Part B

Cross-cutting Themes





This part deals with a selection of critical areas of high priority that cut across all aspects of this NCF. The themes discussed here must be seen as extremely vital and highly pervasive across school education. They are considered here and given a special focus because they do not fall into any one curricular or administrative area simply and neatly. There are six themes chosen for discussion. Each chapter is dedicated to one prominent theme, and it lays out an approach to understanding and principles for execution.

Chapter 1 *on* ***Rootedness in India and Indian Knowledge Systems*** *discusses how character building occurs through the development of values that can be learned from the rich heritage of knowledge that emerged and developed in the country and its relevance to current aims of education. India's ancient wisdom, its unique guru-shishya tradition, the schools and practices of thought in various fields, and its modern thinking find a place in this NCF.* ***Chapter 2*** *on* ***Values and Dispositions*** *foregrounds the importance and the challenge of teaching values and dispositions in schools and shows how it has been pragmatically and creatively approached in the curriculum.* ***Chapter 3*** *on* ***Learning about and Caring for the Environment*** *discusses environmental literacy for students, sustainable practices, positive regard and respect for the natural environment, and other such capacities that will be taught in multiple ways in multiple areas of the curriculum.* ***Chapter 4*** *on* ***Inclusion in Schools*** *lays out the innumerable ways in which this NCF urges the schooling system to encompass the learning needs of students of varied abilities and from varied walks of life ensuring no child gets left behind.* ***Chapter 5*** *on* ***Guidance and Counselling in Schools*** *lays the foundational ideas for setting up support systems within schools that will deal with offering curricular and psycho-social advice, enabling all students to flourish and achieve their fullest potential.* ***Chapter 6*** *on* ***Educational Technology in Schools*** *lays out ways in which Information and Communication Technology (ICT) can enhance educational processes and learning in schools through digital literacy and empowerment.*

Chapter 1

Rootedness in India and Indian Knowledge Systems

India has a rich cultural and ancient civilisational heritage with varied traditions within and across local communities. Contemporary India is equally vibrant, taking its place in the modern world. This vibrant national heritage — and the environment in which we live — influences the way we think, speak, work, eat, wear clothes, interact with nature and with each other, schedule our time, read, write, and learn. Our country is also home to deep knowledge and extensive practice in a variety of disciplines and fields, from Language to Mathematics, Philosophy to Art, grammar to Astronomy, Ecology to Medicine, Architecture to Agriculture, ethics to governance, crafts to technologies, Psychology to Politics, literature to Music, and Economics to Education.

It is therefore important that all curriculum and pedagogy, from the Foundational Stage onwards, is designed to be strongly rooted in the Indian and local context and ethos in terms of culture, traditions, heritage, customs, language, philosophy, geography, ancient and contemporary knowledge, societal and scientific needs, indigenous and traditional ways of learning, etc. — in order to ensure that education is maximally relatable, relevant, interesting, and effective for our students. Stories, art, games, sports, examples, problems, and more, hence, must be chosen as much as possible to be rooted in the Indian and local geographic context. **Ideas, abstractions, and creativity will indeed best flourish amongst our students and teachers when learning is thus rooted**.



Hence, this NCF aims to be strongly rooted in India's context and in Indian thought. This is manifested in the NCF in the following ways:

a. A **holistic vision of education and its aims**, from our ancient heritage to our modern thinkers, informs the overall approach of the NCF.

b. The **vibrant epistemic approach of Indian schools of thought** to knowledge and how we know.

c. The **core of the *guru-shishya* tradition** as a base for the centrality of the Teacher-student relationship for effective learning; correspondingly, the tradition of dialogue and debate as the best way to acquire knowledge and wisdom.

d. The **use of local resources for learning,** including language, practices, experts, histories, environment, and more, as rich sources of illustrations or case studies.

e. The importance of the **involvement of parents and communities** in education.

f. Educational content, such as stories, art, games, sports, examples, and problems, chosen as much as possible to be rooted in the Indian and local geographic context, in order to maximise creativity, comprehension, relatability, relevance, and the flourishing of ideas in the classroom.

g. The rich **history of Indian contributions** to various fields (also referred to as **Indian Knowledge Systems**) incorporated throughout the curriculum, as this not only develops pride and self-confidence, but also enriches learning in those areas. For example, **Mathematics Education** is enriched when students understand the multidisciplinary story of creativity in India in the discovery of the concept of zero, involving philosophy, linguistics, astronomy, and algebra; the approach to **Environmental Education** is deeply enriched by the range of nature-conservation traditions across India; and the approach to **Values and Ethics** is enhanced by its rootedness in Indian concepts and practices, such as respect and compassion for fellow humans and all creatures, embracing of diversity, and the spirit of service/*seva*, cleanliness/*swacchata*.

Section 1.1
NCF Anchored in the Indian Vision of Education

The Indian vision of education has been both broad and deep, including the idea that education must foster both inner and external development. Learning is not merely gathering information, but is about self-discovery and self-development, our relationships with others, being able to discriminate between different forms of knowledge, and being able to fruitfully apply what is learnt for the benefit of the individual and the society.

The rich heritage of ancient and eternal Indian knowledge and thought serves as a guiding light for this NCF. The pursuit of knowledge *(Jnana)*, wisdom *(Prajna)*, and truth *(Satya)* was always considered in Indian thought and philosophy as the highest human goal. The aim of education in ancient India was not just the acquisition of knowledge as preparation for life in this world or life beyond schooling, but for the complete realisation and liberation of the self. The Indian education

system produced great scholars, such as Charaka, Susruta, Aryabhata, Varahamihira, Bhaskaracharya, Brahmagupta, Chanakya, Chakrapani Datta, Madhava, Panini, Patanjali, Nagarjuna, Gautama, Pingala, Sankardev, Maitreyi, Gargi and Thiruvalluvar among numerous others, who made seminal contributions to world knowledge in diverse fields, such as mathematics, astronomy, metallurgy, medical science and surgery, civil engineering, architecture, shipbuilding and navigation, yoga, fine arts, chess, and more. Indian culture and philosophy have had a strong influence on the world.

These rich legacies to world heritage must not only be nurtured and preserved for posterity, but also researched, enhanced, and put to new uses through our education system. Instilling knowledge of India and its varied social, cultural, and technological needs, its inimitable artistic, language, and knowledge traditions, and its strong ethics in India's young people is considered critical for purposes of national pride, self-confidence, self-knowledge, cooperation, and integration.

The traditional Indian system of education, one of the oldest in the world, founded on the Teacher-student interrelationship, fostered holistic development and transmission of knowledge. Debates and discussions were the primary modes of learning and assessment. Teachers were often assisted by their senior students. Older students, more advanced in their learning, often taught younger, newer students. Collaborative and peer learning was encouraged.

Education focussed on the moral, physical, spiritual, and intellectual aspects of life emphasising values such as humility, truthfulness, discipline (and self-discipline, in particular), self-reliance, and respect for all. There was a strong emphasis on appreciating the balance between human beings and nature; it was understood that the individual's well-being is dependent on the well-being of the world around them. Sources of learning were drawn from various disciplines — language and grammar, philosophy, logic, history, architecture, commerce, governance, agriculture, trade, archery. Creative arts developed a sense of aesthetics and sensitiveness to beauty in all aspects of life. Physical Education and Well-being was an important Curricular Area with learning of games, martial skills, and yoga, so as to include the body in a complete education.

Thus, education was seen as the integral growth of *panchakosha* (the five levels or parts of our being), an ancient Indian concept which explains the body-mind complex in human experience and understanding. *(Please see Part A, Chapter 2 for details)*. This is also an eminently pragmatic perspective, achievable and complementary to life — developing good physical health and socio-emotional skills along with developing the ability to think and make ethical and rational choices and decisions in life, must occur in a holistic manner.

During the 19th and 20th centuries, many great modern Indian thinkers and personalities, such as Savitribai and Jyotiba Phule, Rabindranath Tagore, Swami Vivekananda, Mahatma Gandhi, Sri Aurobindo, and Jiddu Krishnamurti, emphasised the need for India to develop her own 'national system of education', with its roots in India's intellectual and artistic heritage, but also integrating the important aspects of contemporary developments, in science and technology in particular (see NCF-FS for more details). Their philosophy of education also underpins this NCF.

Box1.1i

Importance of Yoga

Yoga today is too often understood as a set of practices centred on asanas (postures) and pranayama (discipline or expansion of the breath). But in the ancient Indian conception, yoga (literally, 'union') is vastly more: it refers to any of a number of systems of self-exploration, self-mastery, self-discovery — or indeed discovery of the Self (atman), which is how 'yoga' first appears in the Upanishads.

To reach its ultimate objective, yoga (as in the celebrated Patanjali's Yoga-sutras, a few centuries BCE) first insists on the stilling and detachment of the mind, with asanas and pranayama merely as aids to this discipline. Soon, other major forms of yoga are discussed (as in the Bhagavad-Gita), including jnana yoga or the yoga of self-knowledge, in which meditation usually plays an important part; bhakti yoga or the yoga of devotion and surrender to any form of the Divine; and karma yoga, where action and works are offered as a sacrifice, with no expectation of any fruit (niskama karma or desireless action). Many more paths of yoga have flourished, all of them sharing the same goal. On the way, some of their by-products, as it were, include peace of mind, unshakable calmness, control of emotions and desires, and a sense of focus and fulfilment. Yoga in its many forms has thus transformed the lives of millions, in India and across the world; its profound influence is perceptible in literature, art, and social life. This knowledge system may be said to be one of India's most precious gifts to the world, and this informs the Indian approach to education and learning in very significant ways.

Section 1.2
Approach to Rootedness in India in the NCF

This NCF is anchored in our country's understanding and experience of education and research across disciplines over thousands of years. This includes the full gamut of the country's journey, from the knowledge, wisdom, and traditions of ancient India to the energy, vibrancy, and aspirations of contemporary India. This understanding and experience also includes local knowledge from all parts of the country, including local traditions and understandings from diverse and multiple communities.

The approach to rootedness in India in this NCF involves: (a) the Indian vision of the aims of education; (b) a vibrant epistemic approach; (c) a positive and nurturing Teacher-student relationship; (d) deep engagement of families and communities; (e) judicious use of local resources; (f) curriculum content carefully chosen according to the Indian and local context of the students; and (g) the incorporation of Knowledge of India — including Indian Knowledge Systems — in the curriculum wherever it is relevant, interesting, and beneficial.

1.2.1 Aims of Education

a. The NCF is rooted in the Indian vision of education, which emphasises the holistic development of every child. This includes physical development, socio-emotional development, intellectual development, spiritual growth, and development of values and dispositions.

i. All domains of development are seen as critical and equally important for human development and flourishing.

ii. The design of this NCF reflects the above principle with a range of Curricular Areas being part of school education — Mathematics, Languages, Science, Social Science, Art Education, Vocational Education, Physical Education and Well-being and Interdisciplinary Areas such as Environmental Education and Value Education.

iii. All Curricular Areas are seen as equally important for a child's learning and development — there is no hierarchy across Curricular Areas.

iv. This equal importance is demonstrated by a common rigour in expected Learning Outcomes across Curricular Areas, the choice of content, the pedagogical approaches, the assessment strategies and, perhaps, most importantly, the time allocated to each of these areas in the school day.

b. One of the central aims of the Indian vision of education is character building. The NCF emphasises this through the development of values throughout the school years from early childhood onwards. Values and dispositions are developed through school and classroom culture and practices and through the learning of different subjects in the curriculum.

i. These include values that are an integral part of our tradition (e.g., *seva, ahimsa, nishkam karma*) and values that are part of our modern Constitution (e.g., commitment to equality, to justice, to the protection of the environment).

ii. Along with values, the NCF emphasises developing particular dispositions including a positive work ethic (e.g., being responsible, exerting oneself, pursuing quality and honesty in one's work, having respect towards all manners of work).

This is further discussed in Part B, Chapter 2 on Values and Dispositions.

1.2.2 Vibrant Epistemic Approach

The theory of knowledge, or *pramana-sastra,* is one of the richest areas of classical Indian philosophy, spanning several centuries and rife with the liveliest debates.

Indeed, claims about how we come to know is often the principal criterion that separates different schools or *darsanas* of Indian philosophy. Furthermore, questions about knowledge are almost inextricable from other fundamental questions about the nature of reality (metaphysics) and language.

These debates and approaches express themselves in the current scientific methods and the methods of the various disciplines; their nuances enrich our current thinking on 'how we know,' 'what is it we know,' 'what is true,' 'what is adequate knowledge', and more. Much of this nuance informs the Nature of Knowledge section of Curricular Areas (see Part C, Chapters 2 — 9).

It is important to note that the above methods of India's intellectual tradition involved rigour and logic. To do justice to this tradition of questioning and debate, the NCF insists on the absolute authenticity of all educational material used in imparting rootedness in India, steering clear of the exaggerations and flights of imagination that have plagued numerous popular writings or websites, such as those insisting that ancient Indian savants were masters of aeronautics and nuclear weapons or knew the laws of quantum physics or string theory. Such claims are not only untenable but also end up discrediting and doing a disservice to the glorious and genuine intellectual heritage that Indian students are inheritors of.

1.2.3 Teacher-Student Relationship — Effective Learning

One of the most significant principles of the Indian vision of education is the importance given to the relationship between Teacher and student. Based on this principle, this NCF emphasises a positive and nurturing relationship between Teacher and student that is enriching both for cognitive and socio-emotional-ethical development.

a. This positive relationship is developed mainly through Teachers getting to know each student individually, observing and listening to them carefully, encouraging their questions and responses, and recognising and responding to their thoughts and emotions.

b. Pedagogical approaches and classroom practices may alter as students grow and their ways of learning change, but irrespective of that, they are always based on this bedrock of a positive and nurturing relationship between Teacher and student.

c. In particular, this relationship will be anchored in the value system which the Teacher is expected to embody (see Part B, Chapter 2); this system rests on empathy and patience and promotes self-discipline in the student — a self-discipline of which the Teacher is expected to be an exemplar.

1.2.4 Engagement of Families and Communities

Another important aspect in the NCF is the role of families and communities in a student's overall development and learning. The NCF is clear that Teachers and families should work together to understand each child better and together create a more positive experience for students. When families ask questions of Teachers and clarify doubts in their minds, they learn more about school processes. When Teachers understand a child's home environment, they are able to plan better learning experiences for the student. By sharing and working together, Teachers and families support the child's development across all domains. This kind of involvement helps families support the learning experiences that happen in school through good practices at home as well. Families could also contribute to assessing the child's progress and areas of need. They would also gain further confidence in their own parenting abilities through this process. These measures would help make the time at home and the time at school more synergetic, positive, and productive for the student.

1.2.5 Local Learning Resources

The use of locally rooted resources for learning is not only more cost effective, more eco-friendly, and more supportive of local communities, but it is also more pedagogically effective. It results in curricular content and pedagogy that is more relatable and interesting to the student, which in turn leads to better learning.

Teaching-learning Materials (TLMs) are thus most effective when they are locally sourced. This includes both physical items such as toys, books, games, sports equipment, vocational education equipment, art and craft materials, materials for science experiments, and local plants and flowers, as well as non-physical items such as stories, poems, songs, and festivals. Trips to places such as local parks, monuments, shops, businesses, and education institutions also are considered effective local learning resources at appropriate junctures in the curriculum.

1.2.6 Content Selected from the Indian Context

Learning happens best when it is situated and rooted in the student's context. While contemporary ideas of teaching and learning are an important part of the curriculum framework, it is also extremely important that diverse experiences of children, their families, and their communities find a crucial place in the classroom. Ideas, abstractions, and creativity best flourish when learning is thus rooted.

a. The NCF foregrounds the child's context as critical to learning all through the school years, with particular emphasis in the early years of a child's life in school.

b. Local stories, songs, food, clothes, art, and music are an integral part of the learning experiences of students in school in order to ensure that education is maximally relatable, relevant, interesting and effective for children.

Thus, educational content, such as stories, art, games, sports, examples, and problems, will be chosen, to the extent possible, to be rooted in the Indian and local geographic context, to ensure maximal creativity, comprehension, relatability, relevance, and flourishing of ideas in the classroom.

1.2.7 Integration of Knowledge of India

Building both pride and rootedness in India is a fundamental disposition that is to be developed throughout school education. This happens primarily through building deep familiarity with India's rich heritage, which includes India's contributions to knowledge across all disciplines and fields of study from time immemorial, include some of the significant contemporary achievements. Building pride and rootedness in India is a focus across all Curricular Areas but should be achieved as a natural by-product of exposing the child to this heritage and 'Knowledge of India.'

Knowledge of India will include knowledge, from ancient India and its contributions to modern India and its successes and challenges, and a clear sense of India's future aspirations with regard to education, health, environment, etc. These elements will be incorporated in an accurate and scientific manner throughout the school curriculum wherever relevant.

