UNIT 15 CURRICULUM BASED LEARNING

Structure

15.1 Introduction
15.2 Objectives
15.3 School Curriculum
   15.3.1 School Subjects in Curriculum
   15.3.2 Level Specific Curricula
15.4 Learning Languages
   15.4.1 Primary Stage Language Learning
   15.4.2 Upper Primary Stage Language Learning
   15.4.3 Secondary Stage Language Learning
   15.4.4 Methodology and Instructional Strategies
15.5 Learning Mathematics
   15.5.1 Primary Stage Math Learning
   15.5.2 Upper Primary Stage Math Learning
   15.5.3 Secondary Stage Math Learning
   15.5.4 Values in Learning Mathematics
   15.5.5 Teaching-Learning Strategies for Mathematics
15.6 Learning Science and Technology
   15.6.1 Primary Stage Science Learning
   15.6.2 Upper Primary Stage Science Learning
   15.6.3 Secondary Stage Science Learning
   15.6.4 Teaching-Learning Strategies for Science and Technology
   15.6.5 Process and Skills Based Science Curricula
   15.6.6 Attitudes and Values through Learning Science
15.7 Learning Social Sciences
   15.7.1 Primary Stage Social Science Learning
   15.7.2 Upper Primary Stage Social Science Learning
   15.7.3 Secondary Stage Social Science Learning
   15.7.4 Values and Attitudes through Learning Social Sciences
15.8 Art Education
   15.8.1 Art Education at Primary Stage
   15.8.2 Art Education at Upper Primary Stage
   15.8.3 Art Education at Secondary Stage
   15.8.4 Values and Attitudes through Art Education
15.9 Learning for Mastery
15.10 Let Us Sum Up
15.11 Unit End Exercises
15.12 References and Suggested Readings
15.1 INTRODUCTION

School education is a formally organized, planned and sequential exercise. It is based on school curriculum. As you will learn later, curriculum is a formal means of providing planned learning experiences to students enabling them to acquire knowledge of various school subjects. The study of subjects helps learners in understanding their physical and social environment and the operating processes. You will also learn that the process of education starts with the set of objectives that educationists consider worth learning. These objectives define and describe curriculum-based learning.

This Unit will help you to understand the concept of curriculum and subjects included in school curriculum in most parts of the world. The entire school education has been viewed as a set of three stages viz., primary, upper-primary and secondary, the last one including secondary and senior secondary. Each of these stages lays foundations for curriculum-based learning at the next higher stage. Thus the stages represent the major divisions of what otherwise is essentially continuous school education (classes I-XII). Many educationists these days refer to the first two stages (viz., the primary and the upper-primary) as elementary stage. We have used the names of the stages as given in the National Curriculum Framework for School Education (2000), commonly referred to as NCFSE. The Unit ends with a description of what is learning for mastery and how it can be promoted.

15.2 OBJECTIVES

After studying this unit, you should be able to:

- describe the concept of school curriculum and its determinants;
- list various subjects that children study at various stages of school education;
- describe the nature and importance of various subjects in school curriculum;
- describe the difference in focus related to various stage-specific objectives of subjects in school curriculum;
- explain the attitudes and values specific to various subjects in school-curriculum based learning;
- describe stage-specific methodologies and techniques of teaching various subjects; and
- explain learning for mastery and how to promote it.

15.3 SCHOOL CURRICULUM

The literal meaning of ‘curriculum’ has been derived from the Latin word for ‘a racetrack or a course to be run’ as “a course of study”. The concept of school curriculum can be best described as “the set of all activities designed within the school to promote the intellectual, emotional, social and physical development of the pupils”. The school curriculum includes the formal and informal activities and also the features of the school programme that reflect its ‘ethos’. All teaching and learning activities including teaching styles influence the transaction of curriculum; hence these also form part of the concept of curriculum and its practice. The various components and activities that constitute the school curriculum support and strengthen the attainment of its objectives.

According to Stenhouse (1972), a school curriculum consists of knowledge, techniques (including ‘skills’) and values that are considered relatively more desirable for children to learn. Since the entire corpus of knowledge, all techniques and all values cannot be put in a single curriculum, every curriculum is selective in terms of what is to be
included/excluded in it? "How should this selection be made? What to include and exclude in the curriculum? These have become controversial aspects of curriculum construction. Questions like "Who would decide what knowledge should be included in a social curriculum? What considerations lie behind these decisions? Which values should be selected and included in a school curriculum?" are not easy to answer. Incidentally, the debate about the opposing views on school curriculum, and for that matter any educational curriculum is as old as Aristotle. In Chapter II of Book VIII of The Politics, it has been mentioned that "... there are no generally accepted assumptions about what the young should learn, either for their virtue or for the best life; nor yet is it clear whether their education ought to be conducted with more concern for the intellect or for the character of the soul ... It is by no means certain whether training should be directed at things useful in life, or at those most conducive to virtue, or at exceptional accomplishment". The debate continues and the issues have multiplied and the differences have become now wider than ever.

Further, irrespective of the curriculum and the process of developing it, there is always a "hidden curriculum". The "hidden curriculum" refers to what has not been explicitly stated, and yet gets passed on to children through the processes of education. For example, a variety of gender biases, gender stereotypes, social class specific biases illustrate what a hidden curriculum can support and promote.

What considerations determine the shape and direction of the curriculum? This is an important question. First, it is the society as it exists and how it can be maintained at its present level of development. The second factor relates to the vision of good society towards which the society is moving and trying to evolve itself. The third factor relates to the needs and aspirations of the individuals for whom the curriculum is meant. Since human beings are not just objects but beings with free will, likes and dislikes, their career goals and life aspirations should be facilitated by the curriculum. The fourth factor relates to preserving and further defining the identity of the nation, whose people would be educated through the curriculum. Such a curriculum is known as "the national curriculum". The fifth factor includes the philosophical considerations related to the goal of human life, the nature of "what constitutes good life; and values that are abiding and eternal or utilitarian. The sixth factor is related to the psychological views about the process of learning and what children can learn easily depending upon their developmental stage. This factor determines "what" can and should be taught to children of a particular age group and how. These six factors together determine the shape and the thrust of curriculum. These factors have been shown in the form of a diagram in Fig. 15.1.

![Diagram](Fig.15.1: Factors that determine the curriculum)
According to Goodlad and Richter (1977), a curriculum is based essentially on a rational means-ends argument and it can be taken to exist at three levels, (a) the instructional level: this is the level closest to the learner and the process of classroom instruction; (b) the institutional level: where the curriculum is for the school and it describes educational objectives and learning experiences for attaining those objectives for the school, and (c) the societal level: the highest level at which the curriculum exists. The concept of society can vary from ‘the local community’ to ‘the nation’ and therefore curriculum can be for the local community or at the national level. The latter will be “national curriculum”.

In a multicultural society like India, developing a curriculum for the entire country (viz., the National Curriculum) is not easy. Children come from diverse cultural backgrounds, with different ethnic roots, different faiths, different beliefs and attitudes about schooling, gender, social class, and the nature of work. The more extensive the scope of the curriculum, the greater is the element of contentiousness. Consequently, for developing a National Curriculum, some authority has to define which cultural artifacts should be preferred over the rest and adjudged worthy of inclusion and passed on to the future generations.

