

AN EKLAVYA PUBLICATION

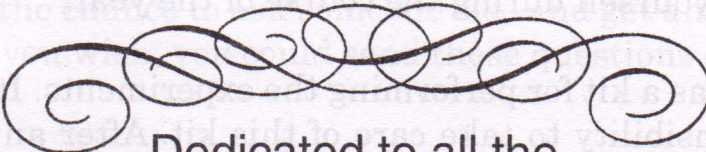
BAL VAIGYANIK

Class 6

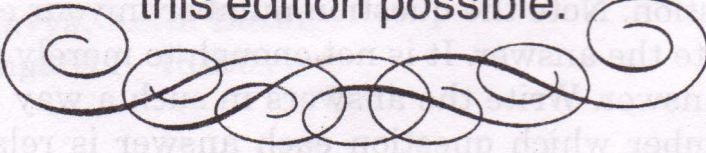


BAL VAIGYANIK

Class 6



Dedicated to all the
teachers and students whose
participation in the Hoshangabad
Science Teaching Programme over
the past 30 years has made
this edition possible.



AN EKLAVYA PUBLICATION

Dear children,

This book is meant for doing, not for memorising. It has several interesting experiments. Perform them, observe, think and understand.

There is a lot to learn even outside the school. Go on field trips with your teacher and classmates to learn about crops, rivers, streams, insects, forest, rocks, soil, the sun, moon and stars. You can learn many things on your way to and from school and at home as well.

You will be performing experiments in groups of four. It is essential to do the experiments yourselves. It is not enough just to watch others performing them. To learn science well, you must perform all the experiments yourself during the course of the year.

Your school has a kit for performing the experiments. It is your collective responsibility to take care of this kit. After an experiment, clean the apparatus and put it away carefully and safely. Many of the items needed for doing experiments are available in your immediate surroundings. Collect these yourself whenever necessary.

Several questions have been included after each experiment and/or field trip. These questions are numbered and the number is written after the question. Note the question number in your exercise book when you write the answer. It is not enough to merely write 'Yes' or 'No' as your answer. Write the answers in such a way that you are able to remember which question each answer is related to even months after you have done the experiments. Your text book has the questions and your exercise book the answers. The two put together form the complete book. Therefore, preserve your exercise book till your Class 8 Board examination.

You will learn about new things in every chapter. After completing each chapter, carefully note all the new things you have learnt in your exercise book.

Repeated exercises are necessary to consolidate our understanding

of any subject. All the chapters have questions for exercises at the end. You must attempt these questions. If you require more questions for exercises you can use the Question Bank. You can get more details about the Question Bank from your teacher.

In addition to the chapters, your book has four pages containing interesting activities. You should do these activities on your own at home, or with your friends, during your leisure time. You must write to me about your experience with these activities.

Whenever a question arises in your mind, discuss it with your friends and ask your teacher about it. No question is worthless. Sometimes, you may not immediately find an answer to a question that may arise in your mind. Write down such questions in your exercise book. You may get the chance to ask someone else and get answers to your questions. If you wish, you could send these questions on a postcard to me.

How do you find this book? Do you enjoy learning science with it? Do you go on field trips? Are you able to perform all the experiments? Have you faced any problems? Write to me about all your experiences, and also send me questions to which you could not find answers. My address is:

SAWALIRAM

c/o Eklavya, Kothi Bazar
Hoshangabad - 461001

Eagerly awaiting your letters.

Yours,
Sawaliram



Picture of Sawaliram drawn by Umesh Chauhan, Assistant Teacher, Timarni

FOREWORD

I am happy to say a few words about the revised edition of Bal Vaigyanik. The efforts made in last thirty years in the field of education by Eklavya and, before that, Kishore Bharati, are probably without parallel. What is so special about this work? Actually, several things. But first I would like to say that the attempt to link learning with life is rarely seen elsewhere.



We generally assume that a good curriculum is one which is prepared by experts. And experts do not need to know about the environment in which a child begins to form her or his relationship with the world - what the child sees, understands, internalises and explores. And if the experts are from outside the country, all the better. It is assumed that if a good curriculum is packed well in a strong box and placed anywhere, knowledge will sprout and spread. But this just does not happen.

It is possible that some teachers, a few officials of the Education Department and some parents may suffer from the misconception that Bal Vaigyanik is science of a somewhat lower standard, because many chapters seem to be related to rural life. This is not true. The environment, flowers, plants and food items are found in life anywhere. What people generally fail to understand is that the elements of science are present in these things as well. This is why science education is often reduced to superficiality. When we live without understanding what is familiar to us, we slowly forget the very habit of understanding itself. If the habit of understanding and the method of understanding do not evolve together, then the science we learn remains barren. This disease afflicts not just school education today, but also our higher

education as well. That affliction, too, needs to be eradicated.

Bal Vaigyanik is a profound effort. Yet it needs to go even further. Only when such thinking spreads to high schools, colleges and universities can we produce scientists of high calibre. Only then can we infuse new life into the nation. Any delay will ensure that education remains an exercise in preparing for subservience.

I congratulate the Education Department of Madhya Pradesh for having taken this vital step jointly with Eklavya. However, I would like to add a word of caution here. Do not take Bal Vaigyanik as the truth and ideal for all times. Teachers, too, must not think that they now have a new kind of *Gita* in their hands. This book needs to be used with freedom, not with reverence. If you feel something needs to be changed, change it. In fact, every child should have a unique curriculum which changes with her or his changing world. This may appear extremely difficult in the prevailing system. Nevertheless, let us take a step forward. It will be a joyful experience.