In particular, ***Indian Knowledge Systems,*** including tribal knowledge and indigenous and traditional ways of learning, will be covered and included in mathematics, astronomy, philosophy, yoga, architecture, medicine, agriculture, engineering, linguistics, literature, sports, games, as well as in governance, polity, and conservation, where it is relevant and enriches learning. Tribal ethno-medicinal practices, forest management, traditional (organic) crop cultivation, natural farming, etc. will also be incorporated wherever possible and relevant. Thus, **Indian Knowledge Systems here refer to all the systematised disciplines of knowledge that were developed to a high degree of sophistication in India, and also all of the traditions and practices, which various communities of India — including tribal communities — have evolved, refined, and preserved over generations.** An engaging course on Indian Knowledge Systems will also be available to students in secondary school as an elective.

School culture and processes also help to strengthen knowledge of and connection to country, such as through everyday practices and activities like the School Assembly and through special events and festivals like Independence Day and Republic Day that reinforce pride in the country and its art and heritage, understanding of our struggle for independence, and the importance of preserving and protecting our independence.

Section 1.3
Some Illustrations across School Stages and Curricular Areas

Learning about India, and thereby developing a pride and rootedness in India, is an integral aspect of this NCF. This is reflected throughout this document — as part of Aims of Education, Knowledge, Capacities, Values and Dispositions to be developed, Learning Standards at every Stage (in Curricular Goals and Competencies across curricular areas), as part of pedagogical processes across Stages, and as a fundamental principle of content selection through the Stages and across Curricular Areas.

Some illustrations are described below :

a. For children at the **Foundational Stage**:

i. One of the Curricular Goals at this Stage is learning the importance of *seva*. This is where children are first introduced to one of the most important Indian values and learn to help those in need — a value that will stay with them for life.

ii. Stories, music, art, games from the Indian and local context and from their families and communities are part of content used for teaching at this Stage. Children also have the opportunity to read and learn appropriate selections from India's great repositories of stories, including fun fables, folk stories, and inspiring tales from the Indian tradition. Stories from the lives of Indian heroes and heroines of history are also seen as an excellent way to inspire and introduce core values in children.

b. At the **Preparatory, Middle,** and **Secondary Stages,** each Curricular Area takes a specific approach to embed rootedness in India based on the nature of the subject:

i. **Art Education** draws from ancient Indian texts such as the *Natyashastra, Abhinaya Darpanam, Shilpashastra, Vastushastra, Chitrasutra,* and *Sangita-Ratnakara*, which have codified and structured the elements, methods, and aesthetic principles of the arts.

Through different Stages, students will develop knowledge of these elements and principles and a vocabulary of the arts used to describe and discuss artwork and their processes, e.g., *sruti, naada, raaga, taala, laya, bhaava, alankaar, nritta, natya, pramaana, saahitya, gamak, meend, rasa*. These concepts are to be introduced in such a manner that the student can experience them and experiment with them.

This will help students understand the unparalleled diversity and multicultural ethos of Indian artistic traditions through a consistent and meaningful engagement with local art, crafts, music, dance, theatre, puppetry, textile art, and so on. It also ensures that students

are exposed to different genres of classical, folk, tribal, and contemporary artistic styles by providing adequate opportunities to view and be inspired by various aesthetic sensibilities and apply their imagination and expression while making their own artwork.

The artistic processes of thinking, making, and appreciating will extend itself beyond the classroom to include the local community of artists, art administrators, and craftspeople, as well as a larger repository of art and culture through monuments, museums, archives, heritage sites, and other relevant cultural institutions and organisations.

At the **Preparatory Stage**, students are expected to observe their local art and culture, and practise basic art forms such as rangoli, and basic crafts such as clay work, pottery (without the wheel), puppetry, folk songs, folk dances, and so on. At the **Middle Stage,** students are expected to learn simple artistic processes that are associated with different art traditions and expand their knowledge of artists and art forms across their state and neighbouring states. They are also expected to draw comparisons regarding the stylistic features and social contexts of various art practices and architectural features of the region.

At the **Secondary Stage**, students are expected to broaden their art exposure to art traditions from different parts of India and analyse the similarities and differences, and the possible causes due to geographical or social contexts. They will also help them to apply this knowledge into their own art practice as they refine their crafting techniques and ideation skills. Class discussions, projects, and activities could include comparisons between different regional styles of music or dance or temple construction, so as to bring out not only their common, pan-Indian features rooted in the classical texts, but also their substantial regional variations. Such exercises will provide opportunities to introduce students to two fundamental principles of India's art traditions, which are (1) faithfulness to classical concepts of aesthetics together with freedom to innovate; (2) free borrowings from folk to classical and vice-versa, resulting in mutual enrichment and endless diversity with an underlying unity.

ii. **Technologies:** As every other major ancient civilisation, India saw great advances in technologies, with some unique developments. Technology, however, cannot be defined here as the 'application of scientific knowledge,' since, more often than not, it precedes science; rather, it should be understood as the ways in which the living environment is altered by human activities and innovations. To drive this point home, it would be useful to first sensitise younger students (ideally through educational videos) to animal technologies, e.g., nest-construction by birds, dam construction by beavers, use of stones or sticks by apes, etc., as an illustration of the richness and complexity of the natural world.

Some of the early technologies in India, roughly in chronological order of appearance, include stone-tool making, hunting-tool making, agriculture (including animal husbandry), pottery, gemmology and bead-making, metallurgy, textile manufacture (including spinning, weaving, and dyeing) and various other crafts, transport technology (from the bullock-cart to transport of heavy loads, sailing, and shipbuilding), water management, construction, town-planning, faience and glass technologies, warfare (including weapon making), writing, cosmetics and perfumes, and more.

Clearly it will not be possible or desirable to impart a detailed knowledge of these technologies to students. An overview with a few selected case studies will suffice. At the **Preparatory** and **Middle Stages**, a purely experiential approach to familiarise the child with a few technologies will work best. Examples could include playing with clay, replicating a water-management system on a small scale (perhaps in a part of the school campus), growing a few small patches of grains or pulses, extracting dye from some flowers and dyeing a white cloth, constructing a corbelled arch and comparing it with a true arch, playing with bricks of different proportions to show the efficacy of the modern (but also Harappan) proportions, constructing a miniature but fully functional bullock-cart, understanding the difference between a river boat and a sea-faring ship (taking as starting points depictions of ships in Indian art, e.g. a painting in the Ajanta caves or a panel at the Sri Alakiyanampirayar temple at Tirukkurungudi), and so on.

At the **Secondary Stage**, more advanced technologies will be brought in, such as metallurgy, with stress on unique achievements such as wootz steel and rust-resistant iron. Their study will be multidisciplinary, since the former will highlight the popularity of this steel all the way to the Mediterranean world, while the latter will lead to a study of the tribal communities that perfected iron-extracting techniques, and their importance in Indian society. Excerpts from relevant texts will be used, again with care to point to their often cross disciplinary nature; for instance, a chapter on preparation of perfumes in Vaharamihira's *Brihat Samhita*, mixing sets of basic ingredients in different proportions, provides a good example of combinatorics. Similarly, texts on shipbuilding connect with overseas trade and India's considerable exports to many regions of the world until the colonial period; a manuscript on the construction of the gigantic Konark temple describes stone-lifting mechanisms which not only can be interesting objects of study, but it also records minute details of the work force engaged in the construction.

In summary, the study of a few early Indian technologies will not be so much about accumulating facts and figures as about understanding Indian society better.

iii. **Science:** The science curriculum will include references to both the everyday use of science in our lives as well as Indian contributions to scientific knowledge, such as those of astronomy mentioned below. While students will learn about the contributions of ancient Indian scientists, they will also engage with the contribution of modern Indian scientists to contemporary scientific knowledge as well as to nation building. This can include inspiring biographical sketches and pioneering discoveries of scientists such as J C Bose, P C Ray, Ramanujan, S N Bose, Meghnad Saha, C V Raman, A K Raychaudhuri, Harish-Chandra, Obaid Siddiqi, Bibha Chowdhuri, G N Ramachandran, Asima Chatterjee, Salim Ali, and many more.

In the **Middle Stage**, students will be introduced to Indian scientific ideas which can be explored through observation in the local community, e.g., students will explore local tools for measuring physical properties of matter, traditional Indian dietary and culinary practices, and diversity of food in India. They will connect concepts such as nutrition, sources of food, and impact of climatic conditions related to diversity of diets in the country. Activities could include cultivating a small plot of medicinal plants, documenting them and their medicinal properties.

At the **Secondary Stage,** students will be introduced to contributions made by ancient as well as contemporary India to scientific knowledge. They will examine the contributions of ancient India to science, indigenous practices related to health and medicinal systems, the basic principles and practices of a system such as Ayurveda, and contemporary Indian contributions to science and technology.

The case of astronomy requires a separate treatment:

iv. **Astronomy:** Although we often hear of developments in 'Mathematics and Astronomy,' Astronomy preceded Mathematics in most early civilisations, India's included. A few thousand years ago, Vedic texts knew about lunar and solar years, equinoxes and solstices, solar eclipses, divided the year into six *ritus* or seasons of two months each, and gave the first list of 27 nakshatras or lunar mansions. Because of the need to keep time for agriculture (the proper time to sow crops and harvest them), for festivals, and for the proper conduct of rituals, calendrical astronomy became very precise in India, with several systems of intercalary months (*adhikamasa*) to compensate for the difference between the lunar and the solar years. Later, huge scales of time were conceived by Jain and other scholars to account for the cycles and duration of the universe. The solar zodiac with its 12 *rashis* was introduced, as well as the seven-day week, among other concepts. During the classical period, sophisticated techniques evolved to calculate the positions at any given time of the sun, the moon, or the five planets visible to the naked eye, and also the occurrences and parameters of solar and lunar eclipses.

    Aryabhata gave a good approximation for the earth's circumference, gave the correct explanations for eclipses, and proposed, among other theories to explain the sun's apparent daily motion, that the earth was a sphere hanging in space, rotating upon itself. Later astronomers refined calculation methods, created highly accurate sine tables, and (as part of the Kerala School of Mathematics and Astronomy) had the planets revolve around the sun rather than around the earth.

    The emphasis here will not be on the technicalities of such concepts, much less the calculations involved (except for a few simple ones), but on the ways in which ancient Indians viewed the cosmos and tried to make sense of it. The insistence on accurate and fast calculations rather than on theoretical models will also be shown to be a distinctly Indian approach to astronomy. A comparison of different regional calendrical systems can also be used to illustrate diversity with an underlying unity.

    A more complete treatment of astronomy is found in Part C, Chapter 4 on Science Education.

v. **Mathematics:** India has a long history of contribution to mathematics in various domains of the discipline, beginning with geometry (for intricate constructions of fire altars, which led to the first general statement, around 800 BCE, of the Baudhayana-Pythagoras theorem) and arithmetic (the basic operations and some early important equations and formulae). In their search for an efficient number system, Indian mathematicians used the zero not just as a placeholder (as the Mesopotamians also did), but eventually as a full-fledged number, which led to the development of the Indian numeral system, the most powerful numeration system in the world which is now used around the globe today and forms the basis for all modern science and technology.

Other major contributions included the discovery of the sine function by Aryabhata (of great application in astronomy and now throughout science), discovery of the negative numbers by Brahmagupta (with the rules for their basic operations), increasingly precise calculations of the decimals of π, with the first exact formula for π given by Madhava as an infinite series, foundational formulae in combinatorics and their interactions with linguistics and poetry, solutions to equations of several types such as single-variable quadratic equations and the Brahmagupta-Pell equation, and (again by Madhava's school), the first expansions of trigonometric functions as infinite series, notions of their differentials, and other foundational elements of calculus.

Mathematics in this NCF makes a deliberate effort to introduce students to some of these major contributions by Indian mathematicians. At the **Preparatory Stage**, students will be introduced to the Indian origin of the Indian numerals and the decimal numeral system in use the world over. Students at the **Middle Stage**, and more so at the **Secondary Stage**, will be able to understand the development of important mathematical ideas over a period and locate the contributions of Indian mathematicians such as Baudhayana, Panini, Pingala, Aryabhata, Bhaskara I, Brahmagupta, Virahanka, Sridhara, Bhaskara II, Madhava, Narayana Pandita, and Ramanujan. At the **Secondary Stage**, students will learn about contributions of Indian mathematicians to advanced mathematical ideas including those in algebra, coordinate geometry, combinatorics, and calculus.

A more complete treatment of Mathematics is found in Part B, Chapter 3 on Mathematics Education.

vi. **Social Science:** One of the key Curricular Goals is for students to appreciate the importance of being an Indian *(Bharatiya)* by understanding India's past and its rich geographical and cultural diversity. Indian contributions to democratic ideas which flourished in ancient, medieval, and the modern periods are also an important part of student learning.

At the **Middle Stage,** students will learn of the historical underpinnings which led to the formation of the modern Indian state and how ideas of peace, ahimsa, and coexistence have been part of Indian culture since ancient times; they will learn about codes of ethics set before rulers and elaborate democratic structures (e.g., assemblies, guilds, panchayats, and sabhas, such as that described in the Uthiramerur inscription) giving the society some freedom to self-organise; they will develop a perception of India as a civilisation rather than as a nation in the current limited sense. At the **Secondary Stage,** students will go into details to understand India's past and appreciate its complexity, diversity, and unity brought about by cultural integration and the sharing of knowledge traditions across geographical and linguistic boundaries.

This is further developed in Part C, Chapter 5 on Social Science Education.

vii. **Languages:** Language education plays a crucial role in keeping students rooted to their country, as it allows individuals to connect with their culture, heritage, and society. Indeed, culture is largely embedded within languages. India is a country with a rich linguistic heritage, comprising scores of languages with a great literary heritage. Learning in the mother tongue or a familiar language at the Foundational Stage will keep students connected to their home and cultural heritage. R1, which is most often the regional language, will help students form a deeper understanding and connect.

Exposure to two other languages (R2 and R3) will help students to become multilingual, appreciate unity in diversity, and thereby help form a national identity.

This language curriculum framework will help individual students connect with their cultural roots and heritage by providing them with a deeper understanding of the language, literature, and cultural practices of their locality and of their country. It will help students appreciate the unity underlying diversity through observing shared concepts, motifs, perspectives, vocabularies, linguistic constructions, and cultural heritage in the country's languages and literatures.

See Part C, Chapter 2 for further elaborations.

viii. **Physical Education and Well-being:** Sports and physical activities are an inseparable part of our culture — they unite us emotionally. India has very rich heritage of games and physical activity that developed across centuries e.g., yoga, wrestling (*mallayuddha, kusti*), malkhamb, handling of weapons such as bows (archery), maces, swords, and sticks, water sports, chariot racing, polo, different forms of martial arts (e.g., *kalarippayattu*), dance forms, hide and seek, and countless other games/physical activities.

Yoga has a special place in our knowledge systems and culture, and its benefits for all-round development are well established. Yoga leads to peace and tranquillity, harmony and health, love and happiness, precision, and efficiency; although its physical aspect *(asanas, pranayama)* is the one most-often taught, its philosophical background, as a tool for self-realisation and self-fulfilment, should not be lost sight of.

The approach in Physical Education and Well-being is to make these Indian games and physical/wellness activities an integral part of the curriculum across Stages.

ix. **Interdisciplinary Areas:** The Interdisciplinary Areas, by their nature, enable an understanding of the social and natural world. This understanding develops the capacity to identify core issues facing our society, and to act towards mitigating them to the extent possible.

An integral part of the Interdisciplinary Areas is Environmental Education. The focus of Environmental Education through school Stages is to develop capacities for understanding the need for and acting to maintain balance and harmony between human society *(Samaj)* and nature *(Prakriti)*. This harmony is rooted in the Indian tradition of viewing human beings and nature as unconditionally interconnected. This tradition also makes no distinction between 'animate' and 'inanimate,' as it sees all elements of nature and the universe as imbued with consciousness. The constant efforts of human beings to preserve the environment, and therefore be preserved by it, are seen as a direct consequence of this worldview. This connect is emphasised not only in historical inscriptions and numerous texts, but also in the Constitution of India, which includes protection and improvement of the natural environment including forests, lakes, rivers, and wildlife, and having compassion for living creatures among the Fundamental Duties.

In the **Foundational** and **Preparatory Stages**, students engage with their immediate social and natural environments and move towards the state, region, and country. Students are exposed to local stories, poems, narratives, folklore, histories, and games. They explore diverse socio-cultural practices, traditions, and festivals within their

community, and connect these to the influence of the natural environment. Activities around plants, observing seasons or the weather can be supplemented by select videos of natural phenomena, wildlife, and more.

In the **Middle** and **Secondary Stages**, through an integrated approach with other disciplines as well as in the form of an essential area of study in Grade 10, students deepen their conceptual knowledge, and are able to use this to acquire an understanding of how Indian cultures and traditions evolved across the country. They also examine the relevance of traditional sustainable practices related to the conservation of resources and agriculture and engage with current efforts in the country towards mitigation of the effects of the triple planetary crisis of climate change, biodiversity loss and pollution.