A curriculum may have its dominant focus on content i.e. subject matter, because of the intrinsic value that a subject has for shaping up human personality. Such a curriculum is called content-driven curriculum, and it usually includes the study of at least one classical language. On the other hand, a curriculum may be based on considerations of practical use expressed in terms of skills and competence. Such a curriculum is known as objectives-driven curriculum. There is a third possibility too. In curriculum based on progressive education, the emphasis would be on enabling the learner to understand the world in own terms, through own enquiries. Therefore this curriculum would focus on processes that enable the learner to construct his/her understandings about the world. Such a curriculum is called process-driven curriculum.

It must be clearly understood that any curriculum would necessarily have content, objectives, and processes. We should first understand which one on these three elements gets the major focus and this in turn will reveal its type.
15.3.1 **School Subjects in Curriculum**

If you look at the factors that determine the curriculum, the school curricula should differ from one country to another, and from one society to another. Yet school curricula are strikingly similar across the world. Meyer and his team (1992) carried out a survey of school curricula in 76 countries and found that due to the pressure to achieve international standards, school curricula in almost all countries are developed in a professional manner. They discovered that the general education curricula which are meant to provide common education to children (e.g. Grade I - X in India) have five major components. All general education curricula include one or more national languages, mathematics, science, a combination of social sciences, and some aesthetic education. In terms of the total time assigned to the teaching of various subjects, Meyer’s team found that languages get the lion’s portion (i.e. 34%), with mathematics coming next with 18% time. This team further discovered that:

1) Teaching of classical languages is no longer considered necessary for developing the individual’s personality and the insistence on teaching of national language(s) has resulted in downgrading of the local and the regional languages;

2) Mathematics has become a universally accepted subject in school curricula due to its critical importance in the rationalistic modern world. Learning mathematics is expected of all children; there isn’t much disagreement about grade-specific mathematics content. However, there is no agreement on techniques and methods to be used for effective teaching-learning of mathematics;

3) All children are required to learn science to enable them to develop an understanding that “the world is empirical and lawful, governed by natural forces which can be scrutinized through rigorous investigations”;

4) Social sciences, a combination of history, civics, geography and economics, is a common feature of school curricula. Sometimes these are taught as separate subjects and in some countries these are taught in an integrated manner. The purpose behind teaching social science is to enable the learners to appreciate that in spite of the visible differences, human beings have a great deal in common and various social processes are found in all societies. In other words, the social world in which we find ourselves has factual and law-like properties;

5) Aesthetic Education is found in some form in almost all curricula; it helps children develop an eye and an ear for rhythm and beauty and discover and cultivate their special talents in this area.

15.3.2 **Level Specific Curricula**

Psychologists have established that human beings develop in a predetermined sequence, from infancy through childhood, and adolescence to youth. Each of these developmental stages builds up on the preceding stage. Thus children at a particular stage of development have their peculiar strengths and limitations. For example, young children learn better and enjoy learning through activities. Piaget and his associates have described each stage of children's cognitive development in terms of its typical
characteristics. It is because of this that school curricula are level-specific and within each level, grade-specific and for every grade, there are subject-specific curricula e.g. the English language curriculum, the math curriculum and so on.

![Diagram of Educational Curricula](image)

**Fig. 15.4: Hierarchical Sequencing of Educational Curricula**

The National Curriculum Framework for School Education (2000) provides a systematic overview of school education and the curriculum subjects at various stages/levels of schools education. (see Fig. 15.5 and 15.6)

**Primary Level National Curriculum**

- Language Curriculum
- Math Curriculum
- AHPL Curriculum
- EVS Curriculum

<table>
<thead>
<tr>
<th>Classes I &amp; II</th>
<th>✓</th>
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<tr>
<td>Classes III-V</td>
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</tbody>
</table>

AHPL: Art of Healthy and Productive Living
EVS: Environmental Studies

**Fig. 15.5: Break-up of Elementary Level National Curriculum**

**Upper-Primary Level National Curriculum**

(Classes VI – VIII)

- Mother Tongue Curriculum (Gujarati, Malayalam)
- English Curriculum
- Social Sciences Curriculum
- Science and Technology Curriculum
- Health and Physical Education Curriculum
- Second Language Curriculum (Hindi, Urdu, etc.)
- Sanskrit Curriculum (Separate / Integrated with Mother Tongue)
- Math Curriculum
- Art Education Curriculum
- Work Education Curriculum

**Fig. 15.6: Break-up of Elementary Level National Curriculum**
In Fig. 15.5 and 15.6 we can see that for classes I & II only three subjects are to be taught; this is so because of the developmental stage of children between 6 - 7 years. As learners grow up and enter the 9th year of their life, another subject viz., EVS is added to their curriculum. Similarly, at the upper-primary stage, the curriculum consists of as many as eight or nine subjects. Thus we find that not only does the number of subjects increase as student matures, but also the content for each subject increases and become richer and more complex.

Check Your Progress 1

Note: Write your answers in the space given below.

1) What are the controversial aspects of a school curriculum?

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2) Explain the concept of “hidden curriculum”.

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3) Why must some authority develop the national curriculum?

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4) Answer the following statements by writing True (T) or False (F) against each:

a) Content-driven curriculum has its focus only on the subject matter. ( )

b) Most school curricula, whatever the society or the country, have amazingly a lot in common. ( )

c) There is more disagreement about what content math curricula should contain than about how math should be best taught. ( )

d) Ideally, social sciences curricula in different countries should highlight the essential oneness of human beings. ( )

15.4 LEARNING LANGUAGES

The ability to use language for initiating and maintaining social interaction is a peculiar characteristic of human beings. No doubt, members of lower species also use some language but their language is learnt instinctively while human beings acquire it as a result of growing up in a particular community. This explains how children from the same family if brought up in different communities grow and learn the language of those communities. Secondly, human language is a very complex system, while the ‘pseudo language’ of other species consists at best of only a limited number of
utterances, each with a unique meaning. Language is often described as a system of sound symbols with arbitrary meanings that human beings use for expressing themselves and communicating with others. To some linguists, language is a patterned system of arbitrary sound signals characterized by structure dependence, creativity and displacement (Aitchison, 1983).

In relation to the school curriculum, a language may have the status of the first language, the second language or the foreign language. The first language is usually the vernacular language or the mother tongue. The second language is a language of communication, trade, business and education in society. Thus Hindi, Urdu and other Indian language in their standard literary form are taught as the first or the second language in our schools. English has the status of the second language and in many schools, it is the medium of instruction as well. Sanskrit or any other Indian language may be taught and learnt as the third language. All modern European languages other than English (viz., French, German, Italian, Russian etc.) also have the status of the third language in our school curriculum.

The mother tongue plays a crucial role in the cognitive and social development of the child. Mother tongue is usually described as “the language that the child already possesses before joining the school and commencement of formal education”. It has been estimated that by the time the child joins school, he/she has a functional vocabulary of between 1200 and 1500 words through which the child interacts with others and constructs knowledge of the world.

