

Curiosity

Textbook of Science for Grade 6



विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

First Edition

July 2024 Jyeshtha 1946

Reprint

December 2024 Pausha 1946

PD 2200T GS

© **National Council of Educational
Research and Training, 2024**

₹ **65.00**

*Printed on 80 GSM paper with NCERT
watermark*

Published at the Publication Division
by the Secretary, National Council of
Educational Research and Training,
Sri Aurobindo Marg, New Delhi
110016 and printed at Chandu Press,
469, Patparganj Industrial Estate,
Delhi-110092

ALL RIGHTS RESERVED

- ❑ No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.
- ❑ This book is sold subject to the condition that it shall not, by way of trade, be lent, re-sold, hired out or otherwise disposed of without the publisher's consent, in any form of binding or cover other than that in which it is published.
- ❑ The correct price of this publication is the price printed on this page, Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

**OFFICES OF THE PUBLICATION
DIVISION, NCERT**

NCERT Campus Sri Aurobindo Marg New Delhi 110 016	Phone : 011-26562708
108, 100 Feet Road Hosdakere Halli Extension Banashankari III Stage Bengaluru 560 085	Phone : 080-26725740
Navjivan Trust Building P.O. Navjivan Ahmedabad 380 014	Phone : 079-27541446
CWC Campus Opp. Dhankal Bus Stop Panihati Kolkata 700 114	Phone : 033-25530454
CWC Complex Maligaon Guwahati 781 021	Phone : 0361-2674869

Publication Team

Head, Publication Division	: M.V. Srinivasan
Chief Editor	: Bijnan Sutar
Chief Production Officer (In charge)	: Jahan Lal
Chief Business Manager	: Amitabh Kumar
Editor	: Shilpa Mohan
Assistant Production Officer	: Sayuraj A.R.

Cover and Layout

The Banyan Tree

Illustrations

*Fajruddin
Junaid Digital Arts*

FOREWORD

The National Education Policy 2020, envisages a system of education in the country that is rooted in Indian ethos and its civilisational accomplishments in all domains of human endeavour and knowledge while at the same time preparing the students to constructively engage with the prospects and challenges of the twenty-first century. The basis for this aspirational vision has been well laid out by the National Curriculum Framework for School Education (NCF-SE) 2023 across curricular areas at all stages. Having nurtured the students' inherent abilities touching upon all the five planes of human existence, the *pañchakośhas*, in the Foundational and the Preparatory Stages have paved the way for the progression of their learning further at the Middle Stage. Thus, the Middle Stage acts as a bridge between the Preparatory and the Secondary Stages, spanning three years from Grades 6 to 8.

This framework, at the Middle Stage, aims to equip students with the skills that are needed to grow, as they advance in their lives. It endeavours to enhance their analytical, descriptive, and narrative capabilities, and to prepare them for the challenges and opportunities that await them. A diverse curriculum, covering nine subjects ranging from three languages—including at least two languages native to India—to Science, Mathematics, Social Sciences, Art Education, Physical Education and Well-being, and Vocational Education promotes their holistic development.

Such a transformative learning culture requires certain essential conditions. One of them is to have appropriate textbooks in different curricular areas as these textbooks will play a central role in mediating between content and pedagogy—a role that will strike a judicious balance between direct instruction and opportunities for exploration and inquiry. Among the other conditions, classroom arrangement and teacher preparation are crucial to establish conceptual connections both within and across curricular areas.

The National Council of Educational Research and Training, on its part, is committed to providing students with such high-quality textbooks. Various Curricular Area Groups, which have been constituted for this purpose, comprising notable subject-experts, pedagogues, and practising teachers as their members, have made

all possible efforts to develop such textbooks. *Curiosity*, Textbook of Science for Grade 6, is one of these. It has been developed in consonance with the recommendations of NEP 2020 and the NCF-SE 2023 to take students on a journey of experiential learning by citing examples from the world of the learners. The content stimulates curiosity, a sense of exploration, questioning, and critical thinking. The content seamlessly weaves together concepts from physics, chemistry, biology, and earth science, along with cross-cutting themes like environmental education, value education, inclusive education, and Indian Knowledge Systems (IKS). The textbook aims to engage learners through an integrated approach by including multiple activities and thoughtful use of technology. The textbook offers ample opportunities for reflection and group discussions.