Along with Environmental Education (Please see Part B, Chapter 3), Interdisciplinary Areas include a course of study on Individuals in Society in Grade 9, which aims to develop the capacity for ethical and moral reasoning among students. This capacity is enabled by the acquisition of traditional Indian as well as Constitutional values through the Foundational, Preparatory, and Middle Stages. Students engage with issues/events that are significant for the country, and also with current affairs that have far-reaching impact within their community and the world. These issues/events cover the sociocultural, political, economic, and environmental domains, and reflect both larger concerns that have persisted over a long period of time (e.g., equitable access to resources, preservation of local art and craft traditions) as well as current concerns (e.g., local elections, schemes for employment generation, ongoing efforts towards mitigation of impact of climate change, encouraging growth of tradition crops such as millets).

This NCF, therefore, aims to be rooted in the immense knowledge, rich culture, and traditions of India. It also ensures that our students build equal familiarity with contemporary India — our immense strengths, our rich diversity — and learn to respond sensitively and effectively to the challenges that we face as our country plays a greater role in the world.

Section 1.4
Course on Indian Knowledge Systems

While the contributions to knowledge are best integrated in the whole schooling as described above, a special, engaging elective on Indian Knowledge Systems should be offered spread across Grades 11 and 12. Creative treatment and coverage of the matter would spark student interest. It could draw from current such courses, for example, a course entitled *Knowledge Traditions and Practices of India* (KTPI), which has been running for over a decade, with the following scheme:

Table 1.4i

Grade 11	Grade 12
Philosophical Systems	Agriculture
Literatures (2 parts)	Architecture (2 parts)
Mathematics	Dance (2 parts)
Astronomy	Education
Chemistry	Ethics
Metallurgy	Martial Arts
Ayurveda (3 parts)	Language
Environmental Conservation	Other Technologies
Music	Painting
Theatre and Drama	Society State and Polity
	Trade

Each module includes a survey of the field, proposed activities and further readings, and a choice of selections from primary texts.

However, for this to happen, some of the modules would now be revised to a slightly more advanced level, since their basics will already have been integrated in earlier classes. This is the case especially of Mathematics, Astronomy, Chemistry, and possibly also Ayurveda, Environmental Conservation and Ethics, among others. The revision of the KTPI modules will be done taking careful note of the levels reached in those fields through the material integrated in the regular subjects and will ensure that students adopting these modules will be taken to a suitably higher level in both concepts and practices, including acquaintance with some primary texts, and will be exposed to a slightly wider range of material in those fields.

It should be emphasised that this elective course would be offered only as a means to deepen the student's knowledge of the above disciplines. With this NCF, by the time students reach Grade 11, the regular curriculum will have ensured that they get exposed to some basic concepts and important practices; from Grade 11 onward, students not adopting this KTPI elective will get more such exposure through the regular curriculum, while those adopting this elective will have an opportunity to pursue those topics further.

Chapter 2

Values and Dispositions

Developing Values and Dispositions is integral to the Aims of Education of this NCF. This is directly informed by the explicit commitment of NEP 2020:

> *The purpose of the education system is to develop good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, scientific temper and creative imagination, with sound ethical moorings and values. It aims at producing engaged, productive, and contributing citizens for building an equitable, inclusive, and plural society as envisaged by our Constitution.*
>
> *[NEP 2020, Principles of this Policy]*

> *Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment.*
>
> *[NEP 2020, Introduction, p. 4]*

> *The education system and its individual institutions must also develop in students ethics and human & Constitutional values like empathy, respect for others, cleanliness, courtesy, democratic spirit, spirit of service, respect for public property, scientific temper, liberty, responsibility, pluralism, equality, and justice*
>
> *[NEP 2020, Principles of this Policy, p.5]*



Students will be taught at a young age the importance of 'doing what's right' and will be given a logical framework for making ethical decisions. In later years, this would then be expanded along themes of cheating, violence, plagiarism, littering, tolerance, equality, empathy, etc., with a view to enabling children to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. As consequences of such basic ethical reasoning, traditional Indian values and all basic human and Constitutional values (such as seva, ahimsa, swachchhata, satya, nishkama karma, shanti, sacrifice, tolerance, diversity, pluralism, righteous conduct, gender sensitivity, respect for elders, respect for all people and their inherent capabilities regardless of background, respect for environment, helpfulness, courtesy, patience, forgiveness, empathy, compassion, patriotism, democratic outlook, integrity, responsibility, justice, liberty, equality, and fraternity) will be developed in all students.

[NEP 2020, 4.28]

Section 2.1
NCF Commitment to Values and Dispositions aligned to NEP 2020

As stated in Part A, Chapter 1 on Aims and Curricular Areas of School Education of this NCF, developing Values and Dispositions is critical to attaining the Aims of Education.

The coherent set of Values and Dispositions to be developed through this NCF are derived from NEP 2020, which, in turn, are informed by India's Constitutional values and broader human values, including those that arise from India's deep cultural heritage, worldview, and elaborate ethical systems.

The process and the content of education across Stages will aim to develop in all students these Values and Dispositions, and the capacities for their practice.

This goal will inform the curriculum, school cultures and practices, as well as the overall culture of the school education system. Some of these values are democratic outlook and commitment to liberty and freedom; striving for equality, justice, and fairness; embracing diversity, plurality, and inclusion while remaining conscious of our underlying unity; humaneness, compassion, empathy, and fraternal spirit; responsibilities that come from freedom and rights; social responsibility and the spirit of *seva* (service); ethics of integrity and honesty; self-discipline; equanimity in the face of success or failure *(nishkama karma)*; scientific temper and commitment to rational and public dialogue; patience and persistence; humility; peace; social action through Constitutional means; respect and care for the environment and nature; sense of aesthetics; respect for India's cultural heritage; unity and integrity of the nation; and a true rootedness and pride in India with a forward-looking spirit to continuously improve as a nation.

See Part A, Chapter 1, and Part D, Chapter 1 for more details.

Section 2.2
Approach to Developing Values and Dispositions in the NCF

While there is an overall consensus that education must develop values, there is equal recognition that developing values has been one of the biggest challenges in formal educational settings.

The approach of this NCF is to aim to develop Values and Dispositions using both direct and indirect methods. In the direct method, there will be classroom activities, discussions, and readings specifically designed to address ethical and moral awareness and reasoning; in addition, a course on 'Moral and Ethical Reasoning' will be introduced for all students in Grade 9. In the indirect method, the contents of Languages, literature, History, and the Social Sciences will incorporate discussions particularly aimed at addressing ethical and moral principles and values such as patriotism, sacrifice, nonviolence, truth, honesty, peace, righteous conduct, forgiveness, tolerance, sympathy, helpfulness, courtesy, cleanliness, equality, and fraternity.

As consequences of basic ethical reasoning, traditional Indian values such as *seva, ahimsa, swacchata, satya, nishkama karma,* tolerance, honesty, hard work, respect for women, respect for elders, respect for all people and their inherent capabilities regardless of background, and respect for the environment will be fostered in students, as these qualities are extremely important for society's and India's progress. Using dustbins, using toilets and leaving toilets clean after use, standing in queues properly and patiently, helping the vulnerable and contributing to philanthropic and community work, being punctual, and always being courteous and helpful to those around you in general even when you do not know them are some of the basic values of social responsibility that will be developed in students early and throughout their school years.

The approach in this NCF for the development of Values and Dispositions has the following key aspects:

a. **Integral part of Learning Standards:** In this NCF, the development of Values and Dispositions is an integral part of the Learning Standards and pedagogical processes across all Stages and Curricular Areas and must reflect in their content, pedagogy, and assessment (e.g., building resilience through learning to win and lose with grace in Physical Education, or building scientific thinking through laboratory experiments and trials in Science).

b. **Development through practice:** Values are best learnt and imbibed, and dispositions are best developed when experienced and seen by students in practice in real life. This NCF lays a lot of emphasis on building, sustaining, and enriching school culture and practices which immerse the students in desirable values. It is the responsibility of the school, from the management and leadership to the Teachers and other school workers, to provide an enabling environment and opportunities and encouragement for practising values and developing dispositions.

c. **School culture is central:** The most important way in which these values are practised and dispositions are developed in school is through the building of a caring, collaborative, and inclusive school and classroom culture and practices. Illustratively, sensitivity and respect for others are encouraged when opportunities are provided for all students to participate in activities and select students do not participate in all activities; regular *bal sabhas* and *bal panchayats* help build notions of democracy, justice, equality, sharing, and fraternity.

d. **Differentiated development across Stages:** The development of Values and Dispositions is influenced by school and classroom culture and processes in a differentiated manner as children grow, and therefore must be planned appropriately at different Stages. Illustratively, at the **Foundational Stage,** the learning of Values and Dispositions are embedded in the selection of content (e.g., choosing stories that emphasise a love of nature) and pedagogy (e.g., encouraging children to play together and learn to share). At the **Preparatory Stage,** there is a clearer emphasis on developing positive habits (e.g., emphasising on completion of given work and putting things back in their place as a part of classroom practice). In the **Middle Stage**, the emphasis on collaborative group work as part of classroom practice helps develop the ability to work in teams. In the Secondary Stage, the emphasis on giving critical feedback on work done would help develop the ability to handle criticism and praise, success, and failure with equanimity.

e. **Differentiated development effects:** It is also important to note that each of these processes helps develop different kinds of values. Some values are developed better through particular processes. Illustratively, regular dialogue and discussion with active listening as part of classroom culture and processes help develop democratic values such as commitment to equality and justice, as well as rational thinking and sensitivity in dealing with fellow humans. Curricular Areas such as Art Education and Physical Education and Well-being help build individual virtues, such as aesthetic sensitivity, patience, endurance, honesty, and courage. Curricular Areas such as Science and Mathematics help build epistemic values, such as scientific temper and mathematical reasoning. Marking important days through community service as part of school culture and practices help build cultural values such as seva, *ahimsa,* and *shanti*. Regular music and dance performances at the school assembly help promote pride in India's rich cultural heritage.

f. **In content:** The content — both, implicit and explicit — will support the development of desired values. All implicit content choices have deep implications for the learning process. For example, diversity in the choices of names of people (e.g., characters in stories or illustrations), vocations, and geographical areas of India used and depicted in textbooks and illustrations that also aim to break gender or other stereotypes, should be given attention throughout.

   Equally, high-quality content explicitly fostering these values should be included. Inspiring lessons from the works of literature and the people of India must be incorporated throughout the curriculum as relevant. India has a long history and tradition of people and stories that beautifully teach or exemplify so many of the above-mentioned core values and socio-emotional capacities. Discussions on the Indian Constitution, the values of Equality, Liberty, and Fraternity that it espouses, and the Fundamental Duties that it enjoins on Indian citizens must be a part of classroom processes. Stories from the lives of great Indian heroes of history are also an excellent way to inspire and introduce core values to students.

g. **Separate subject:** In this NCF, the development of Values and Dispositions is fully integrated into Learning Standards, pedagogical processes, and school and classroom culture and processes. In addition, a course on 'Moral and Ethical Reasoning' will be introduced for all students in Grade 9. In addition to the curriculum for this course, developers or schools (in practice) could consider and rigorously address the following questions and issues:

i. Examine whether there are specific values that need to be addressed in a focussed manner with students and, therefore, require specified time to be set aside. Illustratively, commitment to equality may require an understanding of the idea of equality, its practice, our individual and collective experiences, research from across the world, and its importance for democracy. If so, this could need both separate time and attention, warranting a separate class — perhaps alongside Social Science.

ii. Teachers may need support in developing the capability to handle such specific sessions on the development of Values and Dispositions in a rigorous manner that encourages respectful questioning and discussion.

iii. Teachers and students may need appropriate, rigorous, and interesting material on these matters that incorporates both research and experience.

h. Values in conflict: Another critical issue that schools often face is that the values recognised or encouraged at school may not be seen or practised outside of the school commonly — in fact, they may even be actively discouraged, and the school has very little or no control over what happens in students' lives outside of it. For example, gender equality is taught and encouraged in school but students may sometimes see the opposite within their families or communities.

How does a school handle this conflict in the lives of students presented by the values being aimed at the school versus actual situations in which these values may be violated? This question does not have a simple answer.

Processes of dialogue and empathetic behaviour which demonstrate that conflicts and values are an integral part of human societies and that they need to be resolved through discussion and sustained effort, will have to be built into classroom culture and practice.

This process of reconciliation of values would need some focussed attention. Teachers would need to help students listen and observe carefully, not jump to conclusions, ask questions politely, study the issue, and learn about it in some depth before deciding on a response. It would be critical for Teachers to help students understand why there may be some differences in values at school and in their families or communities, and to support them to choose their responses in a way that allows students to place their views before their families or communities with respect and reason, and without giving up easily in the face of opposition.

A particular kind of conflict or contradiction that must be addressed is an individual's own action that may fall short of the values commitment that they have. Students must learn that such things happen in the natural course of the development of a human being and that the important thing is to learn from such challenging situations and keep improving one's response to it.

i. Assessing the development of Values and Dispositions through observation of behaviour: Developing values and dispositions is a continuous process and is mostly contingent on the environment supporting and encouraging such development. Putting the onus of developing values and dispositions on the student could take away this responsibility from the school and its processes.

However, developing values and dispositions is a critical part of the education process and it is important to understand the development of these just as much as it is important to understand how much Mathematics or Language a student has learnt.

Careful and objective observation would be critical to the assessment of developing values and dispositions.

i. The focus of the assessment must be on the 'behaviour' that demonstrates the value or the disposition. Just like actually adding two numbers demonstrates that a student is able to 'do' addition, illustratively, 'Student A helps other students when there is a problem' is a better way of articulating the learning rather than saying that a student has developed 'empathy' or 'sensitivity.'

ii. The rubrics for this need to be very carefully developed avoiding all biases and ensuring that these can be practically implemented by Teachers.

iii. This should form a part of the periodic learning assessment report.

iv. The rubrics, the report, and everything else associated with this must be constructive and must ensure that it does not have any kind of negative effect on (or negative labelling of) the students or their families.

Some other possible ways of assessment could be through analysis of student reflective diaries or material developed by students, group discussions or presentations on a particular topic, and student participation in community work or school events.

It is important to reiterate that only 'understanding' values and disposition is not enough. Values and dispositions must be part of everyday behaviour to demonstrate that they have been learnt and developed.

j. Values of the Teachers, Principals, and System: In the process of developing values and dispositions in students, the perspectives and capacities of educational functionaries, school Principals and Teachers are equally critical. Their understanding of these values and building them into school culture and practices is what will make this happen. The culture of the education system must support the development of the same values and dispositions that are expected of students.

Section 2.3
Some Illustrations across School Stages and Curricular Areas

Developing values and dispositions is an integral part of this NCF across all School Stages and Curricular Areas. This is reflected in different ways — as part of Learning Standards at every Stage (as reflected in Curricular Goals and Competencies), as part of pedagogical processes across Stages, conceptually integrated into Curricular Areas, and as a separate Curricular Area in the Secondary Stage. It is a critical objective of school and classroom culture and practices.

Some Stage-wise illustrations are suggested below, among countless other possibilities. Teachers will have to judiciously select from the vast material that can be tapped to evoke and inspire values.

See section on Pedagogy for more detail in Part A, Chapter 3, §3.1.2.

a. At the **Preparatory Stage,** values are best learnt through simple stories selected from India's vast repository of stories, such as *Panchatantra, Hitopadesha*, and *Jataka* tales. Storytelling should be followed by discussions ('What is the meaning of friendship in this story?', 'How could the lion and the bull maintain their friendship?'). Among many other possible activities, children can be made to draw scenes from a story, or create a puppet show for it. Apart from children's books with good graphics, well-selected short videos of the stories could also be used.

b. At the **Middle Stage**, more elaborate stories, such as those drawn from Indian Epics and Indian literature from across our languages can be used; popular literature for children, including comics, is a useful source. Many stories of Birbal and Akbar, for instance, illustrate values of justice, compassion, mindfulness, and the capacities of rational thinking, problem solving, scientific temper, and humour. Every story read (or film shown) should be followed by a discussion or class activities, such as staging of the story, role plays, and students imagining multiple alternative scenarios. Life stories of inspiring Indian figures can be introduced, such as Mahatma Gandhi, Babasaheb Ambedkar, Swami Vivekananda, Sri Aurobindo, Guru Nanak, Mahavira Acharya, Gautam Buddha, Dr A P J Abdul Kalam, Shri Rabindranath Tagore, Dr. M. S. Subbulakshmi, Ustad Bismillah Khan, Charaka, Susruta, Aryabhata, Varahamihira, Bhaskaracharya, Brahmagupta, Chanakya, Chakrapani Datta, Madhava, Panini, Patanjali, Nagarjuna, Gautama, Pingala, Srinivasa Ramanujan, Dr. C. V. Raman, Dr. Homi Bhabha, Sankardev, Maitreyi, Gargi, and Tiruvalluvar, among many other Indian greats from all fields and walks of life. Heroes from all over the world in various disciplines can also be discussed to further inspire students, such as Albert Einstein, Martin Luther King, Jr., and Nelson Mandela.

c. In the **Secondary Stage,** the full range of Indian literature can be used for the development of values. Many well-selected *Subhasitas* can also be used in the same manner (e.g., discuss 'One may own a hundred cows, but his need is only one cup of milk; one may own a hundred villages, but his need is only one morsel of food. One may own a hundred-roomed palace, but his need is but one cot. All the rest belongs to others.' Or 'Trees are like good people. While they themselves stand in the scorching sun, they provide shade and fruit for others.) Texts such as Bhartrihari's *Satakatraya* or Tiruvalluvar's *Tirukkural* also offer many thoughtful maxims that can initiate stimulating discussions.