The National Curriculum Framework for School Education (NCFSE, 2000) emphasizes that the mother tongue should be the medium of instruction at the primary stage because the child would then have minimum difficulty in understanding whatever is taught to him/her. In India, each state has its language spoken by the majority of its citizens, and this should be the medium of instruction at the primary stage. In fact, whatever knowledge a child has of his/her mother tongue is refined and further developed at the school. It is quite possible that the language of the home and the language of the school may differ in some respects even when both (i.e. the school and the home) claim to use the same mother tongue. This is because the language in the school has to serve as the medium of formal instruction, for teaching various subjects. Thus the language used in school is more standardized as it has to serve effectively as a medium of formal education.

15.4.1 Primary Stage Language Learning

The general objectives of teaching the mother tongue at the primary stage are to enable the child:

- to listen with understanding and to comprehend ideas through listening;
- to speak effectively in both formal and informal transactions;
- to read with comprehension and enjoy reading various kinds of instructional materials;
- to write neatly, grammatically, logically and creatively;
- to think independently and to differentiate between fact and opinion. (Guidelines and Syllabi for Primary Stage, 2001, 4)

Since the language spoken by the majority is considered to be the state language, schools in India are expected to teach one of the eighteen national languages. The primary schools in a state may teach Hindi, Urdu, Bangla, Marathi, Gujarati or some other national language. Instructional objectives for teaching Hindi as a mother tongue are given below as an illustrative example.
Organising Learning

Class I & II
- to develop the ability of understanding and carrying out oral instructions;
- to develop the ability to differentiate among different articulated sounds;
- to develop the ability to listen attentively for knowledge and entertainment;
- to enable learners to speak without inhibition and to converse normally with teachers;
- to develop their oral expression through story, poetry and group songs;
- to enable learners to approximate their pronunciation progressively to standard Hindi;
- to teach them to speak normally with civility;
- to enable learners to read and understand familiar words based on consonants using ‘devnagari’ script and its various symbols (vowels, consonants, matras, and compound letters);
- to develop the ability to read and comprehend simple ideas and to arouse their interest to read;
- to develop their interest in reading materials other than the prescribed textbooks;
- to increase students’ active vocabulary;
- to encourage their tendency to learn by themselves;
- to inform them about central issues, fundamental duties and human rights;
- to develop their ability to take pride in their region and nation and be patriotic;
- to develop their awareness about healthy and productive lifestyle;
- to develop the qualities of secularism and respect for all religions and the feeling of “all world one human family”;
- to develop respect for our national symbols e.g. our national flag and the national anthem;
- to enable them to enjoy poems, stories, cartoons and other programmes presented on radio and T.V.; and
- to develop their vocabulary of about 1500 words.

Classes III - V
- to develop the learners’ ability to listen attentively in a tolerant and civil manner;
- to develop their ability to listen and comprehend others’ ideas;
- to enable them to develop the standard pronunciation;
- to develop their oral expression skills;
- to develop their ability to read and comprehend others’ views;
- to enable them to identify main genres of Hindi literature through literary works;
- to enable them to read for enjoyment and for increasing their knowledge;
- to develop their ability to appreciate the beauty of language;
- to develop their ability to express their ideas through writing;
to enable them to use grammatically appropriate language;

to familiarize them with main elements of language;

to develop their ability to reflect; and to use language for effective study of other subjects;

to develop their study skills and their ability to participate in various language related activities;

to enable learners to develop their social adjustment through language;

to make them aware of the art of healthy and productive living; and

to develop the skills for learning to learn.

Parents want their children to learn English from the beginning as they believe that if children do not start learning English in class I, it may result into a near permanent handicap in their career. Teaching of English at the primary stage is found faulty and inconsistent across cities and regions, as there is acute shortage of competent teachers of English at the primary stage in most cities. The NCFSE (2000) has made provisions for three-language formula at the primary stage. Under the three-language formula, English can be taught as the second or the third language. NCFSE (2000) recommends though that English may be taught in primary schools if necessary resources are available for teaching it effectively. Under Guidelines and Syllabi for Primary Stage (2001), six areas have been highlighted as of concern for teaching and learning of English. These relate to-

a) the need to develop the learners’ capacity to use English in speech and writing with ease;

b) greater emphasis on oral-aural approach in classes I & II with much less stress on reading and writing;

c) linking teaching-learning of English with the learners’ life and environment;

d) presenting English language items in the local indigenous contexts, free from cultural bias;

e) greater teacher participation in developing instructional materials; and,

f) integrating of EVS-related themes with English language teaching in order to reduce curriculum load on young learners.

The general objectives of teaching English at primary stage aim at enabling the child to:

• develop the abilities of listening, speaking, reading and writing English;

• communicate in English with appropriateness and right pronunciation;

• think independently to differentiate between fact and opinion and to use language intelligently and creatively (understand emotion/intention behind words); and,

• appreciate the melody of the spoken word and to enjoy learning English.

Of these, the last but one objective is considered impractical and rather unattainable for primary stage learners in the context of English.

By the end of Class II, the learners are expected to develop an active vocabulary of 250-300 words which should be expanded to 500 words by the end of Class III, to 750-800 words by the end of Class IV, and to 800-1100 words by the end of Class V. Moreover, by the end of the primary stage, the learner should be able to respond to instructions, talk about oneself and one’s surroundings, express one’s feelings and
emotions, exchange greetings, seek and supply information within the limits of one's expected active vocabulary.

15.4.2 Upper Primary Stage Language Learning

In the context of teaching Hindi as first language, the major emphasis is on teaching of language items, different genres of literature and providing content knowledge. For the development of language skills viz., listening, speaking, reading, and writing, the students are expected to consolidate whatever they have learnt so far and develop these skills further. The students are expected to read a variety of texts and express their ideas independently, coherently and creatively.

So far as teaching of English as a second language at the upper primary stage is concerned, understanding spoken English, participating in conversation on a topic of interest and within the range of one’s experience, reading semi-authentic texts both prescribed as well as others, and expansion of reading-comprehension related skills including interpretation of tables, charts and diagrams, graphs and maps; and expressing oneself with ease and facility within one’s active vocabulary are the major expected learning outcomes. The learners are expected to expand their active vocabulary by another 1500 words and use their proficiency in English as a springboard to explore and study other areas of knowledge.

The learners study the curriculum content that consists of (a) linguistic content and (b) thematic content. The linguistic content comprises of grammar and usage, and vocabulary. Under grammar and usage, learners study:

- word classes e.g. noun, verb, adjective, adverb;
- modal auxiliaries;
- concord i.e. agreement;
- tense forms;
- sentence types;
- reported speech; and,
- passive expressions.

Under thematic content, the students study eleven sub-themes, namely;

- the personal relationships,
- the neighbourhood,
- the larger community i.e. my country and my people, geography and natural resources, sustainable development, history and legends,
- the nation,
- the world beyond,
- the world of adventure, travel, exploration and tales of courage, bravery and endurance,
- the world of sports and health education,
- the world of nature,
- the world of science and technology, and
- the world of imagination i.e. the supernatural, ghost stories and fantasies.
The sub-themes are to be presented through stories, descriptions, letters, dialogues and conversation, diary entries, biographies/autobiographies, travelogues, play lets and poems.