यश पाल

(PROFESSOR YASH PAL)

Professor Yash Pal is an eminent space scientist, active in popularising science. He was Chairperson of the committee constituted by the Government of India to recommend measures to reduce the load of the school bag. He has been associated with many organisations and institutions : as Scientist at the Tata Institute of Fundamental Research, Mumbai; Director of the Space Application Programme of the Indian Space Research Organisation; Chairperson of the University Grants Commission; and Chairperson of the Indian Science Congress.

A WORD FROM US . . .

You have, in your hands, the first book (Class 6) of the revised Bal Vaigyanik series. As with earlier editions, in this edition, too, major contributions have been made by school teachers and resource teachers of the programme. The feedback of their experiences with children in the classroom has formed the basis of the changes in this edition.

The resource group, too, has played an important role in this task. The Science Education Group of Delhi University had a major hand in conceptualising and preparing this edition of Bal Vaigyanik. Scientists and educationists from Delhi University, Indian Institute of Technology Mumbai, Tata Institute of Fundamental Research Mumbai, National Institute of Immunology Delhi, Holkar Science College Indore, other colleges and institutions of Madhya Pradesh, all participated in the revision process, along with teachers and Eklavya personnel. They worked together to reinforce the content, conceptualise and design new experiments, and revise old ones wherever necessary.

Thus, the Bal Vaigyanik books are a well organised amalgam of a deep understanding of science and concrete experiences with children. Bal Vaigyanik attempts to facilitate learning of even the most difficult concepts of science through experiments and discussions in a simple and interesting manner.

We believe that learning science should be a fascinating experience and should excite the curiosity of the learner. If by its manner of teaching, science is boring and difficult, children will run away from the subject even more. Once the curiosity of children is excited, they can be motivated to happily learn the most difficult topics on their own initiative. Their pace of learning also becomes faster.

There is often a misconception that since Bal Vagyanik appears simple, it is science of a lower standard. This misconception needs to be removed. The topics covered in Bal Vaigyanik are the same as in other text books. Measurement, classification, and other topics in biology, physics and chemistry are all covered. Topics are given names different from those in conventional textbooks because they are often treated differently and also to raise the curiosity of children.

Hoshangbad Science is only a different approach to teaching and learning science; it is not a different type of science. Everyone accepts that science is not a subject to be memorised from text books. It is important that children understand scientific principles in depth. And the best way to understand scientific principles is by performing experiments and making observations. So if you want to teach the principles of magnetism, do not make children memorise definitions about magnetism. Place a couple of magnets, iron filings, some pins, a compass, thread and a few other things in their hands - you will find that within an hour or so they will discover many principles about magnets. Not just that, they will also start asking a host of questions- just like any scientist would.

Bal Vaigyanik does not generally contain answers to questions. This fact worries many parents and teachers. However, if you read the book carefully, you will find that questions are formulated on the basis of classroom experiences of children and are structured in such a manner that, with a little prodding, children are able to answer them and start thinking. To make children learn to think for themselves is the main objective of education today. If we ask and answer all the questions ourselves, how can children get the opportunity to think and understand?

However, one factor has been kept in mind while preparing Bal Vaigyanik. Questions which children might not be able to answer, or are unlikely to have information about, have been explained in a simple manner with illustrations.

In the present revision process two other aspects have also been kept in mind. The first is that we have included a number of new exercises to provide children the opportunity to practice and strengthen their understanding. For parents and teachers who want their children

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Bhopal, dated 04/8/2000

MESSAGE

It gives me immense pleasure to learn that the M.P. Text Book Corporation is publishing the new revised edition of Class 6 Bal Vaigyanik, prepared as part of the Hoshangabad Science Teaching Programme.

The main objective of science should be to provide an innovative forum within the framework of accepted educational principles so that children are motivated to learn scientific theories by doing, observing and understanding, rather than through memorisation. Science should be taught in a manner which enhances curiosity, logical thinking, observation and experimental skills and the analytical ability of students.

The eminent scientist, Professor Yash Pal, had made valuable recommendations for decreasing the load of the school bag. I am happy that the M.P. Government has implemented these recommendations in an attempt to reduce the burden of the school bag, so that today's children can develop into scientists of the highest calibre who will make the nation and state proud.

Hearty congratulations to the Eklavya family for its innovative initiative.

(Mahendra Baudh)

to do even more exercises, we have published a separate question bank, which is easily available.

The second aspect is that we have included a number of interesting narratives about science. The expectation is that children will read these narratives, understand them, think about them and, hopefully, be inspired by them.

We have also experimented with new ideas in terms of layout and illustrations in this edition of Bal Vaigyanik. Such experimentation was made possible through the involvement of members of the faculty of the National Institute of Design, Ahmedabad. We are eager to know about your reactions to these changes. Please let us know what you think.

The Hoshangabad Science Teaching Programme is an innovative experiment undertaken by the School Education Department of the Government of Madhya Pradesh and the State Council of Educational Research and Training (SCERT). A unique feature of this programme has been the involvement and contribution of non-government organisations like Kishore Bharati and Friends Rural Centre earlier, and Eklavya at present. We hope we can help in attempts to improve science education at the school level not just in Madhya Pradesh, but in Rajasthan, Gujarat and other states as well.

This revised edition of Bal Vaigyanik is but a step in its continuing improvement and progress. The road ahead is long. Therefore, you should continue to send us your valuable opinions, criticisms, and suggestions. We look forward to hearing from you.

With best wishes

Hoshangabad Science Group, Eklavya