Regional freedom fighters or social reformers can also offer shining examples. Some of our industrialists, businessmen, scientists, and artists of modern times with an altruistic attitude and record, medical and agricultural pioneers, and other inspiring well-known and not-so-well-known people (particularly from local areas) can provide shining examples of values.

Students can be encouraged to find out information on some of these inspiring figures by themselves. For example, a school project could be putting together an anthology of ethical persons who have had an impact on the students' own lives, or a compilation of local freedom fighters, or of unsung heroes who came out to help at the time of calamities and disasters. All of this also lends itself to Stage-wise adaptations.

Besides such material drawn from the vast resources offered by India, students should be exposed, through brief biographical sketches, skits, and/or videos, to some other great figures worldwide (e.g., Martin Luther King, Jr. and Nelson Mandela) who embodied the values of

leadership, dedication, selflessness, altruism, quest for truth, fight for justice, and freedom from oppression. Discussions on growing ethical issues and conflicts in the use of technology (e.g., information technology, genetics, and issues of environmental pollution) also need to be introduced.

In all of the above, two critical approaches should be constantly kept in mind:

a. At every step, care should be taken to lead the student to connect specific values and situations to their immediate environment, or the nation/world at large. This may lead to complex and occasionally delicate discussions, especially in the higher stages, and care should be taken to be non-judgmental and encourage nuanced reasoning in students.

b. Values, as explained above, impact every field of knowledge, from Physical Education to Environmental Education, from Science to Social Science, and from Vocational Education to Art Education. Crosscutting situations should therefore be abundantly used to drive home the point that values are about the whole of life and not a separate isolated subject. Some more discussion regarding this is in Section 3.1.2. This NCF provides many examples of such intersections in chapters on Environmental Education (*see Part B, Chapter 3*), Inclusion (*see Part B, Chapter 4*), Social Science (*see Part C, Chapter 5*), and Physical Education (*see Part C, Chapter 8*), among others. *Chapter 7* in *Part C* on Interdisciplinary Areas also has a useful discussion on this.

2.3.1 School Culture and Practices

Various aspects of school culture and practices can be aimed at developing Values and Dispositions. For example, the daily assembly can allow students to take up different tasks at different times helping them learn responsibility and accountability. Music during the assembly can include songs from the local area as well as from different regions and in different Indian languages. Real stories of courage and resilience and seva can be narrated, preferably by the students themselves. Students can perform skits on various social issues to sensitise others and assembly time also can be devoted to discussing current social and national issues.

Like the daily assembly, mealtime is another daily practice that allows schools to inculcate values of equality, sharing, care, and the importance of health and hygiene. All students sharing and enjoying a meal together will send a strong message to students about non-discrimination. For many students, this could be the one proper meal that they get during the day, so the school's effort in serving a good nutritious meal will demonstrate care and responsibility towards students, teaching them the same. Healthy eating habits and good hygiene standards can also be taught in this process.

Every school must encourage the formation of student committees and forums (*Bal Sabha, Bal Panchayat*, and other student forums) to involve students in school activities and create a sense of ownership and responsibility among them. By participating in activities of different committees, students learn cooperation, teamwork, proactiveness, taking initiative, leadership, and conflict resolution. Some of these committees take care of school-level tasks, such as ensuring cleanliness, managing Mid-day meals, or organising cultural events. Some schools also have committees that work at the community level. Health committees, sports committees, eco clubs, and music clubs can take up activities within the community with guidance from the Teacher. Through these forums, students learn and develop respect for different kinds of work.

When the school reaches out to parents and the community, welcomes them, gives them regular updates, consults them on relevant matters, and tries to use their knowledge and experience, they feel respected. When schools respect parents and the community and invite students to participate in this process, they send a strong message to students that they must do so too. This would improve their relationship with their own parents and their participation in community life.

2.3.2 Pedagogy across Stages

Many values are directly reflected in the way classes are conducted in schools. Student participation and learning must be the focus of classroom activities and events. Opportunities must be provided for all students to participate in activities, and not for select children to end up participating in all activities.

Classroom processes must encourage active learning with an emphasis on dialogue and building relationships based on mutual respect. Students can work individually, in pairs, and groups. They must be encouraged to listen, understand, appreciate, and reflect on their own thought process, and look at others' experiences with empathy and critical understanding. Teachers can participate in discussions as one among the group and facilitate understanding of varied points of view and encourage students to take on varied roles in the group.

Students must be encouraged to develop appropriate work habits and responsibilities. They should organise the space and materials before and after use, persist and complete work, stay on a task even without a Teacher being present, convey doubts, solve problems, and also give space to others to work in silence as per individual needs.

Teachers must ensure that students feel safe enough to take intellectual risks, make mistakes, experiment, and freely express their opinions without the anxiety of being judged, ridiculed, reprimanded, or punished. Confidentiality of sensitive information (regarding a student's background and circumstances) should be maintained. Bullying, harassment, intimidation, and the use of derogatory or demeaning language are calmly but strongly discouraged.

a. At the **Foundational Stage**, the learning expectations of Values and Dispositions are embedded as part of classroom processes, in the selection of content, pedagogical approaches, and assessment tools. Some Competencies lend themselves to values. For example, 'Shows kindness and helpfulness to others (including animals, plants) when they are in need' is a Competency that embodies the value of compassion. Given the developmental stage that children are in, it is well understood that children learn these ideas and their practices best when it is an integral part of the teaching-learning process.

b. **Art Education** across Stages focusses on thinking, making, and appreciation. Students get exposure to artists from their own community as well as those from different parts of India. Knowledge and appreciation of art traditions and unique approaches and artwork help them appreciate the richness and beauty of thought and expression across cultures. This helps them realise that multiple perspectives and interpretations can coexist in their own classroom so the same would hold true for society too.

   The 'making' process lends itself to the inculcation of values. For example, making string puppets and then playing with them to perform a variety of actions to narrate a story requires

practice and hard work, while also being a joyful experience. As students work with a variety of art forms and techniques, they will develop an appreciation for hard work and an understanding of the time, effort, and practice required to achieve quality artwork.

With such experiences, students would develop respect for all kinds of vocations, professions, and work, as well as respect for all people. The value of liberty and freedom is best experienced when students create and express themselves openly through their artwork. A student who may experience shyness, stage fear, or any other kind of discomfort with their own body can express their experiences and challenges during the process of learning Dance and Movement. This develops greater understanding among students and respect for all people regardless of their capacities and background. Such processes also allow all students to feel included as equal contributors in the learning process.

c. **Science** across Stages provides students with opportunities to explore their observations and experiences in the real world. Students must identify and appreciate scientific values (e.g., creativity, objectivity, rational thinking, perseverance, cooperation, scepticism) through 'doing', as well as engaging with specific examples. These examples will be related to the development of scientific laws and theories, and the lives and work of a few scientists in some detail. Students will examine how ideas have changed over time in light of new evidence, leading to an understanding of the tentative nature of science and the role of empiricism in developing scientific knowledge.

   Students must also develop a holistic understanding of Science through seeing its interconnectedness with the real world as well as with other Curricular Areas. While appreciating how science and technology have contributed to human lives, they will also examine their use from the lens of ethics, which may appropriately include discussions on the limits of science and technology when their applications are not governed by appropriate values.

d. **Interdisciplinary Areas** include building sensitivity and care towards the environment and developing the capacity for moral and ethical reasoning.

   Students will be encouraged to explore, appreciate, and develop sensitivity towards their social and natural environment. They will appreciate the need for balance and harmony between human society and nature. They will develop a sense of care not only for themselves, but also for other humans, plants, birds and animals, as well as the rest of the natural environment.

   Students will also develop capacities for ethical and moral reasoning, and active participation as citizens in debate and action. They will develop an understanding of how to respond to issues and events — they will be able to examine them from multiple perspectives, identify ethical and moral questions and dilemmas, and evaluate them for violation of human and Constitutional values as enlisted in NEP 2020. They will be able to take a position and justify it with evidence and rationale. They will also be able to re-examine their positions based on additional information and/or evidence and be able to communicate in a democratic manner.

e. **Physical Education and Well-being** across Stages will help students value physical activity, hygiene, nutrition, and diet for a healthy life. It will also encourage inclusion, cooperation, and responsible behaviour, quick decision making, respect for all players including opponents and fair play, gracious acceptance of both victory and defeat, and commitment, perseverance, and hard work to achieve excellence.

Sports provide opportunities to reflect on personal and team behaviour and help build dispositions helpful for working in teams such as teaching patience, regulating emotions, handling difficult situations, and celebrating others' achievements. Students will also learn to modify a game or create new ones to include those who may have different needs and abilities.

f. **Mathematics** across Stages will develop capacities for logical thinking and reasoning in a rigorous, accurate, objective, and rational manner. Through participation in the discovery of patterns and relationships and the derivation and proof of principles and theorems, they will learn the value of collaboration, creativity, and perseverance when engaging in problem solving. They will also learn the value of communicating their ideas clearly and precisely.

g. **Language** across Stages will help students develop democratic and epistemic values, and dispositions of respect for culture and diversity in society ('cultural literacy'). Learning more than one language will broaden students' horizons and learning another Indian language will enable a deeper connection with the country and develop a sense of pride and belonging to the country.

   Students will be encouraged to think independently, take an interest in books, and read to learn about the world at large. Young learners will develop an attitude of thirsting for knowledge about the world through books. They will also develop the ability to express themselves, fostering independent analysis, organising thinking, and creative expression.

   Through Language education, students will develop deeper capacities for effective communication and will be taught the value of meaningful and effective social and democratic participation. Along with this, students develop the ability to enjoy reading and writing and explore different literary devices and forms of literature in more than one language, thus inculcating respect for other cultures and viewpoints.

   Students will learn an appreciation of aesthetics in different genres, use language to develop reasoning and argumentation and an appreciation for different regional languages to acknowledge, respect, and respond to ideas from across the country.

h. **Social Science** across Stages will focusses on inculcating epistemic values of scientific rigour in the analysis of events, and the interpretation of sources related to different aspects of human life and society. Globally accepted scientific methods of enquiry, such as the evidence-based, empirical, and verifiable approaches to social, historical, and political events ensure the development of this epistemic value.

   Appreciation for Indianness (Bharatiyata) through an understanding of India's rich past (its cultural diversity, heritage, traditions, literature, art, philosophy, and medicine), and learning about the geographical diversity of the Indian subcontinent is an important Curricular Goal. Similarly, understanding the functioning and impact of social and political institutions, and learning about various forms of inequality and discrimination will contribute to social and democratic values of equality, justice, fairness, and inclusion.

   Students will learn the process of development of the Constitution of India, the emergence of the modern Indian state, and the importance of these in the promotion of democratic values, culture, and biodiversity. Understanding the basic contours of the economy and its rapid

development is an essential aspect of the curriculum that contributes to an appreciation of modern India with a forward-looking attitude and desire to continuously improve as a nation.

i. **Vocational Education** helps students learn and respect the value of shrama or physical work, respect for all and their capabilities regardless of background, and respect for the environment.

   Vocational Education will prepare students for meaningful and productive participation in the world of work by learning hands-on abilities and skills (i.e., 'physically doing'), developing equal respect for head-hands-heart, valuing the dignity of labour, and understanding vocational choices for the future.

   Students will develop a broad-based understanding of different forms of work. They will also develop respect for dignity of all labour through the acquisition of values related to work and the workplace. Students will develop persistence and focus, curiosity and creativity, empathy and sensitivity, and collaboration and teamwork. The disposition of working hard with persistence, focus, and attention to detail is an important component of work ethic.

Schools must design and establish cultures and processes to ensure that students develop Values and Dispositions that help them attain the Aims of Education.

2.3.3 Assessment of Values

Assessment of values is necessarily a delicate exercise, since testing values through MCQs, for instance, would be a futile exercise. Values should be assessed in their practice, not as dry knowledge. This section must be read along with Section 2.2 (i) earlier.

Assessment of values must not be for judging the student but must be only a developmental exercise. Any use of such assessment for 'judging' is likely to do deep harm.

Assessment of values in Preparatory and Middle Stages is best carried out internally in the school, through careful and objective observation of each student's participation and behaviour in class discussions and activities. In the Secondary Stage, assessment could additionally include creative short essays in class (e.g., asking for comments on a text) or projects.

In all the above, an excellent practice consists in asking students to evaluate another student's presentation/project/exposition, which provides training in objectivity and impartiality. Self-assessment can also be tried whenever adequate, with guaranteed confidentiality.

At the level of Board examinations, the question needs proper thought and planning and is addressed in *Part A, Chapter 3.*

Since Values and Dispositions will not be acquired if the student fails to perceive the Teacher and the whole school as embodiments of those values, innovative exercises to get the Teacher and the school management assessed by the students could be undertaken (as in higher education, where students' feedback is sought on instructors and courses). This may be done through anonymous questionnaires that will not only ask specific questions and also invite constructive suggestions.

Chapter 3

Learning about and Caring for the Environment

Environmental Education (EE) is a balanced process of developing cognitive understanding, emotional connectedness, and behavioural change towards environmental issues that concern both humans and the natural system. The goal is to enable individuals to find equitable, just, and sustainable solutions that maintain a dynamic equilibrium between human and environmental well-being.

Environmental Education is by nature a cross-disciplinary Curricular Area, as it involves understanding the diverse set of factors — both natural and societal — that can affect this increasingly delicate equilibrium between nature and humans. Environmental Education, therefore, requires a holistic mix of content from the Science as well as the Social Science, including Biology, Chemistry, Physics, Mathematics, Geology, Ecology, History, Economics, Psychology, Sociology, and Anthropology. Additionally, our strong cultural traditions regarding our conception of, and relationship with, nature, and the wealth of practices of environmental conservation that have resulted from this conception, must also find their place in Environmental Education.

The National Education Policy (NEP) 2020 emphasises developing 'among the learners a deep-rooted pride in being Indian … and dispositions that support responsible commitment to human rights, sustainable development and living, and global well-being, thereby reflecting a truly global citizen.' In particular, the Policy makes the topical recommendation of including Environmental Education as a focus subject area, given the perilous state of environmental affairs not just in India, but around the world. The policy further emphasises that:



> *...certain subjects, skills, and capacities should be learned by all students to become good, successful, innovative, adaptable, and productive human beings in today's rapidly changing world ... these skills include: ... environmental awareness including water and resource conservation, sanitation and hygiene.*
>
> *[NEP 2020, 4.23]*

Keeping in the mind this mandate of NEP 2020, the Curriculum Framework for Environmental Education strives to offer a well-researched set of guidelines that will provide strategic direction to the development of the curriculum, as well as tangible means by which these guidelines can be implemented on the ground.

Section 3.1
History of and Rationale for Environmental Education in India

Nature is an integral part of Indian life and traditions — the lives of communities and the environment around them are unconditionally interconnected. This intricate link between nature and society imposes upon us a moral and existential imperative to understand it, stand up for it, and protect it for its and our own survival.

Interventions at all levels are required, but, perhaps, the most foundational and enduring among them is harnessing the power of education to create awareness and develop an empathetic disposition towards the natural system that sustains us all. In fact, the UN's Sustainable Development Goals identify Education for Sustainable Development (ESD) as a key enabler in building a sustainable society that protects life now and in the future. In the Indian context, an awareness of, and sensitivity to, India's local/traditional approaches towards respecting and conserving nature and the environment, and some of the major practices that resulted from these approaches, must be harnessed, and included in any holistic development of ESD.

3.1.1 India and Nature: Concepts and Practices

Extensive literature in India has, from ancient times, emphasised the intimate connection between nature and humanity and the interconnectedness of all creatures. Thus, the *Rigveda*, India's most ancient text, addresses earth and heaven as 'twins' or a single being (*dyavaprithivi*) and compares the universe to a thousand-branched tree (a fine symbol for endless diversity united by one trunk). Similarly, in the *Yajurveda,* another one of the four most ancient Indian texts, the hymns advocate for a peaceful coexistence with every component of nature and ask people to look at one another and all aspects of the natural system through the lens of 'friendship'. The hymns wish for no harm or injury to any of these 'relatives', and their well-being is tied to humans' well-being. Mountains, rivers, forests, trees, animals, and plants are seen as imbued with sacredness and become cosmic symbols of it; thus, the *ashwattha* (peepal) tree, the same tree under which the Buddha will attain enlightenment, is said to symbolise the whole universe. Rivers are mothers (and often goddesses) as they make it easy for us to grow food. The *Tirukkural* declares that 'Sparkling water, open space, hills and forests constitute a fortress' (that is, our

defence and protection), while *Subhasitas* (wise sayings) remind us that 'Trees are like good people. While they themselves stand in the scorching sun, they provide shade and fruit for others.' Countless texts paint pictures of the beauty and generosity of nature, our mother which feeds and nurtures us.