At the upper-primary stage, children are expected to learn another language as their third language. NCFSE (2000) has laid special emphasis on teaching of Sanskrit, because it has been used consistently for thousands of years and it has been the language of our ancient heritage, the great storehouse of our ancient knowledge and wisdom. It is considered as the most scientifically structured language and is now viewed as the most suitable language for computer use. NCFSE (2000) recommends that Sanskrit needs to be taught as a living language because of world-wide interest in yoga, Vedic mathematics, astronomy and ayurveda.

15.4.3 Secondary Stage Language Learning

Secondary stage language curricula enable learners to learn Hindi, Urdu and other regional language as mother tongue or as a second language. English is also taught as a second language and Sanskrit as an optional language. We shall consider only two curricula viz., Hindi as the mother tongue and English as the second language.

The NCFSE (2000) provides an integrated and balanced curriculum for Hindi as mother tongue; its main purpose being to enable the learner to comprehend and practice all aspects of the mother tongue so that the learner is able to understand his/her self, and the society as well as the cultural world in which one finds oneself. It proposes a mix of literature (60%) and functional language (40%). It assumes that the learner will be enabled to assimilate the literature and further develop one’s understanding of the mother tongue, which will be reflected in one’s use of language in formal and informal contexts.

Literature related objectives of the secondary stage Hindi curriculum are:

- to develop the learners’ ability to study Hindi literature;
- to recognize and enjoy sensitive portions of Hindi literature;
- to develop knowledge about contemporary culture, and imbibe moral values and healthy attitudes; and
- to develop respect for Indian culture and civilization and pride in it.

General objectives for Hindi as a functional language are:

- to develop the ability of comprehending and analyzing the structure of Hindi;
- to acquire knowledge of language elements and develop linguistic skills in Hindi;
- to develop and refine one’s oral expression;
- to develop the ability to study other subjects through Hindi; and
- to develop one’s ability to use it as appropriate functional language in various contexts.

While the specific objectives of the Hindi curriculum are skill based, the focus is on the use of Hindi in various contexts and situations, especially in literature related situations and the ability to reflect on what is read and the writing skill. Under functional Hindi, the focus is three-pronged viz., language analysis, composition and purposiveness. Under composition, learners are exposed to a variety of language experiences ranging from applications, letters of thanks, congratulations, condolence etc; to money order, admission, rail reservation forms, writing telegraphs and essay. Further, the Hindi curriculum seeks to promote good citizenship and various values ranging from honesty, cleanliness, courtesy, punctuality, gratitude, to generosity, love, ahimsa, tolerance, faith, patriotism and secularism.
Organising Learning

Language learning at the senior secondary stage caters to two groups of learners: (a) those who are to enter the world of work and for whom formal education at the senior secondary stage would be more or less the terminal stage; and, (b) those keen to pursue their studies at the tertiary level of education. The core language curriculum caters the former and the elective language curriculum the latter group. The Guidelines and Syllabi (2001) provide for core as well as optional language courses in Hindi, Sanskrit, Urdu and English. We should remember that the senior secondary stage provides for options in one’s choice of curricula. Unlike the common single track (i.e. undifferentiated) curricula available from Classes I - XII, (the primary to senior secondary stage) offer differentiated curricula.

Language has a number of functions in human life e.g. (a) it enables us to fulfill our needs; (b) it helps to regulate human behaviour; (c) it is a means of initiating and maintaining social interactions; (d) it helps mould our personality; (e) it is a means of acquiring knowledge and of reflection; (f) it fosters creativity and imagination; and (g) it enables us to represent reality, the world inside as well as outside us. By the time, the learner completes his/her senior secondary education, he/she is almost 18 years old and has the right to vote. Irrespective of whether the learner continues his/her education, he/she should be able to use language whether mother tongue or a second language to fulfill his/her needs and express himself/herself using these listed seven functions. Language learning at this stage has thus to provide for all these functions. In other words, functions should receive high emphasis in language curriculum.

The Hindi (core) curriculum at this stage has a number of specific objectives; some of these are listed below:

- to acquaint the learner with different vocabulary, registers, styles etc; of language as used in various social contexts and to provide practice in these;
- to develop language skills especially writing skills for writing features, summarizing, narrative, descriptive and expository writing etc;
- to provide knowledge and practice in respect of functional aspects of Hindi grammar; to acquaint learners with the discipline and vocation related vocabulary and styles in Hindi e.g. social sciences, science, and technology, commerce and trade, agriculture and rural development, health and environment;
- to provide learners with practical uses of language in their future working life;
- to enable learners to pursue further education through Hindi as a medium of instruction;
- to acquaint them with various genres of Hindi literature so that they are able to understand the author’s message and enjoy themselves;

The Hindi Elective curriculum, on the other hand, focuses on exposing students to various dimensions of Hindi literature. This is vividly reflected in the general objectives of the elective curriculum; some of these are:

- to increase learners’ knowledge of Hindi literature;
- to acquaint them with various genres of Hindi literature (viz., poetry, short story, essay, sketch, memoir, one-act play etc.); major writers, major movements and styles associated with these;
- to apprise them of aesthetic elements and appreciation;
- to acquaint learners with rasa, chhand, alankar etc; in the context of Hindi literature;
- to familiarize them with the general history of Hindi literature;
to acquaint them with the Indian languages literature translated in Hindi;

to develop their knowledge and sense of pride in contemporary culture, moral
values and traditions of our country;

to familiarize them with the role of Hindi as the common thread for national
integration; and,

to develop their knowledge about commonly used expressions in functional Hindi
office work, media, information technology related etc.; and their capacity to
use it in social communication.

It is obvious from these that the focus of elective Hindi curriculum at this stage is
entirely on literature and its various aspects. The focus on literature is however, not at
the cost of developing the characteristics of effective citizen, national pride and national
integration. Various democratic values, our composite cultural heritage and sensitivity
to environment are no less important and should be served by all curricula irrespective
of the subjects.

The English language curricula are also for Core English as well as Elective English.
In addition to their usual emphasis on listening and speaking, these curricula have a
special focus on reading comprehension and writing skills. The core English curriculum,
for example, lists the following learning outcomes under “intensive reading” i.e. reading
with an eye for details (Guidelines and Syllabi, 2001, 25-26)

- reading and comprehending unsimplified texts of 500-750 words and guessing
  contextual meanings of unfamiliar words;
- perceiving the overall meaning and organization of the text;
- identifying the central/main idea and supporting details;
- locating specific items of information;
- making predictions about future events, developments etc; in the text.

Under ‘extensive reading’ i.e. reading with speed and grasping the meaning, the learners
are expected to read and comprehend extended texts (of at least 20 pages) related to
fiction, science fiction, drama, poetry, biography, autobiography, travel and sports in
abridged or original form.

So far as development of the writing skills is concerned, the learners are to develop
their competencies in relation to:

- text-based writing i.e. responding in writing to questions and tasks in prescribed
  or unseen texts;
- expository/argumentative essays of 250-500 words explaining or developing a
  topic, arguing a case etc;
- formal/informal letters and applications for different purposes; and
- writing related to workplace (i.e. minutes, memos, notices, summaries, reports,
  filling up of forms, preparing bio-data, CVs, e-mail messages etc;)

The English (Core) curriculum also lays stress on development of reference material
related skills including making and taking notes.

The themes around which learners are provided experiences related to English (Core)
are an extension of the eleven themes chosen under the secondary stage English
language curriculum.