To encourage creativity and innovation, it is feasible to regard students as active participants in the learning process, rather than mere recipients of a predetermined set of knowledge. This can only be achieved if the necessary number of hours are dedicated to science teaching–learning annually as outlined in NCF-SE 2023. The pedagogical approach of the textbook also considers how important it is for students to think critically, reason well and make decisions. It also provides students with numerous opportunities to learn from each other, making the learning experience more engaging for both teachers and students.

However, in addition to this textbook, students at this stage should also be encouraged to explore various other learning resources. School libraries play a crucial role in making such resources available. Besides, the role of parents and teachers will also be invaluable in guiding and encouraging students to do so.

With this, I express my gratitude to all those who have been involved in the development of this textbook and hope that it will meet the expectations of all stakeholders. At the same time, I also invite suggestions and feedback from all its users for further improvement in the coming years.

New Delhi
30 June 2024

DINESH PRASAD SAKLANI
Director
National Council of Educational
Research and Training

ABOUT THE BOOK

Curiosity, Textbook of Science for Grade 6 learners has been crafted in alignment with the recommendations of the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCF-SE) 2023. The policy advocates a radical shift from a content-based education to a competency-based education, particularly in the realm of science. Therefore, the formulation of curricular goals for Science, subsequent competencies and learning outcomes are tailored towards competency-based learning. These curricular goals encompass various scientific concepts, including matter, the physical and living world, health, hygiene, and the exploration of the interface between science, society and technology. Additionally, the goals focus on the nature of science, its processes, historical and contemporary aspects of the development of science and science communication. While these goals are explicitly articulated, they are interdependent and collectively contribute to a better understanding of the world around us. Accordingly, the chapters of this textbook are structured around creative activities, reflective questions, processes and illustrations. The integration of the concepts from biology, chemistry, physics and earth science, and cross-cutting themes, such as value education, inclusive education, Indian Knowledge Systems (IKS) and environmental education have been interwoven in the content. Thus, the textbook aims to provide experience-based learning, rather than simply reading and memorising the concepts.

In the Middle Stage, science teaching–learning adopts an integrated approach. This integrated approach develops fundamental capacities across biology, chemistry, physics and earth science. The use of an integrated approach helps the learners to appreciate the interrelations between subjects and make sense of their observations and experiences.

Curiosity, Textbook of Science for Grade 6, comprises twelve chapters. As the name of the textbook suggests, there are numerous opportunities for the learners to explore the world of science and its nature. Through the chapters, learners will embark on a journey that will connect them to the world around and spark curiosity for further exploration. The hands-on activities embedded within each chapter engages the learners and provide them an opportunity to

reflect on learning. These activities are inclusive in nature. Some activities require both the teacher and learners to prepare in advance.

Chapter 1, titled ‘The Wonderful World of Science’, provides a holistic view of the new topic of Science introduced in the Middle Stage. It showcases, through examples, the essence of Science—a way of thinking, observing, and finding out by doing, and by asking questions. This chapter weaves together the concepts covered in the rest of the book, and aims to excite the readers as they start their adventures into the world of science. There are no assessment exercises in this chapter and is designed to be **non-evaluative**. Also, every chapter in the book begins with an introduction that makes the learners curious and tries to show different ways with which the goals of the curriculum can be achieved effectively. The chapters begin with the stories related to real-life situations, these are meant to capture learners’ interest and connect them with what is already known. The various activities given are based on scientific processes, designed to provide hands and minds-on experiences. Following each activity, there are questions to help learners understand and assess how well they have grasped the information. Questions are significant in the learning process. They help learners to explore and reinforce their understanding. One will also find many thought-provoking questions designed to encourage deep thinking, self-awareness and critical analysis. These questions prompt learners to ponder and delve deeper into their thoughts.

In order to sustain the interest of the readers, some of the challenging ideas, additional information, poems, stories, strange facts and other interesting materials are also presented as add on **non-evaluative** content in the boxes labelled ‘Do you know?’, ‘More to know!’, ‘Think it over!’ and ‘More to do!’. The thrill of scientific inquiry comes from pursuing the unknown, giving learners the opportunity to think and explore beyond the syllabus. Some chapters also include a section called ‘Know a scientist’, which presents the contributions of Indian scientists related to that concept. All these box items, including brief biographies of scientists, are **non-evaluative**. The important ideas and steps in understanding a given concept of science are included as ‘Keywords’ at the end of each chapter. These ‘Keywords’ will help learners to acknowledge various

ideas and encourage them to think more deeply about the content. The keywords related to scientific processes depict the steps or procedure involved in the scientific activities. These words guide learners on how scientific knowledge is generated, tested and applied. 'Summary' offers an overview of the chapter's main points, reinforcing the key ideas discussed. It serves to outline the content presented in the chapter. A **non-evaluative** interesting element that has been incorporated in some of the chapters is the introduction of certain verses from various Indian texts to promote rootedness in the learners as envisaged in NEP 2020.