These lofty concepts inspired widespread practices. A whole branch of *Ayurveda*, *Vrikshayurveda*, was dedicated to the treatment of trees and other plants, including crops before and after the sowing of seeds. While some forests were cleared for agriculture, others were protected just as today's wildlife sanctuaries (as prescribed in the *Arthashastra*). Vegetarianism spread, largely promoted by the practice of *ahimsa* or 'non-hurting'. Water management systems, from simple to highly sophisticated ones, took care of the people's needs in different regions with diverse climates. In texts and inscriptions, people were promised *punya* (religious merit) if they dug ponds — the simplest way to recharge the water table. Urban planning took care to include parks; reservoirs were added to temples and monuments across India, fulfilling cultural as well as environmental needs; sacred groves, where hunting and the collection of wood were prohibited, were created in the vicinity of villages in many parts of India. Indeed, many of these traditions survive to these days, though diminished and often endangered.

Owing to their lifestyle in proximity to the natural environment, numerous rural and tribal communities developed a huge corpus of traditional knowledge of medicinal plants, agriculture, water conservation, metallurgy, zoology, survival techniques, and resilience in the face of natural calamities. Indian systems of medicine, agriculture, metallurgy, water management, and more have amply borrowed from this corpus, codifying, and classifying it.

Box 3.1i

The Bishnoi's Sacrifice

In 1730 at Khejadli (Rajasthan): 363 women, children and men laid down their lives to protest cutting of Khejadli trees. Led by Amrita Devi and her three young daughters, they died chanting one of their Guru's teachings: Sar Santey Rookh Rahe To Bhi Sasto Jaan — 'If a tree is saved even at the cost of one's head, it is worth it.'

The Maharaja of Jodhpur apologised and prohibited the cutting of trees and hunting of animals in all Bishnoi villages.



The Khejarli Massacre cenotaph to commemorate the sacrifice of the Bishnois (Wikipedia)

These ancient, tribal, and other local traditions to conserve and live in harmony with our environments have been practised and advocated throughout India for centuries. In more recent times, many poets, novelists, environmental thinkers, and activists, such as Mahatma Gandhi, Rabindranath Tagore, Premchand, Ghanashyam Raturi, and R K Narayan, to name just a few, have stressed this inextricable link between nature and human society.

The Constitution of India also emphasises this connect — one of its Fundamental Duties enjoins citizens to 'protect and improve the natural environment, including forests, lakes, rivers and wildlife and to have compassion for living creatures.'

3.1.2 Today's Context

In more recent times, the pressures of modern life have fractured the bonds between the natural environment and human beings. What was once revered as a mutually sustaining relationship is now steadily falling into an intense competition between two conflicting entities. As India's future generations inherit the challenges of life in the modern era, it is important to pass on this ancient knowledge and reverence, the mandate from our Constitution, and, most importantly, the modern knowledge and tools from the Science and Social Sciences. Ideally, knowledge from ancient times to the modern should converge towards sustainable solutions to the growing environmental challenges.

Environmental Education constitutes an important step in this direction. By incorporating topics from various subject areas, students will learn to appreciate the nuances and complexity of the human-nature equilibrium and the impact and trade-offs of different decisions taken at a societal, or even individual, level. They will develop important skills, such as keen observation, critical thinking, pattern recognition, logical reasoning, and problem solving, all of which are important to finding remedies to the environmental issues we face today to avoid far more serious problems in the future. At the same time, such a cross-disciplinary approach that opens students' eyes to different realities and perspectives will help students be less rigid in their outlook and more compassionate in their attitude towards those around them.

At this time, the world is undoubtedly at a crisis point due to environmental concerns, which include but are not limited to scarcity of water, ground, air and water pollution, waste overload, loss of natural habitats through deforestation, accelerating loss of biodiversity, rising sea levels, and increasingly severe weather due to climate change. It is equally clear that encouraging students to develop sensitivity towards the environment, build an understanding of the environment, and find ways to demonstrate care through action about their environment is a critical responsibility of school education.

As committed to in NEP 2020, developing sensitivity to and care for the environment must thus be a central theme throughout school education in this NCF.

Section 3.2
Aims of Environmental Education

The aims of Environmental Education in the school curriculum are listed below.

a. Create a strong foundation of environmental literacy, which includes understanding the interlinkages between ecological, social, economic, and political factors.

b. Develop a more compassionate attitude towards the natural environment, drawing upon teachings from ancient Indian traditions and practices, the Indian Constitution, as well as scientific research on the effects of modern human activity on the environment.

c. Develop an action-oriented mindset and skillset to promote environmental causes, with a solid understanding of how individual, societal, national, and global actions can help us restore the balance between humans and nature and thereby save our planet and ourselves.

Section 3.3
Approach to Learning about and Caring for the Environment in the NCF

Environmental Education is best imparted through a combination of in-class and experiential learning.

Previous approaches of teaching facts without an opportunity to discuss and debate open-ended questions rendered Environmental Education a perfunctory subject that was only important as far as school assessments were concerned. On the other hand, introducing a more immersive, experiential learning component will ensure that students internalise conceptual knowledge gained in the classroom.

Below are some of the salient features of Environmental Education that will enable learning for children:

a. **Familiar**: Content should be customised to children's surroundings and environment so that it is accessible and familiar to them. Local/regional flavour to the content will also make it easier for educators to include experiential learning elements in the learning process, e.g., 'show and tell' of natural resources found locally, field visits to nearby sites of topical importance, and guest lectures by regional experts on local flora/fauna/ environmental issues.

b. **Cumulative:** Learning must build on the foundations laid in previous classes. Related to this point, content must be appropriately curated for each pedagogical Stage — neither too easy (which makes the subject uninteresting) nor too difficult (which makes it daunting). For instance, teaching a complex concept about ecological communities could be broken up into smaller parts that build up across Stages. In the **Foundational Stage**, the focus could be on plants and animals found in an area. Teachers could use a combination of in-class teaching, field visits, and museum tours to explain this concept to students. In the **Preparatory** and **Middle Stages,** the material can build on what was previously taught and include concepts such as the role of different plants and animals — producers, consumers, scavengers, and decomposers — in the ecological community. As students grow older, their ability for logical and abstract thinking develops as well. In the **Secondary Stage**, the same ecological community concept can be expanded to include more complex components, such as predator-prey relationships, food chains, food webs, and energy transfer. Such a cumulative approach to teaching holds true even for the socio-emotional and behavioural dimensions of learning. In the **Foundational** and **Preparatory Stages**, students can be taught to develop a curiosity and interest towards the environment. By the time they reach the Secondary Stage, their attitudes and behaviours evolve beyond interest to respect and acceptance of different perspectives with a desire to understand the nuances of human-environmental relationships. Students in the Secondary Stage can independently deepen their environmental knowledge, analyse issues across various areas, make informed judgements on statements and debates in media and society, and use a wider range of techniques to investigate, analyse, synthesise, question, critique, and draw their own conclusions. At this Stage, it is best to offer them cases to study, and critique existing policies and practices.

c. **Participative:** Students should be encouraged to engage with the content at an intellectual level through active participation in the classroom (e.g., asking questions, engaging in debates) and also at an experiential level by undertaking hands-on community projects (e.g., participating in environmentally sustainable activities at school, composting, minimising waste and maximising recycling/ upcycling, raising a small plot or bed of medicinal plants, fundraising for important causes, community service in and around the school locality). Students' questions — related to the social and physical environment and of social processes around them (including schools and family) — must be given space. In the classroom, students must be provided opportunities to explore the relationship between questions and responses, rather than limiting to 'yes/no' or fact-based answers. This helps them connect their thinking process with their exploration and findings. This process leads to the development of the ability for critical thinking. Use of different modes and methods that are interactive, observation and dialogues, and the communication of ideas, help students strengthen this ability. It also helps them relate present content to previous knowledge.

d. **Continuous/integrated**: Learning continues beyond the classroom when Teachers lead by example. Learning in Environmental Education in the early years is largely through interaction with adults and peers, in alignment with learning theories of social constructivism. Interaction with adults, peers, and experts forms an important part of learning in Environmental Education. The culture of the school with respect to its surroundings and the environment also has a deep impact on the lifelong attitudes of the members of the school including its students.

e. **Diversified:** Content that spans spatial and temporal breadth will open students' eyes to various perspectives on environmental issues. Also, by making the dissemination of the content more multi-modal in nature, students can engage with the topics/content in a manner that most appeals to them, e.g., documentaries, field trips, guest lectures, class and group projects, essay writing. Depending on each student's bent of mind, different activities will resonate differently. For example, getting students to participate in task-oriented work, such as the creation of simple models and toys may facilitate better conceptual understanding for some students who prefer learning by doing.

Other considerations that must be considered when developing TLMs and pedagogy in Environmental Education:

a. Students are naturally inclined to observe their natural and social environments. They participate in several interactions with nature, living and non-living things, and relationships within families and communities. They experience emotions related to these experiences. Further, personal, and cultural identities are often tied to the local environment. School education must build on this natural ability and interest.

b. Learning about the environment helps students discover its beauty and take pride in, ownership of, and responsibility for its care. This also helps in developing specific values, e.g., dignity of all beings, respect for all living beings, appreciation of diversity, respect for resources and their judicial use, and equitable distribution of available resources.

c. India has a long history and rich traditions of environmentally sustainable practices. It is important for our students to understand this and learn about such practices from different regions of our country. They can also research why the modern context often causes these

practices to be abandoned. (Illustratively, they may research the accumulation of plastic waste in their village or street, and discuss, among themselves as well as with the concerned neighbourhoods, how this could be reduced or eliminated.)

d. As students grow, school education must enable them to be environmentally literate. This includes the students developing environmental values, dispositions, and capacities to investigate the environment and make intelligent, informed decisions about individual and collective solutions to the current problems, and the prevention of new ones.

   An important aspect of environmental literacy is the ability to sift through information, news, views, and opinions to arrive at authentic conclusions. This must lead them to advocate for and participate in necessary action at the level of their local communities, since collective action is a key in mitigating environmental challenges.

e. Students must also develop awareness of and concern for the interdependence between the natural and human-made environments and the economic, socio-cultural, political, historical, ethical, and aesthetic dimensions of human societies. They must appreciate the need for balance between the environment and human society.

f. The knowledge base for Environmental Education comes from both, research, and practice. Environmental Education draws from many different fields, such as Biology, Ecology, Philosophy, Geography, Chemistry, Geology, Physics, Economics, Sociology, Natural Resources, Agriculture, Management, Law, and Politics. Environmental problems must be seen in all their complexity. They involve issues of public health, social justice, behaviour towards nature, science, policy, rights, and ethics. They must, therefore, be examined through the lens of multiple disciplines and perspectives.

g. Pedagogy must use different modes and methods, including observation of nature, interaction and dialogue, completing small projects, reading, and writing. Students' questions and experiences must be given space. Older students should work on specific issues and examine their impact using an interdisciplinary lens. All this will require sufficient time, which is provided for in this NCF.

h. While it is important that students acquire a conceptual understanding of environmental issues and challenges as well as an appreciation of the magnitude of the problem, it is equally important to ensure they do not get discouraged or despair for their future. Indeed, information on the environmental crisis tends to be overwhelming and distressing, at times resulting in depression (now called 'eco-anxiety'); students should be shown how to convert such trends into positive action, in effect turning despair into hope. To do this, the NCF focusses on presenting possibilities and positive examples of actions to contain or reverse environmental damage. At the same time, it is emphasised that the onus for mitigation is not only on individuals, but on communities and nations as well.

Section 3.4
Learning about and Caring for the Environment across School Stages

Learning about and caring for the environment is an integral part of this NCF across all School Stages. This is reflected in different ways — as part of Learning Standards at every Stage (as reflected in Curricular Goals and Competencies), as part of pedagogical processes across Stages, conceptually integrated into Curricular Areas, and as a separate Curricular Area.

a. There are 13 Curricular Goals and 20 Competencies that directly address learning about and caring for the environment in this NCF across curricular areas and School Stages.

b. Having Curricular Goals and Competencies focussed on this area of will ensure that all students attain environmental literacy and sensitivity through school education.

c. Some illustrative Curricular Goals on the environment at the Foundational, Preparatory, and Middle Stages in this NCF are as follows:

   i. Foundational Stage: Children develop a positive regard for the natural environment around them (CG-6)

   ii. Preparatory Stage: Students develop sensitivity towards their social and natural environment (CG-4 — The World Around Us)

   iii. Middle Stage: Understands the spatial distribution of resources (from local to global), their conservation, and the interdependence between natural phenomena and human life (CG-5 — Social Science)

d. At the Secondary Stage, Environmental Education is a subject that all students must study. This has a set of Curricular Goals and Competencies focussed fully on learning about the environment.

Some other key points for each of the Stages follow.

3.4.1 Foundational Stage

a. In the Foundational Stage, Curricular Goals and Competencies are organised around domains of development and not as Curricular Areas. Developing a positive regard for the environment, caring for all life forms, and finding joy in engaging with nature are part of the Learning Standards at this Stage.

b. Spending time in nature is an integral part of pedagogy at this Stage, encouraging children to observe and interact sensitively with plants, animals, insects, and birds.

c. Children listen to stories, poems, and songs that often have elements of the environment (e.g., birds, animals, plants, flowers, mountains, rivers) woven in. Sources of sound around them include the buzzing of bees, the cooing of the *koyal*, or rain on a window. Toys are made from local materials and often take the shape of animals and birds.

3.4.2 Preparatory Stage

a. In the Preparatory Stage, learning about the environment is integrated into The World Around Us, one of the Curricular Areas at this Stage. The focus is to begin with the immediate environment of students and gradually broaden it by the end of the Stage. An interdisciplinary approach enables learning and ensures that students do not receive a fragmented view of the world around them.

b. In this Stage, there are Learning Standards related to observing, understanding, and engaging with nature. Pedagogical processes that emphasise caring for nature (e.g., growing plants, observing animals, using water carefully) are also the focus at this Stage. For students to become environmentally literate, they must learn through 'doing by themselves.'

c. Students also begin to appreciate the interdependence of human society and the natural environment at this Stage. They make connections between cultural practices within the community and the environment, appreciate how natural systems support their lives and those of other living beings, and begin to understand how life changes as the environment changes. They carry out small investigations, surveys, field trips, and observations to understand these connections.

d. Content in this Stage is selected to ensure maximum interaction with the environment, reflecting diversity in geographical features, flora, and fauna. Folklore, folk songs, oral histories, and small case studies connected to the environment continue to be used to develop among students a love for the environment.

3.4.3 Middle Stage

a. In the Middle Stage, concepts related to the environment are integrated into Science and Social Science. This is to ensure that students engage with the basic 'knowledge of the environment' to enable a deeper understanding of ideas around the environment at the next Stage.

b. Learning Standards in Science and Social Science include those on understanding the environment (e.g., Explores the living world around us, and its interaction with the inanimate world in scientific terms; Understands the spatial distribution of resources, their conservation and the interdependence between natural phenomena and human life).

c. Content and pedagogical processes continue to emphasise sensitivity to and care for the environment. Students engage with the environment through as much direct engagement as possible in Science, examining diversity of living beings — both those that are in their surroundings as well as those at a smaller scale — and how they interact with their environment. They examine the conditions necessary for sustaining life. In Social Science, students examine the spatial distribution of resources, and disparity in availability for people from different sections of society. They illustrate attempts at conservation, restoration, and regeneration — and advocate the critical importance of these efforts.

3.4.4 Secondary Stage

a. In the Secondary Stage, Environmental Education is part of Interdisciplinary Areas, a separate Curricular Area at this Stage, offered in Grade 10. Students will focus on developing a holistic understanding of key concerns and issues related to the environment, drawing upon their understanding across other Curricular Areas.

b. In this Stage, students can independently deepen their environmental knowledge, assess issues, and analyse their causes, make informed judgements on statements and debates in the media and in society, and use a range of techniques developed in earlier grades to investigate, analyse, synthesise, question, critique, and draw their own conclusions. They can use multiple perspectives to develop an integrated understanding, and advocate actions for certain environmental phenomena.

c. The capacities mentioned in the preceding point are developed through Individuals in Society, offered in Grade 9. This course aims to develop capacity for ethical and moral capacities with a specific focus on the environment, among other domains. Students systematically examine issues/events related to the environment to identify key ethical and moral questions and then present an informed position for specific actions.

d. Students will view Environmental Education from the perspective of a social-ecological perspectives, as opposed to a perspective informed primarily by either Science or Social Science. The social-ecological perspective emphasises interdisciplinarity, integrating conceptual frameworks and methods from the Natural and Social Science for a holistic understanding of interlinkages between society and the environment. Central to the idea of the social-ecological framework are ideas of equity, environmental justice, and human well-being — all fundamental to the development of sustainable societies.

e. In this Stage, Environmental Education will also encourage students to develop knowledge about traditional practices across communities for prevention of environmental degradation, issues related to the survival of animal species, and sustainable use of resources, such as forests and rivers.