The English (Elective) curriculum is geared to further development of the competencies
listed under the English (Core) curriculum through language experiences related to

Curriculum Based Learning
the above described eleven themes. The English (Elective) curriculum provides for the learner's attainment of an active vocabulary of at least 4000-5000 words and functional mastery of the basic grammatical patterns of the English language. Moreover, the new NCFSE curriculum requires the learners to develop their mother tongue to English translation skills for passages (of about 500 words) that are factual and/or literary taken from texts and/or from newspapers etc;

Thus we find a marked difference between the overall thrust of the Hindi (Elective) and the English (Elective) curricula. This is primarily because of the status of Hindi and English in the life of the learner and the society. While Hindi has the status of a mother tongue, English is a second language. Hence the thrust of the Hindi curricula is in favour of literature related to functional performance in various contexts of everyday social and work life.

### 15.4.4 Methodology and Instructional Strategies

Whatever the status of languages (viz., the first, the second, or the third language), language teaching at the primary stage emphasizes the primacy of the spoken language and the development of speech related skills viz., listening comprehension and speaking needed for interaction and communication. Instructional strategies at this stage emphasize the use of situational and activity-based language teaching. This is especially appropriate in view of the developmental stage at which learners find themselves. Language teaching should therefore be as joyful and appealing as possible. It is only during Class III that written language is to be introduced. Reading lessons should be preceded by a variety of reading readiness exercises, so that the process of reading becomes manageable and as interesting as elements and the appeal of a game.

At the upper-primary stage, the students are to work on contrived texts that are controlled in terms of sentence patterns, vocabulary, tense form of verbs, length of sentences and density of new vocabulary and structural items. However, during Class VII, the learner's should be presented semi-authentic texts that are a mix of partly contrived and partly natural use of language. At this stage, the teaching and learning of languages becomes more formal with teaching of grammar if necessary, though the overall approach remains interactive throughout.

At the secondary stage, the English language curriculum is designed to support further development of learners' English language proficiency. It has two-pronged thrust: (a) to equip learners with communicative skills to enable them to perform various language functions, and, (b) to help develop their cognitive and affective faculties. At this stage, the learner develops a vocabulary of 2000 words related to various disciplines e.g. information technology, environment, natural, sciences and social sciences. The learner also develops skills of forming new words with the help of prefixes and suffixes, making compound words, collocations, phrasal verbs and idiomatic expressions. Personal relationships, neighbourhood, the larger community, the nation, the world beyond, the world of adventure, health including reproductive health, the world of nature, science and technology, the world of imagination, are some of the themes around which the learner learns to communicate through English.

The variety of classroom activities through which the learner is able to communicate in English also increases. This may include role-play, simulating real-life situations, dramatizing and miming, problem solving and decision making, interpreting information in table form and schedules, using newspaper clippings, using language games, riddles, puzzles and jokes, interpreting pictures, sketches and cartoons, debating and discussing, narrating stories and anecdotes etc; reciting poems, working in pairs and groups; and using media inputs like computer. Television, tapes, video-cassettes and software packages are some of the activities recommended in the Guidelines and Syllabi (2001, 39).
The secondary stage English language curricula in planning all these activities emphasizes that the learner should be enabled to become an effective citizen, law-abiding, conscious of one's duties as described in our constitution, and proud to be an Indian and a responsible member of the human family.

Check Your Progress 2

Note: Write your answers in the space given below.

1) List any two important characteristics of human languages.

2) Explain the concept of the mother tongue.

3) What is the major focus of teaching a language at the primary stage?

4) At what stage the focus of teaching Hindi shifts from the language to literature?

5) Answer each of the following by writing T (true) of F (false) against them:
   a) Contrived texts in English are meant for classes VIII and IX.
   b) At the senior secondary stage, students get more learning experiences for developing their writing skills in English.
   c) Ability to read and comprehend unsimplified English texts of about 500-750 words developed in Classes IX and X.

15.5 LEARNING MATHEMATICS

Mathematics is essentially like a language and in some respects more than a language. Usually, a language is a means of expression and communication using written or spoken symbols, and by this criterion mathematics is a language, in fact "a language of complete abstraction". But unlike ordinary language, mathematics comprises "chains of logical reasoning" (Phenix, 1967, 73). Mathematical meaning can be communicated only to those who are familiar with its symbolic constructions. Mathematics through its symbolic systems strives to achieve complete precision in meaning and rigour in
reasoning. Typically in math, one really knows the subject only if one knows about the subject, i.e. if one examines and justifies each step in one’s reasoning, according to the canons of rigorous proof. This is because of the fact that logical consistency is the supreme principle in mathematical reasoning.

So far as inclusion of mathematics in school curriculum is concerned, it is primarily because of its utility value for young learners. Study of mathematics helps in developing the skill of quantification of experiences in real life. It promotes reasoning, abstract thinking and problem-solving. There is hardly any other school subject that does not have some relationship with mathematics. It is closest to physics and is helpful in understanding music and dance. According to National Curriculum Framework for School Education, “Mathematics helps in the process of decision-making through its application to real life situations in familiar as well as non-familiar situations, it contributes in the development of precision, rational and analytical thinking, reasoning, positive attitude and aesthetic sense” (2000, p. 55).

According to Curriculum and Evaluation Standards for School Mathematics, a document published by the National Council of Teachers of Mathematics (NCTM) in 1989, while learning mathematics at school, students should try to attain the following five goals:

1) Learn to value mathematics;
2) Become confident in their ability to do mathematics;
3) Become mathematical problem solvers;
4) Learn to communicate mathematically; and
5) Learn to reason mathematically.

In order to achieve these goals, students must be exposed to numerous and varied experiences that may enable them to value mathematics and develop mathematical bend of mind.

15.5.1 Primary Stage Math Learning

Through level-specific mathematics curriculum, we need to emphasize “the abilities to reason mathematically, communicate mathematically in a range of representative modes, make connections using mathematical concepts, and use mathematical applications or tools” (Adams & Ham, 1994, 185). The objectives and learning areas or content for primary stage math curricula as listed in Guidelines and Syllabi, (2002) are:

To enable the learner to:

- develop an understanding of the number concepts;
- develop understanding of four fundamental operations of addition, subtraction, multiplication and division and perform them with speed and accuracy in solving problems of day-to-day life;
- develop an understanding of various kinds of measures such as length, mass, capacity, time, money, temperature, area and volume and use these measures in situations arising in the learner’s immediate environment;
- develop an understanding and appreciation of geometrical shapes and their characteristics, and discuss and draw two/three dimensional shapes; and
- develop the power of interpretation and representation of given information.

The five learning areas in mathematics at the primary stage are:

a) Number and numeration;
b) Four fundamental operations;
c) Measurement: length, mass, capacity, time and money;
d) Geometrical shapes; and
e) Pictorial representation of data.

15.5.2 Upper Primary Stage Math Learning

The objectives of Math learning at this stage are to enable the learner to:

- consolidate his/her mathematical knowledge acquired at the primary stage;
- acquire knowledge and understanding of concepts, facts, principles etc. related to commercial mathematics, mensuration, elementary statistics;
- acquire knowledge and understanding of properties of geometrical figures through activities, experimentation, verification etc. in mathematical contexts;
- develop abilities to solve geometrical problems by identifying relationships between different parts of the problem and applying logical reasoning;
- acquire knowledge and understanding of the fundamentals of elementary algebra;
- develop drawing, model making and measuring skills;
- develop abilities to read and interpret data from statistical graphs; and
- appreciate the contributions made by ancient mathematicians particularly the Indian mathematicians.