The primary aim of *Curiosity* is to prepare the children for becoming the responsible members of the society, and therefore efforts have been made to raise awareness about various issues, such as gender, region, environment, health and hygiene, water scarcity and energy conservation. Activities given in the book endeavour to promote peer-learning and group activities.

The assessment exercises, 'Let us enhance our learning', play a vital role in the learning process. They help to reinforce the understanding and identify areas for improvement, making them essential components of effective teaching and learning. Assessment consists of various exercises, from pictorial questions to creating puzzles and multiple-choice questions, to create a challenging and interesting experience for the learners. These questions also facilitate the evaluation of various competencies expected to be developed through a particular chapter. Peer and group activities to explore answers to the questions are also encouraged.

A significant feature of the book is what we termed as 'Learning further'. In this section, some projects and activities are designed to increase learners' interaction with experts, teachers, parents and the wider community. Learners are encouraged to gather diverse information and draw their own conclusions.

The textbook is just one way to learn. Learners should enhance their knowledge by exploring and observing their surroundings. Information and Communication Technology (ICT) can also be a valuable tool for learners' learning and development, when used appropriately. Learners can explore ICT with the help of Quick Response (QR) codes provided in the textbook. QR codes make the reading experiences more interactive and enjoyable. These QR

codes that have additional resources can be accessed by the learners at their own convenience and pace. These additional resources include videos, puzzles, games, quizzes, audio, documentaries and additional content on some topics.

At the end of this book, learners will find a page titled 'It is not the end, my friend!'. This includes words of encouragement, motivating learners to continue their educational journey and ignite their curiosity for further learning. It is meant to be **non-evaluative**.

May the journey of every learner be filled with joy and continue the curiosity in the higher grades as well!

We express our gratitude to all the members of the textbook development committee for their contributions in shaping this textbook. We look forward to the feedback of the readers.

ANJNI KOUL
Professor, Academic Convener
Department of Education in
Science and Mathematics
NCERT

NATIONAL SYLLABUS AND TEACHING LEARNING MATERIAL COMMITTEE (NSTC)

1. M.C. Pant, *Chancellor*, National Institute of Educational Planning and Administration (NIEPA), **(Chairperson)**
2. Manjul Bhargava, *Professor*, Princeton University **(Co-Chairperson)**
3. Sudha Murty, *Acclaimed Writer and Educationist*
4. Bibek Debroy, *Chairperson*, Economic Advisory Council–Prime Minister (EAC–PM)
5. Shekhar Mande, *Former Director General*, CSIR, *Distinguished Professor*, Savitribai Phule Pune University, Pune
6. Sujatha Ramdorai, *Professor*, University of British Columbia, Canada
7. Shankar Mahadevan, *Music Maestro*, Mumbai
8. U. Vimal Kumar, *Director*, Prakash Padukone Badminton Academy, Bengaluru
9. Michel Danino, *Visiting Professor*, IIT–Gandhinagar
10. Surina Rajan, *IAS (Retd.)*, Haryana, *Former Director General*, HIPA
11. Chamu Krishna Shastri, *Chairperson*, Bhasha Samiti, Ministry of Education
12. Sanjeev Sanyal, *Member*, Economic Advisory Council–Prime Minister (EAC–PM)
13. M.D. Srinivas, *Chairperson*, Centre for Policy Studies, Chennai
14. Gajanan Londhe, *Head*, Programme Office, NSTC
15. Rabin Chhetri, *Director*, SCERT, Sikkim
16. Pratyusha Kumar Mandal, *Professor*, Department of Education in Social Science, NCERT, New Delhi
17. Dinesh Kumar, *Professor and Head*, Planning and Monitoring Division, NCERT, New Delhi
18. Kirti Kapur, *Professor*, Department of Education in Languages, NCERT, New Delhi
19. Ranjana Arora, *Professor and Head*, Department of Curriculum Studies and Development, NCERT **(Member-Secretary)**

THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ²[unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)

TEXTBOOK DEVELOPMENT TEAM

Chairperson, Curricular Area Group (Science)

Shekhar C. Mande, FNA, FASc, FNASc, Former *Director General*, CSIR, *Distinguished Professor*, Bioinformatics Centre, Savitribai Phule Pune University, *Honorary Distinguished Scientist*, National Centre for Cell Science, Pune.