Across School Stages, students' continuous engagement with and care for their environment is emphasised. From a direct engagement with nature in earlier Stages, students move towards deepening their environmental knowledge, assessing issues, showing initiative, creativity, perseverance, and problem-solving skills for environmental action.

Environmental values include, but are not limited to, aesthetic appreciation of beauty and sensitivity — they also include the ability and motivation to identify and raise questions related to the environment. Therefore, these values related to the environment have to be demonstrated by adults in the school so that students develop them as well.

This NCF progressively builds capacities, values, and dispositions for learning about and caring for the environment in students across the School Stages.

Chapter 4

Inclusion in Schools

Inclusive and equitable education — while an essential goal in its own right — is also critical to achieving an inclusive and equitable society in which every citizen has the opportunity to dream, learn, thrive, and contribute. NEP 2020 aims to create an education system where all of India's children get equal opportunity to learn and excel, regardless of circumstances of birth or background.

Existing inequalities create several roadblocks in the process of achieving inclusive and equitable education across all Stages. Studies show that a large percentage of students who either drop out of school or discontinue their education after school belong to Socio-Economically Disadvantaged Groups (SEDGs). Many among these groups who manage to continue their education struggle to achieve appropriate Learning Outcomes due to a lack of adequate support, nutrition, access to learning resources, or various sorts of social and/or economic distress.

The commitment to inclusive education is an integral and important part of the design of this NCF. Schools must ensure that every student gets full opportunity and access to learn and experience a sense of belonging. To ensure this, schools and the overall education system must take many actions. The curriculum must be truly equitable and inclusive in practice for all students.



Education is the single greatest tool for achieving social justice and equality. Inclusive and equitable education — while indeed an essential goal in its own right — is also critical to achieving an inclusive and equitable society in which every citizen has the opportunity to dream, thrive, and contribute to the nation. The education system must aim to benefit India's children so that no child loses any opportunity to learn and excel because of circumstances of birth or background. This Policy reaffirms that bridging the social category gaps in access, participation, and learning outcomes in school education.

[NEP 2020, 6.1]

This Chapter outlines the basic principles of inclusion and illustrates some practices of inclusion that is appropriate in schools. This is followed by a Section on practices appropriate for students with disabilities and another Section for students with special talents.

Section 4.1
Principles of Inclusion

The practices for inclusion in school education is driven by some fundamental principles. These are articulated below.

a. All education begins with the foundational principle that every child is capable of learning. Children learn best when they are respected, valued, and involved in the learning process.

b. Student success and failure are often determined by the nature of school culture and the learning environment.

c. Inclusion is an integral part of school culture that manifests in the relationships in school, organising of school processes, accessibility of resources, and fundamentals of classroom pedagogy and assessment. The School Principal is critical for setting the vision and culture, and ensuring its translation into practice.

d. There should be equitable and non-discriminatory access to, both physical and curricular resources. Schools must make necessary infrastructure and learning resources available to help every student learn better, and this can happen with appropriate provisioning at the school level. For example, TLMs have to be reviewed for biases against any category of people or culture, and different aids for learning for students with visual, speech, or hearing impairment must be procured. Physical spaces too would require assessing with these disabilities in mind.

e. Schools should develop safe environments with credible mechanisms to ensure there is no discrimination, harassment, or bullying. Classrooms must be safe spaces for students to ask questions, make mistakes, and try out ideas.

f. Having adequate number of Teachers is necessary but not sufficient. Teachers need to be able to respond to the context such that principles of equity and inclusiveness are of the highest priority — this should be a fundamental ingredient of teacher professional development.

g. All members of the school will need to be sensitised to the requirements of all students, the notions of inclusion and equity, and the respect and dignity of all persons. Aspects of the curriculum that emphasise equity and inclusion and the values that underlie this must be significantly strengthened.

h. Schools must engage with the local communities around them. An educational institution cannot meaningfully engage in its educational endeavour while being insulated from the communities around it.

i. This NCF is in consonance with the provisions of the Rights of Persons with Disabilities (RPWD) Act 2016 and endorses all its recommendations regarding school education. The Act clearly states that children with disabilities shall enjoy their rights equally with others.

j. These principles of inclusion are equally applicable for any and all students whose differences may require specific attention. While the sections below detail measures for students with disability and those with special talents, the principles must also be practised in schools and school systems for any other form of difference, for example, transgender students, temporary migrants, physical differences, amongst others.

Section 4.2
Illustrations of Inclusive Practices across Stages

This Section gives illustrations of appropriate practices based on the principles of inclusion stated in the previous section. Illustrations of inclusion are categorised in terms of physical infrastructure provision, language usage, safety measures adopted, use of curricular content, and inclusive pedagogy.

a. Physical access

i. There is barrier-free access into and inside the school for all.

ii. Toilets are well maintained, functional, safe, and suitable for all including people with disabilities, and there are separate toilets for boys and girls.

iii. Common spaces and common property on the school campus meant for students and Teachers are equally accessible to all students and Teachers without discrimination (e.g., furniture, stationery, plates used for meals, glasses used for drinking water).

b. Language

i. There is extensive use of home language/familiar language in the classroom and in curricular material, especially at the Foundational and Preparatory Stages.

ii. All languages, including regional variations in accents and vocabulary, are given equal dignity and status.

iii. Indian Sign Language is used wherever necessary.

c. Safety

i. Students feel safe enough to take intellectual risks, make mistakes, experiment, and freely express their opinions without the anxiety of being ridiculed, reprimanded, or punished.

ii. Inequity on the basis of caste, gender, religion, socio-economic conditions, physical characteristics, or performance of students is not tolerated and actively discouraged.

iii. Bullying, harassing, intimidating, and use of derogatory or demeaning language with or by students is not tolerated.

iv. Threats or physical punishments are never used.

v. Confidentiality of sensitive information (regarding a student's background and circumstances) is maintained.

d. Curricular Material

i. All backgrounds, genders, and abilities are represented in a manner that upholds their dignity and empowers them.

ii. Special care is taken to avoid promotion of stereotypes.

iii. Experiences from the lives of all people and children from SEDGs are represented. NEP also recommends that curriculums should be free of all forms of bias and stereotypes and 'more material will be included that is relevant and relatable to all communities.'

iv. Images and illustrations also reiterate inclusion.

e. Pedagogy

i. Classroom processes are flexible and inclusive, and reflective of diverse needs.

ii. School timetable/calendar is adjusted to suit the needs of students and the local community.

iii. There is heterogeneity in seating arrangement and fixed seating arrangements on the lines of background, gender, abilities, or performance are discouraged.

iv. Assessments use multiple modes to ensure that all students can meaningfully demonstrate their learning.

Section 4.3
Inclusive Practices for Students with Disabilities

To be truly inclusive, all schools must be prepared to give meaningful and effective educational opportunities for students with disabilities.

a. The RPWD Act 2016 defines inclusive education as a 'system of education wherein students with and without disabilities learn together and the system of teaching and learning is suitably adapted to meet the learning needs of different types of students with disabilities.'

b. Physical access for all students with disabilities is enabled through barrier-free structures as per the RPWD Act. Adequate attention must be paid to the safety and security of children with disabilities.

c. Early identification and early intervention for children with developmental delays, disabilities, and children at risk is a strong focus at the Foundational and Preparatory Stages.

d. Curricular and pedagogical accommodations:

The idea of accommodations is different from modifications. While modification is about altering or changing the difficulty levels of the content or the expectations of learning of the student, accommodation is about making changes to assist a student to work with the conditions of disability *and* be able to demonstrate their learning achievement on the same standards. With accommodations, neither what is being taught changes nor does the grading criteria for students with disabilities.

i. Illustrative content accommodations: Use of bigger fonts of the printed material with adequate spacing, sharing printouts of summarised notes of the class, using assistive technologies (e.g., text-to-speech read aloud, speech-to-text software), repeated and reinforced ideas and concepts in the TLM are important support mechanisms.

ii. Illustrative pedagogical accommodations: Teaching strategies will require a Universal Design in their planning and structure for equitable access. This is an important accommodation that will help meet learning challenges that students face. Allowing students to use word processors with/without spellcheck (through the use of assistive devices to practise spelling, grammar, and computing), creating a system of peer support, and organising special educator support in the classroom whenever necessary would make for an inclusive pedagogy.

iii. Illustrative assessment accommodations: This typically involves changing or reorganising the order of tasks or questions for assessment, making assessment question papers or worksheets with large font print for ease of reading, allowing extended time for completion, organising for a scribe/writer or reading assistant, allowing the use of word processing software on a computer, organising a distraction-free room, allowing for the use of a calculator or a tablet, permitting more frequent breaks in the course of the assessment, and providing alternative furniture.

iv. Assistive devices and appropriate technology-based tools, as well as adequate and language-appropriate TLMs (e.g., textbooks in accessible formats, such as in large print or Braille) are made available. This applies to all school activities, including art, sports, and Vocational Education. More details on aspects of using technology for students with disability is addressed in Part B, Chapter 6 on Educational Technology in Schools.

The core intention of accommodations is to ensure equity in learning opportunities in the classroom. This means enabling equal access for all students. It also means effectively assisting learning for students with specific learning needs because of disabilities of any kind that they may have.

Section 4.4
Inclusive Practices for Students with Special Talents

There are innate talents in every student, which must be discovered, nurtured, fostered, and developed. These talents may express themselves in the form of varying interests, dispositions, and capacities. Those students that show particularly strong interests and capacities in a given realm must be encouraged to pursue that realm beyond the general school curriculum. Teacher education will include methods for the recognition and fostering of such student talents and interests. The NCERT and NCTE will develop guidelines for the education of gifted children. B.Ed. programmes may also allow a specialisation in the education of gifted children.

[NEP 2020, 4.43]

The commitment to inclusion in schools also implies accounting for the educational needs of students with special talents. Identifying students with special talents is often easier when they excel in their academic performance in some subjects in the classroom than those who excel across the spectrum of Curricular Areas.

Special talents can independently exist in intellectual, creative, social, musical, and psychomotor domains. Care must be taken to identify special talents in students in all areas of the curriculum and to plan for enriching their learning in depth and breadth. This will ensure these students do not get frustrated and lost in the class, and that their enthusiasm and motivation to learn are maintained.

Some key considerations for the inclusion of students with special talents are as follows.

a. **Special attention and special support:** Contrary to popular belief, students with special talents may need special attention and support with their school learning experience and cannot be left to their own devices. This may include using richer reading material, as well as assigning more challenging exercises.

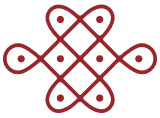
b. **Inclusion of students from across the socio-economic spectrum:** Students with special talents who come from economically-advantaged backgrounds tend to get better overall support than students from economically-disadvantaged backgrounds. Schools need to ensure equal opportunities for all students in this realm.

c. **Differences in behavioural traits:** These students are often reported to have certain social/emotional traits in common, including heightened sensitivity, emotional intensity and reactivity, perfectionism, and uneven development of intellectual and emotional capacities. Teachers and parents/families need adequate orientation to understand and deal with these needs.

d. **Rethinking pedagogy:** Teaching strategies/practices require review and redesign based on the degree and kind of special talents students display across the Stages.

e. **Supportive and democratic school culture:** Peers and other adults in the school must also be oriented to support these students which requires the development of a school culture that values special talents while acknowledging other students' talents as well. Schools must guard against giving undue attention to students with special talents at the cost of others.

As stated in NEP 2020, a good educational institution is one where every student feels welcomed and cared for, a safe and stimulating learning environment exists, a wide range of learning experiences are offered, and good physical infrastructure and appropriate resources conducive to learning are available to all students. The fundamental principle that guides good education is that all children are capable of learning. Thus, equity and inclusion are the cornerstones of our education system.



Chapter 5

Guidance and Counselling in Schools

One of the key principles of good education also stated clearly in NEP 2020 is that care is central to learning.

Care is demonstrated by detailed attention to the content, pedagogy, structure, and processes used in teaching and learning. It is visible in the way Teachers and students interact with and amongst each other, the way tasks are constructed and organised, the physical accessibility of learning resources, the organisation of the timetable, the distribution of responsibilities, and the participation of students in a host of arrangements and actions that schools undertake for student learning.

In addition, individual students or cohorts of students may have particular needs which the school may meet through a system of Guidance and Counselling provided by the school.



Section 5.1
Defining Guidance and Counselling

Guidance can be broadly defined as the process of assisting individuals to enable themselves. It is a supportive engagement that enables a person to find direction for making their own decisions and take actions — all with the objective of moving towards personal well-being and useful social participation. Often, it involves a trustful relationship where the person guiding is in some position of trustworthiness, seniority, or authority or is deemed insightful or knowledgeable.

Counselling as a process involves an individual consulting another for advice. Much like the process of guidance, it involves helping individuals understand and act upon their attitudes and decisions. Except that, here, this change-seeking aspect takes a more central feature and often requires a skilful (and well-trained) individual to engage and challenge individual patterns of belief and behaviour.

In the school environment, Guidance and Counselling can be seen as paired activities and not separate ones. Here, it refers to the process of supporting the learning and maturation of students and not as a standalone or a separate part of the school curriculum. It must be seen as complementary to the overall curriculum. Another important point to note is that the school curriculum is almost wholly designed for student groups. The pointed focus of Guidance and Counselling is on an individual student's needs of learning, health, and well-being.

Having a system of Guidance and Counselling would also help Teachers, parents, and administrators meet the academic and psycho-social well-being needs of different students, e.g., difficulties in learning, career and higher education choices, maturation-related issues (adolescence, autonomy, social cohesion), and mental health and well-being.

Section 5.2
Approach to Guidance and Counselling in Schools

In schools, Guidance and Counselling can be seen as supporting the attainment of educational aims. It contributes to creating an ethos of overall well-being, teaching individuals an ethic of care and mutual respect.

The scope of Guidance and Counselling support in schools may be seen as follows:

a. **Health and well-being for members of the school community:** Providing basic Guidance and Counselling to students, parents, and administrators in the context of the school community in the following areas:

    i. Physical health and wellness: This is one of the most crucial needs of growing up that requires careful addressing by schools. Designing programmes that contribute to good health and physical fitness for all students across the Stages of their school life is a central goal.

ii. Psychological health and wellness: With a primary focus on students, Guidance and Counselling work must teach strategies for emotional regulation and positive motivation. While mild to moderate challenges with mental health can receive counselling support within the school, it would be necessary to direct students and families to more qualified professionals outside the school system for clinical diagnosis and support.

iii. Social participation and cohesion: This would involve teaching strategies for healthy adherence to social norms, expectations, and valuable social participation in the school. Schools would need to be equipped to meet the challenges of resistance, aggression, isolation, and bullying.

iv. Cognitive health and growth: Identifying students who are struggling to meet cognitive developmental milestones, advising their parents with supportive strategies, and planning for additional teaching support.

v. Learning needs and diversity: Identifying challenges of attention and learning, attending to challenges that arise from any disability in students, and creating Individualised Education Plans (IEPs).

b. Academic and Career counselling: Helping students make choices across Stages of their school life whenever newer Curricular Areas are introduced and also helping with making decisions about academic and career choices after the Secondary Stage.

c. Providing support for administrative and systemic improvements: Individuals involved in Guidance and Counselling support must also be consulted while making decisions about the school's functioning, policies, programmes, and activities. Enabling systemic improvements in schools such that these are cognizant of the diversity of learning needs and support required by all members of the school.

Section 5.3
Who Can Guide and Counsel in School

In formal and informal ways, School Teachers and School Principals have long been naturally vested with the responsibility of guiding and counselling students and families. These members of the school community are best placed to do this because of their continuous contact and connection with students.

Considering the ground realities of a vast majority of schools across the country, it is important and reasonable to acknowledge that school systems will have their limitations in addressing many challenges that come up concerning Guidance and Counselling. A successful plan for such support would require an understanding of what kinds of challenges Teachers and Principals can manage to address and the kinds of events or issues they cannot manage themselves but must direct to professionals outside the ambit of the school.

While Teachers and Principals will continue playing the role of guides and counsellors and should get basic capacity building in this regard so that they have the required skills and capacities, a professional/specialist at the cluster or school complex level must be appointed as soon as possible, as suggested by NEP 2020. Schools that have the resources and access to professionals can simply take the lead and follow what NEP 2020 suggests.

Section 5.4
Expected Outcomes of Quality Guidance and Counselling

A good quality Guidance and Counselling support process in schools over time will ensure that the following outcomes are achieved.

a. Students are physically and mentally healthy as individuals and comfortably practise positive learning habits.

b. Students are retained in school and the number of school dropouts in all Stages of schooling is lowered significantly.

c. Students with diverse learning needs find equitable opportunities for support and growth.

d. Individual students are able to make good subject, vocational, and career choices based on the advice they receive during Guidance and Counselling.

e. Teachers and parents are able to meaningfully communicate and support student learning.

f. Administrative policies and practices keep students' achievement of Knowledge, Capacities, and Values and Dispositions at the heart of all decision-making processes.

g. The school environment is experienced as safe, and all members of the school are protected.

h. The school environment is seen as a space that allows for creative expression.

i. The school year is well-planned and designed with good-quality learning processes that demand rigour and discipline in students.

j. The school receives adequate support and respect from the local community.