The content of the math curriculum at this stage is related to five major areas viz., the number system, commercial mathematics, algebra, geometry and mensuration. The overall approach is to enable learners to understand the structure of math by dealing first with what needs to be understood. For example, under the number system, students of class VI learn about natural numbers and whole numbers, prime and composite numbers, factorization, LCM and HCF, integers, representation of integers on the number line, the basic operations etc. Class VII students begin learning rational numbers, equality and order relations, decimals, exponents and their laws. Thus the approach is to learn the basics, the first things first, so that more complex learning in math can be built upon it. Along with the teaching of concepts, the focus is on procedures and their application in simple problems.

15.5.3 Secondary Stage Math Learning

The learners at the secondary stage should be able to:

- consolidate the mathematical knowledge and skills acquired at the upper-primary stage;
- acquire knowledge and understanding of the terms, symbols, concepts, principles, process, proof etc.;
- develop mastery of basic algebraic skills;
- develop drawing skills;
- apply mathematical knowledge and skills to solve real mathematical problems by developing abilities to analyze, to see interrelationships involved, to think and reason;
- develop the ability to articulate logically;
Organising Learning

- develop necessary skills to work with modern technological devices such as calculators, computers etc.;
- develop interest in mathematics and participate in mathematical competitions and other mathematical activities in the school;
- develop appreciation for mathematics as a problem-solving tool in various fields for its beautiful structures and patterns etc.; and
- develop reverence and respect towards great mathematicians, particularly towards the Indian mathematicians for their contributions in the field of mathematics.

At the senior/higher secondary stage, the pupil:

- acquires knowledge and critical understanding of basic concepts, facts, principles, terms, symbols and mastery of processes and skills;
- applies mathematical knowledge and skills to solve problems within mathematics and problems from other subject areas;
- develops positive attitude to think, reason, analyze and articulate logically;
- develops appreciation for the beauty and logic of mathematics for its applications in sciences, social science, information technology and arts;
- develops interest in mathematics by participating in mathematical competitions, engaging himself/herself in self-learning;
- develops necessary skills to work with modern technological devices, such as calculators, computers etc; and develops understanding of cause-effect relationships and interplay of variables; and
- develops reverence and respect towards the Indian mathematicians for their contribution in the field of mathematics.

We find that these objectives are hierarchical. The objectives at the lower level pave way for attainment of objectives at the higher levels of school education.

The content for the math curriculum at the secondary stage (Class IX) includes irrational numbers, factorization of polynomials, ratio and proportion, linear equations in two variables, percentage, profit and loss, discount, compound interest, cost of living index, sales tax, banking, geometry-lines and angles, congruence of triangle, parallelogram, areas and constructions, trigonometric ratios, area of plane figures, volume and surface area of right triangular prisms, tetrahedrons and octahedrons, and elementary statistics, including graphical representation of data and measures of central tendency.

It may be noted that math curriculum for Class IX denotes a transition. It introduces trigonometry and statistics for the first time; this applies to income tax and banking as well. The new elements introduced at this stage get strengthened in class X. The class X curriculum includes linear equations in two variables, polynomials (HCF & LCM), quadratic equations, arithmetic progression, installments, income tax, similar triangles and circles and their constructions, trigonometric identities, trigonometric ratios of complementary angles, heights and distances, volumes and surface areas, statistics (mean, probability).

The senior secondary stage prepares students for university and professional courses; the math curriculum provides what many students describe as ‘a stiff dose’. The Class XI course starts with sets, relations and functions, mathematical induction, complex numbers, linear equations, sequences and series, Cartesian system of rectangular coordinates, circles, conic sections, binomial theorem, exponential and
logarithmic series, mathematical logic, three-dimensional geometry, vectors, and ends with stocks and debentures and index numbers.

The class XII course starts with matrices, Boolean algebra, probability, functions and limits, continues through vectors, partnership, bill of exchange, linear programming and ends with indefinite and definite integrals, differential equations, elementary static and dynamics and applications of calculus.

15.5.4 Values in Learning Mathematics

The learning of mathematics has two kinds of values: (i) those inherent in teaching-learning of mathematics, and (ii) contribution of mathematics in facilitating the learning of other school subjects. The latter are called ‘instrumental’ values of mathematics, while the former are known as ‘inherent values’ in learning mathematics.

Inherent values of teaching and learning mathematics are three viz., utilitarian, disciplinary and cultural values.

a) **Utilitarian Value**: Every person irrespective of his status and vocation utilizes the knowledge of mathematics in one-way or the other. A housewife managing the family budget, the milkman who delivers milk and collects his dues after a month, the newspaperman who supplies the morning copy from door to door, the shopkeeper, the banker, the engineer, the farmer, even the labourer use some knowledge of math in their professional and personal lives. The health of national economy touches every citizen's life directly or indirectly. Illiteracy in mathematics can be a tremendous handicap in effective management of money, as well as property. One has also to plan for tax savings and post-retirement life. Improved knowledge of mathematics contributes to the economy and prosperity of the country. The shape and structure of various objects, natural or man-made, adheres to and illustrates the principles of geometry. Patterns of change in natural phenomena e.g. seasons, rotation and revolution of planets etc. also illustrate mathematical principles.

b) **Disciplinary Value**: To do mathematics is to reason logically. Teaching and learning of mathematics disciplines the mind. Knowledge of mathematics improves one’s capacity to think and reason. Deriving of conclusions in mathematics is logical reasoning and it necessarily involves postulation thinking.

Another disciplinary value of learning mathematics is concerned with the ability to make valid generalizations. This ability is indeed hard to attain, and the ability to reason logically is a pre-requisite for it. Repetitive practice in mathematics can facilitate the development of the ability to generalize through induction and applying of a given generalization through deduction to a specific situation.

The learning of mathematics also facilitates the ability to transfer one’s knowledge in mathematics for use in another situation, or in another discipline. However, the teacher needs to emphasize this during teaching and provide practice for it.

c) **Cultural Value**: Human culture and civilization at any time reflect the use of mathematics. The entire design of the great pyramids rests on mathematics. The concept of zero was formulated by ancient Indian mathematicians and it led to place-value based number system. The famous Brihadshwara Temple of Tanjor and the placement of its ‘kalash’ would not have been possible without knowledge of mathematics. Cultural value of learning mathematics enables us to appreciate the achievements of mankind across the globe. The leaning tower of Pisa in Italy stands even today because of its mathematical design. Art, music, games and sports, poetry, painting, architecture, town planning etc; use mathematics in different cultural settings and enhance its quality.