Contributors

Arnab Bhattacharya, *Centre Director*, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research (TIFR), Mumbai, *Professor*, Department of Condensed Matter Physics and Material Science, TIFR, Mumbai **(Chairperson, Physics Sub-group)**

Ashish Kumar Srivastava, *Assistant Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Gagan Gupta, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Meher Wan, *Scientist*, CSIR-National Institute of Science Communication and Policy Research, New Delhi

M. S. Sriram, Former *Professor* and *Head*, Department of Theoretical Physics, University of Madras, Chennai and *President*, K. V. Sarma Research Foundation, Chennai

Ritika Anand, *Principal*, St. Mark's Senior Secondary Public School, Meera Bagh, New Delhi

Sarita Vig, *Professor*, Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram

V. B. Bhatia, Former *Professor*, Department of Physics and Astrophysics, University of Delhi, Delhi

Rachna Garg, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi **(Coordinator, Physics Sub-group)**

R. Shankar, *Adviser*, International Geoscience Education Organisation, *Coordinator*, International Earth Science Olympiad and *Former Professor*, Mangalore University, Mangaluru **(Chairperson, Earth Science Sub-group)**

Abhay Kumar, *Assistant Professor*, Central Institute of Educational Technology, NCERT, New Delhi

H. L. Satheesh, *Principal*, Maharshi Public School, Mysuru

Poonam Katyal, Former *TGT*, Zeenat Mahal Sarvodaya Kanya Vidyalaya, Jafrabad, Delhi

R. Srinivasan, *Visiting Professor*, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru

T. A. Viswanath, Former *Associate Professor*, Goa University, Goa

R. R. Koireng, *Associate Professor*, Department of Curriculum Studies and Development, NCERT, New Delhi **(Coordinator, Earth Science Sub-group)**

Saroj Ghaskadbi, Former *Senior Professor*, Savitribai Phule Pune University, Pune **(Chairperson, Biology Sub-group)**

C. V. Shimray, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Dinesh Kumar, *Professor and Head*, Planning and Monitoring Division, NCERT, New Delhi

Karthick Balasubramanian, *Scientist E*, Agharkar Research Institute, Pune

K. V. Sridevi, *Associate Professor*, Regional Institute of Education, NCERT, Ajmer

Pankaj Jain, *Director*, Academic and Operations, Seed2Sapling Education Foundation, Bengaluru

Pooja Gokhale, *Assistant Professor*, Sri Venkateswara College, University of Delhi, New Delhi

Preeti Khanna, *Rehabilitation Professional* (Visual Impairment), National Association for The Blind, New Delhi

Pushp Lata Verma, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Sarita Kumar, *Professor*, Acharya Narendra Dev College, University of Delhi, Delhi

Somdatta Karak, *Science Communications and Outreach Officer*, CSIR-Center for Cellular and Molecular Biology, Council for Scientific and Industrial Research, Hyderabad

Sujata Bhargava, Former *Professor*, Savitribai Phule Pune University, Pune

Yukti Sharma, *Professor*, Department of Education (CIE), University of Delhi, Delhi

Sunita Farkya, *Professor and Head*, Department of Education in Science and Mathematics, NCERT, New Delhi (**Coordinator, Biology Sub-group**)

Uday Maitra, *Honorary Professor and INSA Senior Scientist*, Indian Institute of Science, Bengaluru (**Chairperson, Chemistry Sub-group**)

Anand Arya, *Associate Professor*, Regional Institute of Education, NCERT, Ajmer

Jaya P. Swaminathan, *Teacher Developer*, Royal Society of Chemistry, Bengaluru

Padma Prabhu, *Former TGT*, Kendriya Vidyalaya Sangathan and *Teacher Developer*, Royal Society of Chemistry, Bengaluru

Pramila Tanwar, *Associate Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Ravindra Kumar Parashar, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Ravijot Sandhu, *PGT (Chemistry)*, Navyug School, Laxmibai Nagar, New Delhi

