness of the

authors. Most of the authors write a book with a purpose of earning money, caring, little for the capabilities and interests of the children. Secondly, there is tendency to prefer quantity to quality. Moreover the time at the disposal of the author is very short. He is given hardly a few couple of months to write and present the textbook. This reflects upon the quality of the textbook. The authors steal one paragraph from one book and another from other books. They have lost spirit of originality altogether in competition for the number in the market. Government should prescribe the books after impartial evaluation of the textbook. However, there are certain criteria for a good science textbook. These may be classified under the following categories:

The author-his qualification and experience.

- Only the author who has a certain amount of experience of teaching the subject should be allowed to publish a book because he can understand the actual learning situations and difficulties of 'pupils. Moreover he is conversant with the changing concepts and techniques of teaching.
- Certain minimum academic qualifications may also be prescribed for the authors should be rooted out.
- Mechanical features of the textbook.
- The print and the paper used and the binding of the textbook should be attractive. The size of the print should suit the age of the students.
- The book should be well-illustrated with diagrams, sketches, pictures etc. Illustrations play a vital role in raising the standard of a textbook and making it more attractive and useful. As the Chinese saying goes **"One picture is worth a thousand words"**

but this should not be taken as an absolute truth. It is essential that the illustration should find its proper place in the book so as to serve the purpose it stands for.

The subject matter—its nature and organization

- The subject matter should be developed as far as possible in psychological sequence. Care must be taken of the mental growth and interests of the pupils.
- There should be consistency of the subject matter and the textbook should stand for the objectives of science teaching. It should lead to the inculcation of scientific attitudes, disciplinary and cultural values and should suggest project or activities for the pupils, which may help to give a better understanding to the principles and concepts.
- Each chapter should begin with a brief introduction and end with a summary;
- Each chapter should contain assignments at the end of the chapter conforming the following:-
  - Applications to life situations.
  - New types self-assessment tests.
  - Suggestions for experimental work of project.
  - Suggestions for further study.
  - Numerical examples where desirable.
- Each textbook contains a detailed table of content and an index.
- Headings and sub-headings should be in bold type. The matter should be suitably presented in varied and distinctive form.

- The book should be written in lucid, simple and precise scientific language. A standard terminology for scientific and technical terms should be used. The English equivalents should also be given within brackets. It should also contain a glossary of technical terms used in the book. It should be free from any type of ambiguity in language, terminology and information.
- It should suggest some good methods of learning.
- It should contain helpful and practical suggestions for preparing and improving the science apparatus.
- It is better if the text book contains examples from the local environments. Weightage should be given to those methods, materials which draw upon the social community resources and school-society interaction.
- Adequate provision should be made to correlate general science with craft, social environment and physical environment.
- Each textbook should be accompanied by a laboratory handbook or manual.

Besides these principles, the UNESCO Planning Mission have given some principles of writing textbooks in U.S.S.R. and other countries. They have advocated that:

- It should first of all receive the requirements of the syllabus. It should also help in the improvement of the syllabus.
- The facts, concepts etc, should be modern and within the comprehension of the pupils.
- It should help in linking up science with life and practice. The pupils should be equipped with 'know-how' of utilizing the knowledge in everyday life.

- The contents should contain not only the established facts that the problems which are being researched and thereby, arousing the interest in the pupils to these problems.
- The whole content of the textbook should be aimed at shaping integrated modern scientific world outlook, which ensures the success in mastering scientific knowledge and solution of the problems of vital importance. The content should be simple, brief, exact, definite and accessible.

So, a good textbook should aim at satisfying, as far as possible, the above mentioned criteria. It should, however, not take the place of the teacher but should give the minimum knowledge necessary for the foundation. Good textbooks in science are indispensable for effective learning of science.

1.2 STATEMENT OF THE PROBLEM

The present study is related to the analysis of VI Class science textbook of M.P. State. The specific problem is worded as follows:

"A Critical Analysis of the Science Textbook of Class VI."

1.3 OBJECTIVES OF THE STUDY

1. To find out the percentage of parents who rated the physical aspects of the science textbook of Class VI as good, average and poor.
2. To find out the percentage of teachers who rated the physical aspect of VI Class textbook as good, average and poor.
3. To find out the percentage of teachers and parents who rated the physical aspect of VI Class textbook as good, average and poor.