Guidance and Counselling in school help students recognise and understand their own abilities, enhance their coping skills, promote better decision making, improve their relationships, and help them become self-directed in adapting to life and its challenges.

Chapter 6

Educational Technology in Schools

Technology is a broad term used for all types of tools, methods, and processes created by human beings to improve their lives. In this Chapter, the reference is specific to Information and Communication Technology (ICT). Information and Communication Technology (ICT) is a wider term and encompasses in it 'Technology of Education' and 'Technology in Education'. Whereas the first term talks about human touch and human role, the second one talks about technology (machines, engineering, and industry) in the field of education which is popularly known as ICT. It includes a wide range of software and hardware tools and technologies, including devices such as computers and mobile phones, networks such as the Internet, and software applications. These technologies enable us to store, process, and access information in digital form. This information can be stored in both textual and audio-visual forms. These technologies have also enabled us to communicate information with each other effectively, efficiently, at scale, and at great distances. In the past few decades, ICT has transformed the way in which humanity engages with information.



While education will play a critical role in this transformation (India's transformation into a digitally empowered society and knowledge economy), technology itself will play an important role in the improvement of educational processes and outcomes; thus, the relationship between technology and education at all levels is bi-directional.

[NEP 2020, 23.1]

In this chapter, we will explore the potential of ICT in school education, the possibilities of its use, the precautions of use and abuse, and finally the principles of use of ICT in school contexts.

Section 6.1
Context of ICT in India

India is rapidly becoming a society where technology is part of everyday life. People use ICT for daily transactions such as payments, shopping, and communication. Farmers use technology to learn and make decisions on farming practices. Various services such as finding work or finding a marriage partner are also offered through ICT.

Digital platforms are being used to learn new skills and hobbies and even to clarify doubts. There is increasing use of technology in various shapes and forms by both children and adults alike. Technology tools evolve and will continue to do so, it grows integral to life, social interactions and transactions, communication, and livelihood. The adoption of technology is a bottom-up process — people adopt the tools that benefit them and will use technology if it serves their needs and matches their purpose.

The relationship between education and technology is 'bi-directional' in the sense that many innovations in the Information and Communications Technology (ICT) world have found effective application in education and are making large differences. Similarly, education develops the capacities amongst our young that drives India's vibrant technology sector.

Technology evolves and changes every generation, as it has been witnessed with radio, television, computers, internet, mobile devices, and, more recently, Artificial Intelligence (AI) including generative AI. Introduction of technology by itself does not radically improve school education, unless it complements, supplements, and fundamentally supports the growth and learning of the Teacher and students.

It is abundantly clear that no technology can fix fundamental problems of resource provision, Teachers' capacities and motivation, and students' readiness for schooling. The centrality of the presence of a motivated and capable Teacher in every classroom in achieving educational goals needs continued emphasis. However, with the availability and appropriate use of these technologies, the effectiveness of Teachers and the experience of learners can be enhanced. Technology can be a significant enabler of improvement on multiple dimensions of the education system.

Box 6.1i

Key Highlights of Recent Digital Education Initiatives

School closure due to the COVID-19 pandemic affected an estimated 286 million children (aged 3-18 years) in India. During closure of educational institutions, 'continuity of learning' was a key challenge, and now post-pandemic, the need to respond to 'learning loss' is the key challenge.

There were several ICT-based responses across the country. The key enablers that emerged for ubiquitous access across the country were Direct to Home (DTH) channels such as PMeVidya DTH TV channel, Swayam Prabha DTH Channel, Radio, Community Radio stations, Podcasts, and tele-classes on local TV channels and podcasts. Almost every State/UT has shared experience of using these media during the pandemic.

Data-led decision making has been a key possibility at State level using data analytics through Control and Command Centre (CCC) for education for tracking and monitoring of learning and administrative tasks. The learnings are being tracked with a view to identify the gaps in Learning Outcomes (LOs) at the level of schools so that suitable remedial action can be taken. This initiative accrues benefits to all stakeholders from different perspectives — administrators, Teachers, students, and parents.

For e-content, DIKSHA provides video lessons, worksheets, assignments and e-Textbooks for school curriculum across Boards and in multiple languages. States/UTs took initiatives to make learning content accessible through YouTube Channels of SCERTs and toll-free call centres for students to clear their doubts in critical topics.

Several States distributed Tablets/Laptops/Smartphones to Teachers and students with preloaded content.

To enhance the teaching versatility and smooth visualisation of lesson content, a CRT TV is being converted into a Smart class with lesson plans, teaching videos, assessments, and fun zones to make teaching easy and learning easier.

None of this takes away from the fact that inequitable access to technology is a real challenge, — the digital divide is real. Not everyone can have access to the same technology. For instance, India has users of smartphones and feature phones, as well as people who have no access to phones. When we are thinking of solutions and scale solutions in a digital world, this fact cannot be ignored.

Technology tools are 'good slaves,' but 'bad taskmasters' — a balanced approach to the selection and use of tools needs to be taken, including respecting the digital rights of children. As we move towards becoming a more digitised society, data of individual actions, choices, and behaviours are generated and also perhaps more accessible. This data, when used to serve the user, is a convenience, but the same data can make the individual vulnerable. Technology tools need to be used with caution, especially around data in an increasingly digital society and inappropriate usage in the teaching-learning processes.

6.1.1 Evolving and Emerging Technology

6.1.1.1 Artificial Intelligence, Machine Learning, Augmented Reality, Virtual Reality

The emergence of technologies such as Artificial Intelligence, Machine Learning, as well as big data analytics and visualisation will definitely find innovative applications in the education domain. There are enormous possibilities to use emerging technologies such as Artificial Intelligence, Machine Learning and Data Science, as well as immersive (AR/ VR/ virtual labs), interactive, and gamified contents to improve the teaching-learning and assessment processes, supporting Teacher preparation and professional development, enhancing educational access, and streamlining educational planning, management, and administration. For this, an ecosystem of digital education needs to be created where Teachers, students, parents, as well as administrators are well oriented about the appropriate use of technology while taking necessary safety and security measures.

These technologies being used and implemented without discerning their impact is a danger of adding to the digital divide. However, their potential to be used to enhance and support the capabilities of Teachers and students should not be ignored. Teachers and students as users/ contributors/beneficiaries of these technologies must be made aware of the inherent function of such technologies. At national, State, and school level, students must be made aware of these technologies, their role, and how to discern its use and impact on them. For example, Responsible AI for Youth (YUVAi) is a national programme for government schools to empower the young generation to become AI-ready. Established by the National e-Governance Division of MeitY, the platform aims to help students develop a new-age tech mindset and relevant skill sets.

6.1.1.2 Generative AI

The evolution of technology is not entirely predictable. However, in the foreseeable future, the growth of Artificial Intelligence, Machine Learning, and consequently Generative and responsive AI appears inevitable. Irrespective of the nature of technology, the skill sets of Teachers and students to develop a basic understanding of how these technologies work and therefore to channel these emerging and disruptive technologies in a manner that serves the need and helps the Teacher and student in the Indian context is critical.

Generative AI is a type of AI that creates original content by learning from existing data; it uses patterns and structure from existing data to produce new content. It can generate new text, images, or music without explicit programming. Some examples of Generative and responsive AI are Chat GPT and Bard. However, these can be leveraged to create technology solutions, such as TaraBot, on DIKSHA. They can be used to discover ideas, create innovative content, and enable exploration and problem solving across design, music, art, and storytelling.

In education, generative AI can be a valuable tool for Teachers. It enables the creation of engaging educational materials such as interactive lessons, videos, and personalised exercises. It also aids in content generation in multiple languages, promoting inclusivity. However, caution must be exercised to ensure that the generated content aligns with the curriculum and avoids biases. By responsibly incorporating generative AI, Teachers can enhance creativity and innovation in the classroom, offering unique learning experiences to students.

Generative AI has the potential to play a complementary role in learning by significantly reducing the time and effort involved in generating content — quizzes, lesson plans, learning materials, adaptive assessments, interactive simulations, and virtual environments for engaging learning.

However, it is important to note that generative AI is a rapidly evolving field, and there are ethical considerations and challenges associated with its use. Issues such as bias in generated content, data privacy, and validity and veracity of generated content are issues that have come up, and more are being discovered. Also, there may arise real challenges and disruptions in education by (mis)use of AI, including students and educators 'outsourcing' the most fundamental process of educational work — of thinking — to AI. This could be in the form of homework and assignments being done by AI, or lesson plans and content being developed entirely by AI. In the long term, such behaviour starts stunting the growth of the capacities outsourced — in this case, thinking — and this would be deeply damaging.

Only deeply thoughtful and well-researched integration of AI in the process of education will let us use its potential fully while not succumbing to its more serious risks. This must be one of the most important areas of research and attention for the entire education system — eliminating the risks of AI and using it to its fullest extent. At the time this NCF is being written, nothing more definitive can be said.

Section 6.2
Potential of ICT in School Education

Technology in education has the potential to play the role of a significant extension of human capabilities, and ways of making teaching and learning more effective. Here are a few scenarios to examine what technology can enable:

a. Can break down barriers and constraints. For example: The student is not limited only to classroom experiences. They can explore and access content beyond the constraints of the book, Teacher, and the classroom.

b. Enables exploring worlds, ideas, and places beyond that which can be physically accessed. For example: a student or even the Teacher may not have travelled to see a planetarium or a museum, but if a video or a link to an augmented reality experience can be provided, they would be able to explore any space in the world.

c. It does not discriminate by itself. For example: the user's ability or location does not matter to technology. Technology opens up access to people of different abilities. Video content with subtitles and supported by sign language is critical for the hearing impaired; similarly audio content is critical for the visually and print impaired. Text with audio would be a life changer for learners with learning disabilities.

d. It makes it possible to exercise choice, make connections, and find what they need and want to learn. For example: Teachers undergo training programmes on predetermined topics; while this is useful, it can be supplemented by the Teacher accessing training on the web.

6.2.1 Access

This NCF has consistently mentioned learning should not be limited to what is presented in textbooks. ICT makes it possible for students and Teachers to have access to a wide variety of content. With the spreading network access to the internet and the ubiquity of digital devices that can connect to the internet, access to educationally valuable content has become more equitable and democratised, thereby enabling learning anytime and anywhere.

6.2.1.1 For Students

Direct access to digital content on the internet might not be appropriate for very young children. Access to digital content should be moderated and mediated by adults in this case.

a. Students can be encouraged to access and engage with relevant digital material that complements and supplements the content in their curriculum, syllabus, textbooks, and other materials they are typically unable to access in their physical environment.

b. Students can use ICT to deepen understanding, learn at their own pace, engage with additional practice, and do self-assessments. More than anything else, ICT can be of immense value to discover and explore new areas and topics, and as is becoming common — to become creators and makers (for example, creating 'how to ….' videos and demonstrations).

c. Students can utilise technologies such as peer forums and chatbots to clarify their doubts or just to ask a question through voice or text to clarify or develop understanding and satiate curiosity.

d. The agency to learn and find spaces for learning without fear or judgement can be enabled through ICT.

6.2.1.2 For Teachers

More than the students, it is for the Teachers that the use of ICT becomes significantly enabling and empowering.

a. Teachers can use digital content available on the internet for complementing and supplementing the textbook material. Such content can enable different pedagogical approaches, as well as provide different forms of engagement through audio-visual material. Textbook chapters and Teachers' handbooks can embed appropriate QR codes, which guide them to relevant complementary and supplementary content.

b. Resources for suggested and illustrative lesson plans for specific content areas and textbook chapters aid the Teachers in preparing for classroom instruction.

c. Well-designed Pedagogical Content Knowledge (PCK) packages for specific concepts can orient and prepare Teachers conceptually for teaching.

d. Additional assessment tools and readily available worksheets can enable Teachers to create formative assessments to understand the learning of the students.

e. More in-depth courses can allow Teachers to deepen their perspectives of education as well as specific content areas. Teachers can enrol in these online courses and develop their capacities at their own pace and convenience.

f. Teachers can use tools that can simplify administrative tasks to unburden themselves.

6.2.2 Content Creation

ICT has not only eased access to content, but it has also enabled the creation of content. ICT has the potential to enable a wide variety of practitioners to create educationally valuable and relevant content.

a. Locally relevant content to be used in classrooms can be created with the assistance of ICT at the school cluster/complex level by Teachers and resource persons.

b. Teachers can create content dynamically, based on the specific needs of their classroom. They can access existing digital content and modify it to their specific needs.

c. ICT has made it possible for content to be created and presented in various forms. Videos, audio clippings, graphic simulations, animated presentations — all these forms of content can now be easily created by a motivated and capable Teacher with the use of simple tools in ICT. These different forms allow for a variety in the content used in the teaching-learning process.

d. ICT also enables students to express themselves beyond a simple textual form. They can capture their educationally relevant understanding in various audio-visual forms for Teachers to assess.

e. With this NCF's emphasis on Art, Physical , and Vocational Education, it is not hard to imagine the central role played by digital content. Instructional videos would be far more effective than textbook chapters for these Curricular Areas.

f. Teachers can use Generative AI technologies to create content that is localised to their contexts and specific to their immediate pedagogical needs.

6.2.3 Individual Attention

ICT can help Teachers provide greater individual attention to students and to their specific needs.

a. ICT can enable the recording of the learning achievements of the students at a fine level of granularity. This information can assist the Teacher in creating useful learning profiles for a subset of students in their care. These learning profiles can help Teachers in creating individualised learning plans, which could also be developed with the aid of relevant technology solutions. The Teacher is central to this process to assess if the plan is relevant and of use to their students.

b. Students can engage with personalised content through digital devices, moderated by the Teacher in the classroom. ICT can assist in personalising this content by using the students' specific profiles, which includes their prior knowledge and preferences.

c. In higher grades, students can access digital content that explains the concepts in different languages and multimedia formats. Students can engage with these materials at their own pace. Thus, this facilitates the slow shifting of the responsibility of learning to the students and makes them independent learners.

d. Teachers too can receive individualised training plans to suit their needs and for improvements in areas of difficulty for them.

e. Technology can bridge gaps and enable independent learning to support the diverse needs of students with disabilities. Technological aids in the form of diverse tools for early detection and intervention will be needed. In addition, specially curated e-content to address the learning needs of students with disabilities should essentially follow Universal Design for Learning (UDL) principles and the end products should be available on audio, video, ISL, and other digital formats such as EPUB, flipbooks, interactive Digitally Accessible Information System (DAISY). Mobile applications can be used to cater to the specific needs of students with learning disabilities. Audio modes, such as radio and audio books, and television for hearing impaired with subtitling and ISL can be leveraged for students with disabilities .

6.2.4 Interactive Content

The use of ICT allows for the possibility of dynamic and interactive content that a textbook cannot manage. Such use of ICT might be appropriate from the Middle Stage, where students engage with interactive content through digital devices.

a. In Curricular Areas such as Science and Mathematics, digital simulations can make engagement with concepts more hands-on and dynamic, thus improving conceptual understanding.

b. With advanced voice recognition and natural language processing techniques, ICT can assist in oral language development through interactive software.

c. Digital textbooks can have assessments embedded in them and students can check their understanding immediately.

6.2.5 Teacher Empowerment — Emerging Innovative Pedagogical Practices and Skills

There are many pedagogic practices, strategies, and ideas that are being tried that have achieved various degrees of success. These include flipped classrooms, blended learning, personalised learning, game-based learning, edutainment, computer-assisted learning, and several others. All of these may be effective in some contexts and not so in other contexts. There is no one method or use of technology that fits all.

Thus, preparation of Teachers to engage with technology and make the best choices for their students and schools becomes a critical step in making effective use of ICT in classrooms. Capabilities of ICT can be used in such capacity building of Teachers at scale. The PRAGYATA [Pragyata Guidelines, Government of India] guidelines for digital education articulates the kind of preparation necessary for Teachers to be able to deliver digital education as being a twofold process.

a. The first is the requirement of Teacher preparation for adopting digital technology for teaching their students more efficiently.

b. The second is to use digital medium to keep abreast of new development, in education for their own professional growth.

Teachers must be ready to harness the potential of digital technology to keep them professionally up to date. The Teacher may:

c. Explore digital technologies such as LMS (Learning Management System), apps, web portals, digital labs, and repositories of Open Educational Resources (OERs) at national/ State/global levels.

d. Attend webinars, online training programmes, online courses on ICT — Pedagogy and Content integration.

e. Use appropriate technology for teaching and learning and conducting assessments.

f. Use digital resources embedded in Alternative Academic Calendars (AAC) developed by NCERT for different Stages.

g. Be part of forums, interest groups, and online communities to interact with peers and know how the rest of the world is doing with digital education.

h. Get acquainted with copyrighted as well as Free and Open Source (FOSS) e-content and tools for learning. Teachers can be made aware to use open resources as everything on the Internet is not available for free download or sharing.