Ruchi Verma, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Sandhiya Lakshmanan, *Scientist*, CSIR-National Institute of Science Communication and Policy Research, New Delhi

Sekar Venkatraman, *Head of Department*, Isha Home School, Coimbatore

Sunita Malhotra, *Professor*, Indira Gandhi National Open University, New Delhi

Tarun Choubisa, *Director*, Pedagogy and Innovation (Science), Seed2Sapling Education Foundation, Bengaluru

Vijay Pal Singh, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Reviewers

Adithi Muralidhar, *Scientific Officer*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Ankush Gupta, *Associate Professor*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Anurag Behar, *CEO*, Azim Premji Foundation, Member, National Curriculum Framework Oversight Committee

B. K. Sharma, Former *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

Gajanan Londhe, *Director*, Samvit Research Foundation, Bengaluru

K. K. Arora, Former *Professor*, Zakir Husain Delhi College, University of Delhi, Delhi

Manjul Bhargava, *Professor*, Princeton University & *Co-Chairperson*, NSTC

Manjushree Chaudhuri, Former *PGT* (Physics), Delhi Public School, R.K. Puram, New Delhi, La Grande Boissière Campus of International School, Geneva

Mridula Arora, *Principal*, Navyug School, Sarojini Nagar, New Delhi

Pushpa Tyagi, Former *Head of Department* (Physics), Sanskriti School, Chanakyapuri, New Delhi and Former *PGT* (Physics), Kendriya Vidyalaya, Delhi

Rama P. Jayasundar, *Head*, Department of NMR, AIIMS, New Delhi

Ravi S. Nanjundiah, *Professor*, Centre for Atmospheric and Oceanic Sciences (CAOS), Indian Institute of Science, Bengaluru

Sanjay P. Sane, *Professor*, National Centre for Biological Sciences, TIFR, Bengaluru

Savita Ladage, *Professor*, Homi Bhabha Centre for Science Education, TIFR, Mumbai

Surendra Ghaskadbi, Former *Scientist G*, Agharkar Research Institute, Pune

Vijay Sarda, Former *Associate Professor*, Zakir Hussain Delhi College, University of Delhi, Delhi

V. P. Srivastava, Former *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi

V. Ramanathan, *Assistant Professor*, IIT BHU, Varanasi

Member-convener, Curricular Area Group (Science)

Anjni Koul, *Professor*, Department of Education in Science and Mathematics, NCERT, New Delhi (**Coordinator, Chemistry Sub-group**)

ACKNOWLEDGEMENTS

The National Council of Educational Research and Training (NCERT) acknowledges the guidance and support of the esteemed Chairperson and members of the Curricular Area Group (CAG): Science and other concerned CAGs for their guidelines on cross-cutting themes in developing this textbook.

The Council is grateful to the members of the Textbook Development Team, for their contribution in the development of this textbook. The Council also gratefully acknowledges the contribution of the participating members for giving inputs in refining of the textbook—Ankita Dureja, *TGT Science*, DAV Public School, Gurugram; Anupa Kumbhar, *Assistant Professor*, Savitribai Phule Pune University, Pune; Ganti S. Murthy, *Professor*, IIT Indore; Jatinder Mohan Mishra, *Professor*, DEL, NCERT, New Delhi; Lalmin Kipgen, *Assistant Professor*, Division of Educational Kits, NCERT, New Delhi; Mayuri Rege, *Reader*, HBCSE, TIFR, Mumbai; Meenakshi, *Assistant Professor*, DEL, NCERT; Michel Danino, *Visiting Professor*, IIT Gandhinagar, Gujarat; Neeraja Dashaputre, *Assistant Professor*, IISER, Pune; Paresh Joshi, *Professor*, HBCSE, TIFR, Mumbai; Poonam Bhadoria, *Ph.D Scholar*, IIT Varanasi; P. V. Raghavendra, *Associate Professor*, DESM, NCERT, New Delhi; Rahul S. Chatterjee, *Assistant Lecturer* (Physics), Boys' Higher Secondary School, Shillong; Saket Bahuguna, *Assistant Professor* (Linguistics), Central Institute of Hindi, Delhi Centre, Ministry of Education, Government of India; Santosh Gharpure, *Professor*, IIT Bombay; Shirish Pathare, *Scientific Officer*, HBCSE, TIFR, Mumbai; Sudesh Kumar, *Associate Professor*, DESM, NCERT; Vijay Singh, *Former Professor*, IIT Kanpur, *Former Professor*, HBCSE, TIFR, Mumbai, *Visiting Professor*, Centre for Excellence in Basic Sciences (CEBS), Mumbai; V. P. Arya, *Assistant Professor*, Regional Institute of Education, NCERT, Ajmer.