So far as the instrumental value of mathematics in facilitating the learning of other subjects is concerned, the understanding of almost every subject in school curriculum can be improved/enhanced to some extent, if assisted by our knowledge of mathematics.
Physics comes closest to math and good knowledge of math is a real asset in learning physics. All chemical reactions and combinations involve the use of mathematics. Map-making, preparing population charts, studies of density of population in geography and study of astronomy involve the use of mathematics. At first sight biology may not appear to be related to math, but it in fact involves a fascinating use of math. Volume of human body and of the blood in it, weight, size amount of oxygen we breathe in, and the carbon dioxide that we breathe out - all these involve the use of our knowledge of math. Mathematics can help us in understanding why there are no small animals in arctic regions; even the size of penguin increases as one reaches the Pole. A polar bear if twice as large as a normal bear would consume eight times as much food and generate eight times more heat but its skin will be larger only four times, and therefore it can keep itself warm in the harsh cold of the arctic region.

15.5.5 Teaching-Learning Strategies for Mathematics

The teaching-learning strategies for mathematics should be in line with student’s interests and level of cognitive development peculiar to their developmental stages. Young learners cannot carry out abstract thinking; therefore activity-based teaching-learning strategies are found more effective for them. National Curriculum Framework for School Education (NCFSE) suggests that at the primary stage, the teacher must ensure that students are ready for learning mathematics and the learning experiences for them are planned and sequenced in advance. These experiences should be related to learners’ daily life, inside as well as outside school. Peer group, collaborative learning and use of learner-centered activities are particularly useful with these learners. Active learning of mathematics should be used through observation, comparing, asking questions, looking at patterns, classifying, generalizing, framing problems and solving them in groups. As far as possible, learning of mathematics should be made a joyful activity for young learners.

At the upper-primary stage, the learners should be taught elementary mathematical concepts; both from arithmetic and geometry. Strategies of teaching-learning mathematics should be such as to promote oral learning, experimental verification with the help of various models and instruments, and interpretation of data from graphs, charts and diagrams, model making, and the skill of drawing figures to scale. It is important to strive for mastery level learning at this stage, and remedial instruction should also be carried out to ensure that students attain the stage-specific objectives of teaching-learning of mathematics. At the secondary and the senior secondary stage, teaching of mathematics as a discipline should be taken up, and teaching-learning strategies used at these stages should enable learners in laying firm foundations for higher studies in mathematics. Mathematical reasoning should be promoted and the students should be enabled to use logical reasoning for proof through deductive reasoning. Wider applications of mathematics in various organized activities, industries and study of other disciplines e.g. physics, chemistry, biology etc; should be emphasized.

### Check Your Progress 3

1) Answer by writing T (True) and F (False) for each of the following statements:

a) Concrete experiences should be used for teaching math to students of classes I & II. ( )

b) Students learn about algebraic expressions for the first time in class VII. ( )

c) Math students are introduced to cube roots of perfect cubes by factorization in class VII. ( )

d) Matrices are taught to students of class XI. ( )
2) Why is it said that math curriculum for class IX denotes a shift in its focus?

3) Describe the disciplinary value of learning math.

15.6 LEARNING SCIENCE AND TECHNOLOGY

You may be surprised to find 'science' and 'technology' occurring together in the heading. NCFSE (2000) uses this expression because science should not be taught in schools without its application aspects. Thus while 'science' connotes 'theory', 'technology' underlines its practical use in today's world.

It is not hard to make a case for teaching science and technology as part of school education. If we were to make a list of the reasons why it should be taught in schools, we'll easily be able to prepare quite a long list. Today's world is indeed the success story of science. Science has not only deepened our insights into the physical world in which we spend our lives, it has literally transformed the way in which we live. For this reason alone, science and technology must be included as a key area in school curriculum. Theory of evolution changed our views about origin of life in general and origin of human beings in particular. Science can help students appreciate the common heritage of different ethnic groups, and treat differences of colour and gender as superficial. In fact, if taught properly, science can enhance our respect for all forms of life and improve natural and social harmony, and overall develop a concern for the health of this planet, our only home.

To the question "What is science?", one could respond in various ways, such as (a) 'it is a body of knowledge'; (b) 'it is systematic empirical inquiry into our physical environment'; (c) 'it is the set of various activities that scientists carry out; and (d) 'it is a philosophy of life, a perspective on what we find around ourselves'. According to Phenix (1967), science is systematic empirical inquiry concerned with matters of fact and resulting in abstract descriptions. Physical science describes the world through physical measurement i.e. quantitative assessment of material objects and processes using agreed upon standards of 'mass', 'length' and 'time'. However it should be remembered that physical science does not provide a complete description of the world or the whole truth about it. For example, colours as perceived by us in life have no meaning to the scientists, unless they are taken as measurable wavelengths of light. This process of physical measurement helps scientists infer and make precise formulations of scientific ideas. The goal of science is the creation of validated knowledge about our physical world in the form of theories and mathematical propositions. Theories are conceptual structures that explain phenomena, enable us to make predictions and to exercise control. A theory can be compared to a map, a formal representation of an area, which helps us to understand it, and explore it in detail without losing our way. We must remember that science is essentially 'provisional', i.e. true until proved wrong. Scientific findings are never final and true for all time to come. Scientific knowledge is accepted as good only within the limits established by prior tests and always subject to revision in the light of new evidence.
Science in the school curriculum consists of integrated study of physical environment, which includes the study of matter, life, and cosmos. Thus its curriculum would consist of physics, chemistry and biology as an integrated area of study.

In the context of learning science, we often come across the concept of 'scientific literacy'. American Association for the Advancement of Science describes scientific literacy in terms of the following six characteristics:

- Being familiar with the natural world and recognizing its unity and diversity;
- Understanding important concepts and principles of science;
- Understanding some of the important ways science, mathematics and technology depend on each other;
- Knowing that science, mathematics, and technology are human enterprises, and what this implies about their strengths and weaknesses;
- Having a capacity (ability) for scientific ways of thinking; and,
- Applying scientific knowledge and ways of thinking to achieve personal and social purposes.

Teaching scientific literacy means organizing science-based learning experiences around real-life issues.

15.6.1 Primary Stage Science Learning

According to Association for Science Education (ASE), teaching science in school should enable the learner to:

- appreciate science as a human activity;
- understand how science operates;
- know and understand scientific concepts and principles;
- be scientific; and
- relate scientific enquiry and action to other modes of human behaviour. (ASE, 1992,6)

NCFSE (2000) recommends that keeping in view the developmental characteristics and needs of primary stage learners, Environmental Studies should be taught as an independent curricular area in classes III - V. In classes I & II, environmental concerns should be taken up through language, mathematics and Art of Healthy and Productive Living (AHPL). Environment Studies (EVS) should focus on developing habits, attitudes and skills in the child for being a healthy and active member of the community.

The objectives of teaching EVS at the primary stage should help the learner to:

- become healthy-physically, emotionally, socially and mentally;
- be able to function effectively as a member of the social groups that he/she belongs to;
- develop skills, attitudes and values for improving the quality of life of self and that of community; and
- appreciate the need to live in harmony with nature.