4. To find out the difference between teachers and parents with regard to their perception about the physical aspect of VI Class science textbook of M.P. State.
5. To find out the difference between male and female with regard to their perception about the physical aspect of VI Class science textbook of M.P. State.
6. To find out the perception of teachers (sex-wise) about the physical aspect of VI Class science textbook of M.P. State.
7. To find out the perception of teachers (qualification wise) about the physical aspect of VI Class science textbook of M.P. State.
8. To find out the perception of teachers (experience wise) about the physical aspect of VI Class science textbook of M.P. State.
9. To find out the perception of parents (sex-wise) about the physical aspect of VI Class science textbook of M.P. State.
10. To find out the perception of parents (qualification wise) about the physical aspect of VI Class science textbook of M.P. State.
11. To assess the efficacy of text or content presented in the VI Class science textbook of M.P. State.
12. To assess the effectiveness of figures and diagrams given in the VI Class science textbook of M.P. State.
13. To assess the nature of exercise given in the VI Class science textbook of M.P. State.
14. To know the student participation in activities presented in the VI Class science textbook of M.P. State.
15. To analyze the chapter summary given in the VI Class science textbook of M.P. State.

16. To study the nature of the textbook in terms of authoritarian type or democratic type.
17. To know the strengths of the VI Class science textbook of M.P. State.
18. To know the shortcomings of the VI Class science textbook of M.P. State.

1.4 HYPOTHESES OF THE STUDY

Ho 1. There is no significant difference between teachers and parents with regard to their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 2. There is no significant difference between male and female with regard to their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 3. Sex of teachers would not influence significantly their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 4. Qualification of teachers would not influence significantly their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 5. Experience of teachers would not influence significantly their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 6. Sex of parents would not influence significantly their perception about the physical aspect of VI Class science textbook of M.P. State.

Ho 7. Qualification of parents would not influence significantly their perception about the physical aspect of VI Class science textbook of M.P. State.

1.5 TERMS USED IN THE STUDY:

- **Analysis**: Analysis means a careful examination of something in order to understand it better. Analysis word is used when giving the most basic or important facts about a situation.
- **Textbook**: Textbooks command attention because they not only provide the basic source of school instruction but also transmit culture, reflect values and serve as spring boards for the intellectual development of individuals and the nation. Being the source of 90 percent of instruction (**Soloman, 1878**) textbook yield powerful influence, both cognitive and affective, upon individuals, families, communities and the nation. Historically, textbooks have changed in response to the prevailing educational philosophy and curriculum reform movement of the times as well as to pressures from both the liberal and the right-wing element of society and form vocal minorities.
- **Science**: The words 'science' and 'scientific' have become so popular in all walks of life that science is considered the hallmark of progress and a prominent theme of the present age. Science is also regarded as an activity which forms the basis of acquiring and refining knowledge. Former is the static view of science, and refers to the content or the subject matter of science. The latter is the dynamic view of science and refers to the process aspect or the methods of the scientists and their attitude towards work, which are commonly called scientific method and scientific attitude.

Science does not deal with the value judgment. It is concerned only in adducing the evidence. Whether the use of spacecraft in war is immoral or not, whether landing on the moon is auspicious or not, science is silent about these and is non-committal. 'What ought to be done', is beyond the boundaries of science. Likewise, science cannot prove or disprove certain beliefs as they are based on certain values which science does not handle. Truth, value and purposes are the words which science does not and cannot embrace within its fold. In fact it is due to this un-acceptance of such concepts that science advances and attempts to explain the mysteries of nature through the use of the reliable tool, the scientific method.

1.6 NEED AND SIGNIFICANCE OF THE PROBLEM

Providing quality education on universal basis especially at the elementary stage has been a long cherished goal. Emphasis has, therefore, been laid on increased and sustained inputs into the system in terms of improved infrastructure facilities and boosting up of the teaching, learning and evaluation processes. Textbook play an important role in the efforts to raise the learner's achievement and thus contribute towards quality of education.

No doubt, numerous attempts have been made in India during the last four decade on the aspects of textbook evaluation in different subjects. But a scientific approach for their assessment could not emerge to bring objectivity in the evaluation process. In Madhya Pradesh no such attempts has been made to evaluate the textbooks published by the M.P. Textbook Corporation. The present study will be an attempt of its own kind. It is for the first time that a book in science has been thoroughly examined and suggestions advanced for their improvement. This will go a long way in

improving the qualitative aspect of the science textbook and will keep the readers in touch with the latest developments and trends that are going on.

1.7 DELIMINAITONS OF THE STUDY

The study is subject to the following limitations:

1. It is related with the analysis of a textbook and not with the procedural aspect of writing a textbook.
2. It takes into account only the textbook in science.
3. Textbook published by the M.P. Textbook Corporation alone has been selected for analysis.
4. Science textbook meant only for VI Class has been taken up.
5. Science textbook written in the Hindi medium has been selected.
6. The title of the book taken up is:

   विज्ञान Class 6