The Council is thankful to Manoj Nair, *Scientific Officer*, HBCSE, TIFR, Mumbai for making some of the illustrations for Chapter 7 'Temperature and its Measurement.' The Council is also thankful to L. N. Aggarwal, *Former Director*, Geological Survey of India;

R. Shankar, Former *Professor*, Mangalore University; Ravi Korishettar, *Adjunct Professor*, National Institute of Advanced Studies, Bengaluru; Prabhakar Sangurmath, Former *Executive Director*, Hutti Gold Mines Company Limited, Bengaluru for providing some photographs of rocks and minerals for Chapter 11 'Nature's Treasures.' The Council is also thankful to Dorje Angchuk, *Engineer-in-charge*, Indian Astronomical Observatory (IIA), Hanle, Ladakh for providing the photographs and to Pritesh Ranadive, *Scientific Officer*, HBCSE, TIFR, Mumbai for providing some illustrations from Stellarium (a free open-source planetarium) for Chapter 12 'Beyond Earth.'

Acknowledgements are due to Sridhar Srivastava, *Joint Director*, NCERT; Amarendra P. Behera, *Joint Director*, CIET, NCERT; Ranjana Arora, *Professor and Head*, DCS&D, NCERT; Sunita Farkya, *Professor and Head*, DESM, NCERT, New Delhi for providing academic, administrative and technical support.

The Council is thankful to Fanindra Sharma, *Consultant*, Programme Office, NSTC, NCERT, New Delhi; M. Pramod Kumar, *Senior Consultant*, Programme Office, *Assistant Professor*, Amrita Darshanam Centre, Amrita Vishwa Vidyapeetham, Coimbatore; Suparna Diwakar, *Educator and Development Sector Professional and Chief Consultant*, Programme Office, NSTC, NCERT, New Delhi.

The Council acknowledges the efforts of Annu Dahiya, Archana, Neha Dhingra, Manish Joshi, Tanya Kaur, *Senior Research Associates*, Nitika Rani, *Course Administrator*, and Neha Yadav, *Junior Project Fellow*, DESM, NCERT, New Delhi; and the support provided by the APC office and administrative staff of DESM.

Acknowledgements are due to Ankeeta Bezboruah, *Freelance Editor* and Mathew John, Former *Editor*, NCERT, New Delhi, for their valuable assistance in editing the manuscript of this textbook and Ritika Marothia, *Proofreader* (Contractual) for proofreading the textbook. The Council acknowledges the contribution of Pawan Kumar Barriar, *In-charge*, DTP Cell, Publication Division, NCERT; Vipin Kumar Sharma, Manoj Kumar, Shiv Shankar Dubey, and Rajshree Saini, *DTP Operators* (Contractual), Publication Division, NCERT for giving this document a final shape.

CONTENTS

<i>Foreword</i>	<i>iii</i>
<i>About the Book</i>	<i>v</i>
Chapter 1	
The Wonderful World of Science	1
Chapter 2	
Diversity in the Living World	9
Chapter 3	
Mindful Eating: A Path to a Healthy Body	35
Chapter 4	
Exploring Magnets	61
Chapter 5	
Measurement of Length and Motion	79
Chapter 6	
Materials Around Us	101
Chapter 7	
Temperature and its Measurement	123
Chapter 8	
A Journey through States of Water	143
Chapter 9	
Methods of Separation in Everyday Life	163
Chapter 10	
Living Creatures: Exploring their Characteristics	183
Chapter 11	
Nature's Treasures	207
Chapter 12	
Beyond Earth	231



*If you are stressed, anxious, worried,
sad or confused about*



Studies and Exams



Personal Relationships



Career Concerns



Peer Pressure

Seek Support of Counsellors



**Call
8448440632**

**National Toll-free
Counselling Tele-Helpline
8am to 8pm
All days of the week**

MANODARPAN

Psychosocial Support for Mental Health & Well-being of Students
during the COVID-19 Outbreak and beyond
An Initiative by Ministry of Education, Government of India, as part
of Atma Nirbhar Bharat Abhiyan



[www.https://manodarpam.education.gov.in](https://manodarpam.education.gov.in)