Section 6.3
Possible ICT Solutions for School Education

The above section broadly outlines the potential of ICT to have a positive impact on school education; this section explores various ideas and solutions that are in use and may be envisaged. However, this is not by any means an exhaustive list of ideas or solutions, it is merely indicative. Technology will evolve and adapt as is its nature, the attempt is to provide a framework for Teachers, educationists, and administrators to think of and leverage these tools (and also what may come in the future) to suit the needs of learners. For instance, a policy framework for developing education technology is National Digital Education Architecture (NDEAR).

6.3.1 National Digital Education Architecture

To fully achieve the potential of ICT in enabling the vision of NEP 2020, NDEAR was launched in July 2021. 'The core idea of NDEAR is to facilitate achieving the goals laid out by NEP 2020, through a digital infrastructure for innovations by, through and in the education ecosystem.'

NDEAR is a blueprint for the future of education in India. It aims to create a unified national digital infrastructure that will enable the use of technology to improve educational outcomes for all students. NDEAR creates standards and principles for technology solutions in education. This will help Teachers find and use solutions that help meet the learning needs of students. NDEAR will encourage an ecosystem of digital contributors who can develop and use technology in school education. It follows some core principles for developing technology in a manner such that it enables open access, agency, and choice for usersas well as diversity and inclusion. It endeavours to meet the special needs of students with disabilities.

The NDEAR addresses the following aspects of ICT in education:

a. **Core Interactions**: NDEAR identifies two core interactions in education — learning interactions and administrative interactions. Learning interactions are those that take place between students and Teachers, while administrative interactions are those that take place between Teachers and administrators.

b. **Scenarios**: NDEAR defines three scenarios for the use of technology in education — learn, help learn, and manage learn.

   i. *Learn* scenario refers to the use of technology to enable learning directly

   ii. *Help learn* scenario refers to the use of technology to provide support to learners

   iii. *Manage learn* scenario refers to the use of technology to help administrators manage the educational process

c. **Key Personas**: NDEAR identifies five key personas — students (any learner), parents (any caregiver), Teachers (anyone who is a Teacher, formal or informal), administrators (anyone who can help manage), and community members (society in its widest term including market players).

Digital resources for learning and for use by the five different personas have a very important role to play in leveraging technology in a manner that is contextual and relevant to learners.

6.3.2 Digital Books and Libraries

Textbooks, stories, novels, articles, and non-fiction in various languages in digital form are very important resources for school education.

6.3.2.1 Relevance

Digital books would be relevant across all subjects including vocational training. One example is to address the issue of low literacy levels requiring more resources for the development of language. Digital resources can aid in more listening, reading, expansion of vocabulary, and meaning making. The class and home need to be print rich, but it is also essential to be print rich digitally and have access to diverse digital content in the form of stories, books for various levels of readers, audiobooks, read-along digital content, vocabulary builders, digital dictionaries, word games, video content and online courses in multiple languages, and have access to tools to get a sense of one's own learning level in language.

6.3.2.2 Benefits of Digital Books

a. Overcomes physical barriers to access — Many books can be accessed by the individual even if they do not have access to physical books in their local environment.

b. Portable — They can be accessed from anywhere, anytime, and across devices.

c. Extendable — Textbooks particularly can be extended, modified, and updated quickly when in digital form.

d. Delays — Delivery delays can be overcome.

e. Inclusive — Digital books lend themselves to accessibility, options to enlarge size of the font, change the page colour, use the read-aloud, and access the audiobook formats can be enabled.

6.3.2.3 Resources

There are several platforms and resources available that enable access to digital books. NCERT has made all its textbooks available online across various platforms, such as SWAYAM, DIKSHA, ePathshala. In addition, IIT Kharagpur has the national digital library platform. Several private publishers are enabling access to digital versions of their publications, be it fiction or non-fiction.

6.3.3 Videos, Animations, and Audio

Digital material in the form of videos, animations, and audio is useful to explain topics, and concepts, and demonstrate through 'how to…' for both students and Teachers.

6.3.3.1 Relevance

Across all subjects and domains ranging from an explanation and demo video for Teacher (and student) on 'How to teach/learn place value using sticks and stone' to watching a video on 'Force in action in a cricket game.' Videos and animations are excellent learning aids for both students and Teachers. The creation of contextual content is as relevant as the consumption of content in the teaching-learning process. This form of digital content is particularly relevant for the Curricular Areas of Art Education, Physical Education and Well-being, and Vocational Education.

6.3.3.2 Benefits

a. Deepens understanding — Helps understand the subject matter better by engaging multiple senses (seeing and hearing) of the learner and also enables visualisation of the topic or concept.

b. Connection — A video helps establish a human connection to the learning process unlike engaging only with text.

c. Shareable — The Teacher can send a video to the parent via messaging and students can share with each other.

d. Independence — Enables independent study by students and this becomes relevant as the learner evolves across Stages.

e. Repeatability and pacing — Videos also give Teachers the opportunity to demonstrate an aspect or subject repeatedly. The student can go back to ideas and concepts they have not understood and watch and learn again: it helps a student 'personalise' their pace of learning.

f. Builds on an existing habit — Engagement with videos across various platforms is an integral part of evolving learning habits, be it watching a cooking video to learn how to make an unfamiliar dish or a Teacher watching a video on how to teach place value using sticks.

g. Makes interdisciplinary learning easier — A well-crafted video on the topic can connect domains of learning in shorter time periods and a more efficient way. For example, connecting topics of physics to playing cricket; cooking to chemistry; carpentry to math.

6.3.3.3 Resources

Creating and sharing these videos and animations are possible across several platforms. Television, OTT platforms, and radio (including community radio) can play a big role — imagine being able to watch a movie or listen to a play based on a story in the language textbook.

Platforms such as SWAYAM and DIKSHA are regarded as well-curated spaces for curriculum-linked content, in addition to several private platforms. Using the curation along with sourcing tools (such as VidyaDaan) available on these platforms, the quality of curriculum-linked content can be increased. The learning experiences from SWAYAM and DIKSHA can help evolve a body of knowledge of digital pedagogy which, in turn, can help craft a common set of guidelines that will enable the creation of better quality and relevant content.

6.3.4 Online Courses

These are micro-courses and courses with certification available online.

6.3.4.1 Relevance

This NCF will open up the need for training and capacity building of Teachers and administrators across the country. A cascade approach or only an in-person method of training will not be sufficient. The NCF also focusses on new Curricular Areas such as Vocational Education and Interdisciplinary Areas. Neither students nor Teachers should be limited by geographical barriers, language barriers, or any other constraints to develop skills or explore interests outside of the school framework. Digital courses with or without credentials can enable exploration and capacity development.

6.3.4.2 Benefits

a. Anytime, anywhere learning.

b. Choice of topics to learn and develop skills.

c. Digital credentials for both students and Teachers enable them to build and showcase their abilities and body of knowledge.

d. Opportunities to revisit and relearn.

e. Micro-courses as a concept will provide just-in-time, bite-sized learning. For Teachers, 'How to teach mathematics connecting to day-to-day living?', 'How to conduct read-aloud with stories to make them engaging' and 'Tips on how to link sports and physics'. For students, 'How to make pots,' 'How to build a wooden table', 'How to build a biogas plant', 'How to compost organic waste', 'How to play a musical instrument', 'How to develop the skills to be a sportsperson', 'How to pursue a certain career, e.g., police official' are useful educational resources.

6.3.4.3 Resources

SWAYAM, DIKSHA, NISHTHA platforms, and several State training programmes will be available for skill development, capacity building, and issuance of verifiable credentials.

NCERT's and State SCERTs' experience in rolling out large-scale online training programmes are available to be leveraged to evolve digital pedagogy that will work for the context, scale, and constraints of India.

Sourcing content for specific demands from the wider ecosystem through NDEAR VidyaDaan would enable the ecosystem to contribute to the needs of these courses.

6.3.5 QR Codes and Other Technologies that Connect the Physical to Digital — *Phygital*

6.3.5.1 Relevance

Across all Curricular Areas, access to a wide range of digital resources is needed. These resources could be in the form of further explanation of content, demonstration videos, worksheets, Teacher education courses and assessments. QR codes act as the access point to the wider array of resources starting from a familiar learning resource — either a textbook or any physical teaching-learning material.

6.3.5.2 Benefits

a. Bridging — Bridges the physical and digital teaching-learning environments. For example, in a multilingual classroom, children whose home language is not the MOI may need access to some basic translation of content in their home language. QR-coded textbooks that connect the student to the explanation of key terms of each chapter in different languages will help build vocabulary and better understanding.

b. Extendibility — QR codes on physical books make it possible to 'extend content' and supplement in a seamless way.

c. Connection — Due to the limitation of physical space on the materials, it is easier to make connections in the digital space — the QR code can provide access to linked materials in the form of text, audio or video, or any other format.

d. Inclusive — Across all subjects and educational materials, QR codes or similar *phygital* technology can become the gateway to access diverse content relevant to different learners, making inclusive classrooms a reality. Audio added to books helps print-impaired learners similarly, ISL content can be made available through the same QR codes or similar *phygital* technology.

6.3.5.3 Resources

Digital infrastructure available in the form of NDEAR-compliant DIKSHA DIAL code (a registry of QR codes linked to topics) and content repository enables the generation of taxonomy-linked QR codes to be used on TLMs. In addition, content repositories such as DIKSHA or any other NDEAR-compliant content repositories can be leveraged to source content.

6.3.6 Virtual Labs and Simulations

ICT allows for democratising access to environments for experiential learning and makes scarce resources available for all through technology. Virtual Labs and simulations are examples of such access; however, these need to be used in conjunction with physical teaching methods. Access to some basic physical labs will enhance the ability of students to leverage Virtual Labs better.

6.3.6.1 Relevance

Practical application of concepts and the ability to conduct experiments in a virtual environment will deepen learning. While used more often in Mathematics and the Sciences, it can also be developed to teach Languages and other subjects.

6.3.6.2 Benefits

a. Access anytime anywhere: Students in remote locations get access to labs and enable anytime anywhere learning for all.

b. Quality: Better quality of labs without being restricted to challenges of funding, procurement of materials, and equipment.

c. Immersion: Visual aids to teach complex theoretical topics and concepts creates an immersive learning experience.

d. Repeatability and flexibility: Time and space to repeat experiments and try new experiments without resource constraints.

e. Feedback loops: Faster feedback and learning loops where dependence on the Teacher may be reduced.

f. Equitable: As a shared common resource, Virtual Labs as a common infrastructure provide equitable access to a scarce resource and remove constraints that apply to setting up high-quality physical labs.

6.3.6.3 Resources

The Virtual Labs project of the Ministry of Education has participation from many institutes of repute from higher education. However, more labs need to be created with a focus on the requirements of school education. One example of such a programme is the Amrita Virtual Lab. There are many such virtual labs being developed and will evolve to meet the requirements of Teachers and learners as technology evolves.

Leveraging open-source tools and adapting them to the Indian context, such as the PhET Interactive Simulations project at the University of Colorado Boulder, creates free interactive Math and Science simulations. These are based on extensive education research and engage students through an intuitive, game-like environment where students learn through exploration and discovery.

6.3.7 Content Creation Capabilities

ICT enables easy creation and sharing of educationally appropriate content for the local context and ensures equity by enabling the creation of accessible content.

6.3.7.1 Relevance

a. Across Curricular Areas, there is a need for the creation and distribution of contextual local content. Teachers and administrators are routinely creating and curating TLMs. This capability is demonstrated through the digital habit of Teachers creating video content and sharing their work through messenger services.

b. Ideas on how to create and generate local content should be made available to all DIETs and Teachers across the country. The Social Science Curricular Area requires 20% of the content to be locally specific to that panchayat or district. Such content should be created and made available through NDEAR-compliant platforms such as DIKSHA.

c. Local content creation can be implemented as a decentralised process throughout the year and uploaded onto SWAYAM, DIKSHA, and other platforms, including local TV and radio, and made available to all Teachers.

d. Micro-courses that guide content creation processes should be made available to Teachers and other content creators.

e. The NDEAR ecosystem should enable community members to create relevant content, particularly in the areas of Art and Vocational Education.

f. There is a need to ensure equitable access to accessible content that has been developed following Universal Design for Learning and made widely available.

6.3.7.2 Benefits

a. Enabling content creation and building local capabilities will ensure contextual content development.

b. Self-sufficiency in resource regeneration at various levels will result in a diversity of teaching and learning resources.

c. Nuances, such as addressing learning gaps and dealing with multilingual classrooms which are very specific, can be addressed.

d. Enabling personalisation and access to contextual, relevant content for diverse learners.

6.3.7.3 Resources

a. There are multiple digital content creation tools across a multitude of platforms for various purposes, and there are a wide variety content platforms. As formats of content have evolved, tools have been evolving, including AI tools.

b. For open and easy access, NDEAR guidelines should be followed by content creators.

c. DIKSHA provides the capability of multilingual content support and creation support at the local level.

d. NCERT guidelines for digital content creation and the creation of inclusive content are useful resources in this journey.

6.3.8 Assessments, Question Banks, and Practice Materials

Easy access to a portfolio of assessment tools and question banks that address and test a range of skills (including conceptual understanding and provoke critical thinking and problem sets) enables Teachers to use them appropriately in their classroom teaching.

6.3.8.1 Relevance

For achieving several competencies, repeated practice becomes a necessity. At the same time, this practice work should not be routine and mechanical. To create a set of worksheets that allows for in-depth practice and, at the same time, sustains the learners' interest is not an easy

task. ICT can enable Teachers to easily create appropriate practice tasks keeping in mind the learning levels of the students and their local contexts.

Teachers need question banks and problem sets linked to the curriculum to be able to do formative assessments of their students. Students can take charge of their own learning if assessments are non-threatening quizzes.

Assessments and quizzes can be done in many ways — online at scale, online at a local level, and in an offline manner. Question banks and practice questions appropriate for different levels of learners will be required across subjects and languages. To accommodate student diversity, assessments in many forms are to be facilitated, e.g., paper-pencil tests, oral assessments, project work, and group assignments.

6.3.8.2 Benefits

a. Online assessments give Teachers and administrators data instantly.

b. Teacher aids: Access to question banks to curate regular formative assessments will be a supportive Teacher aid.

c. Student aids: Access to practice questions across levels and access to quizzes would be helpful to students to do independent practice.

d. Inclusion by levelling and enabling formats of assessments — curated levelling of questions in different languages and enabling various methods of assessment — oral, video, and project work — would allow the assessments to be within the Zone of Proximal Development (ZPD) of the learners.

e. Digitisation of assessment responses can help determine gaps across regions and necessary remedial action to be taken. This needs to be done at the class and school level but is also necessary for large scale assessments and surveys.

6.3.8.3 Resources

Digital infrastructure may be leveraged to create question banks aligned to Competencies and Curricular Goals. Tools for assessments may be developed and, where appropriate, the quiz creation capability of DIKSHA can be leveraged or also sourced from various solution providers across the ecosystem via NDEAR. For example, NCERT has conducted several national-level quizzes on the DIKSHA platform for students. While this is not an assessment tool as such, the same infrastructure can be used by Teachers at a school, district, or State level to generate short assessments and quizzes on a daily basis for their students.

Section 6.4
Precautions in the use of ICT in School Education

a. Safety

Students in schools have not reached adult age. Safety is thus paramount in any decision related to technology use. While students can be physically protected within the boundaries of the school, allowing them to access the internet during school hours creates avoidable risks. It is the responsibility of the school to protect children from predatory and abusive behaviour often found on the internet.

The effect of screen time and the use of digital devices on the well-being of young children is still not fully understood. This implies a cautious approach to the use of digital technology by students, at least till the end of the Preparatory Stage.

b. Privacy

It is the responsibility of the school to protect the privacy of students when they are expected to use ICT for educational purposes.

c. Inappropriateness

Controlling access to all content available on the internet is not an easy task. Even inadvertent access to inappropriate content can cause serious harm to young minds. Schools should be extremely mindful of this possibility and access to the internet should be under adult supervision in schools. For students in the Secondary Stage, norms of behaviour in the digital world should be explicit as the norms of behaviour in the school.

d. Distraction

Several large-scale studies have shown that digital technology can be as much of a distraction as a useful tool for learning. Schools and Teachers should be very cognizant of this possibility. It should not be forgotten that the purpose of the use of ICT is for the achievement of Learning Standards and not for the general entertainment of students or Teachers.

e. Commercialisation

In recent years, rampant commercialisation of educational content has resulted in very predatory practices of commercial interests. These profit-seeking enterprises have preyed upon the anxieties of parents and are promoting ICT-based educational solutions with doubtful efficacy.

f. Deep Risks

As mentioned in the section on AI, we are still discovering the risks of many technologies. For example, there is growing evidence of the mental health impact of social media on teenagers, and of its impact on attention spans on children, which then affects all aspects of education and life. Not using or experimenting with technology in education because of the apprehension of such deep risks would stop progress. At the same time, using technology at the core of how children develop and grow (education being one such key process) without addressing the deepest of such risks can profoundly alter human well-being. Rigorous research and very thoughtful use of technology is the only way forward.