According to Guidelines and Syllabi for Primary Stage (2001), teaching EVS at this stage should help learners achieve Learning to know, Learning to Do, Learning to Live Together and Learning to Be, the four pillars of learning advocated in Delors' Commission Report (UNESCO, 1996).
15.6.2 Upper Primary Stage Science Learning

The objectives of teaching Science and Technology at the upper-primary stage are to:

- expose the children to basic processes of science;
- understand the processes that underlie simple scientific and technological activities;
- develop an understanding of some basic principles and laws of science;
- make the children understand applications of basic scientific principles to solve problems related to daily life;
- develop the ability to apply appropriate concepts of science to technology;
- develop measurement and manipulative skills and to encourage the use of locally available resources;
- familiarize the children with life processes, health, nutrition and human diseases;
- acquaint the children with the technology that abounds in immediate surroundings;
- create an awareness of the immediate environment and a need for its protection;
- make the children recognize the relation to science, technology and society;
- inculcate in children some of science and technology related values; and
- to provide scientific and technological literacy to the learners.

15.6.3 Secondary Stage Science Learning

The objectives of teaching science and technology at the secondary stage (classes IX and X), which is also the last stage of general education, are to enable the learner to:

- understand the nature of science and technology;
- understand the basic concepts, principles and laws of science;
- apply basic scientific principles in finding solutions to problems related to agriculture, energy, health, nutrition etc;
- develop problem-solving and decision-making skills;
- inculcate values that underlie science and technology;
- develop an understanding of the various processes of environment and concern for its conservation and preservation;
- understand and appreciate the joint enterprise of science, technology and society;
- develop rich and satisfying views of the universe;
- develop an attitude which would equip them to continue science and technology education throughout life;
- acquire process skills which form part of the attitude for developing a scientific temper; and,
- develop certain manipulative skills which are required in day-to-day life situations.

At the higher/senior secondary level, science is taught as separate disciplines viz., physics, chemistry and biology and each of these has its discipline-specific objectives.
These are given below:

**Physics:** Teaching of physics at the senior secondary level should:

- strengthen the concepts developed at the secondary stage to provide firm ground work and foundations for learning at the tertiary level and learning the relationship with daily life situations;
- develop conceptual competence in the learners so that they can cope up with professional courses in future career;
- expose the learners to different processes used in physics-related industrial and technological applications;
- develop process-skills and experimental, observational, manipulative, decision-making and investigative skills in the learners;
- promote problem-solving abilities and creative thinking to develop interest in the learners in the study of physics as a discipline; understand the relationship between nature and matter on scientific basis, develop positive scientific attitude and appreciate the contribution of physics towards the improvement of quality of life and human welfare.

**Chemistry:** In teaching chemistry as an area of school curriculum, the objectives are to:

- promote understanding of basic facts and concepts in chemistry while retaining the excitement of chemistry;
- make students capable of studying chemistry in academic and professional courses (e.g. medicine, engineering, technology) at tertiary level;
- expose students to various emerging new areas of chemistry and apprise them of their relevance in their future studies and their application in various spheres of chemical sciences and technology;
- equip students to face various challenges related to health, nutrition, environment, population, weather, industries and agriculture;
- develop problem-solving skills in students; expose the students to different processes used in industries and their technological applications;
- apprise students of interface of chemistry with other disciplines of science, such as physics, biology, geology, engineering etc;
- acquaint students with different aspects of chemistry used in daily life;
- develop an interest in students to study chemistry as a discipline.

**Biology:** Teaching of biology at the senior secondary level should

- promote understanding of basic principles of biology;
- expose learners to emerging knowledge in biology and its relevance to individuals and society;
- acquaint students with benefits of knowledge about issues related to nutrition, health, population, environment and development;
- encourage specific attitude to issues related to population, environment and development;
- develop skills to study and understand complexities of living world and harmonious co-existence;
- enhance awareness about environmental issues, problems, and appropriate solutions; develop appropriate environmental ethics, values;
- enable students to appreciate the complexity of living world and the role of biology vis-a-vis other disciplines; and,
- enable students to appreciate the role of biology in dispelling myths, misconceptions and misbeliefs.

15.6.4 Teaching-Learning Strategies for Science and Technology

At the primary stage, instead of science and technology, we teach Environmental Studies (EVS). Teaching of EVS can take three forms:

a) Learning about the environment which should be concerned with developing knowledge about the content and processes of the environment through systematic exploration by means of a variety of activities;

b) Learning in the environment that should promote learning science outside the classroom and the laboratory, in the real context of life to develop understanding. Field trips, real-life projects, guided field experiments etc; can be the teaching-learning strategies for this; and

c) Learning for the environment which can enable students to develop opinions and make decisions about the connections between human activities and the environment. This indeed constitutes a very challenging part of EVS.

At the upper-primary and the secondary stages, a thematic approach for teaching science and technology has been recommended in the Guidelines (2001). These themes continue throughout this stage and even at the secondary stage but every time they recur, the content becomes richer and more detailed. In order to attain the objectives of teaching science and technology the teacher should use a variety of techniques based on process skills in science. These could include demonstration in laboratory, problem solving through modeling, experiments, projects, quiz sessions, making functional models. Collaborative work techniques can be particularly useful in teaching science and technology. Visits to a variety of industrial plants, extramural talks by experts from industry etc; can also be used to advantage.

15.6.5 Process and Skills Based Science Curricula

During the 1960s and 1970s, the debate about the objectives of science education treated the science process skills and science concepts as if these were independent and separable. For example, Elementary Science Study (1966) was considered primarily process skill based, while COPES (Conceptually Oriented Program in Elementary Science) developed in 1971 was predominantly based on science concepts. During the 1980s, it was realized that the concepts and process skills in science education could not be treated as isolated because they are interdependent. However, science process skills can be relatively more emphasized at the elementary stage of schooling if the curriculum is largely activity-based. The notion of ‘process skills’ in science needs to be examined a little closely. In teaching science and technology we cannot accept that a ‘skill’ is simply the ability to perform some manipulative task. Science process skill involves perception, decision-making, knowledge, judgments and understanding in addition to some meaningful coordinated overt activity by hands, of speech etc.

Watts and Michell (1987) have listed various skills and processes related to science education that have been shown in Fig. 15.7.
Process and skills based science curriculum has special relevance for enabling the students to understand what science is all about. If science is what scientists do, then process and skills based science curricula can help the students to learn science by doing, through a variety of activities, peer discussion and using science related processes and skills. This approach to science education can promote interest in science and help in developing positive attitude towards science, and assimilate the values it stands for.

15.6.6 Attitudes and Values through Learning Science

Attitudes and values promoted through teaching-learning science include the following:

- curiosity
- respect for evidence
- willingness to tolerate and live with uncertainty
- critical reflection
- perseverance
- open-mindedness
- respect for analysis and synthesis; and
- creativity and inventiveness.

According to NCFSE (2000), "learning of science in schools augments the spirit of enquiry, creativity and objectivity along with aesthetic sensibility. It also nurtures the ability to explore and seek solution of the problems related to environment and daily life situations and to question the existing beliefs, prejudices and practices in society" (p. 58).
Check Your Progress 4

Note: Write your answers in the space given below.

1) Explain why scientific knowledge is always taken as provisional and not final.
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2) Explain "learning in the environment" as part of learning science.
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3) How is science taught in classes I and II?
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4) List any four values that can be learnt through science and technology.
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15.7 LEARNING SOCIAL SCIENCES

The area of school curriculum now called "social sciences" was earlier known as "social studies" which consisted of subjects directly related to the organization and development of human society, and to man as a member of social groups. Under its new name, social sciences curriculum enables learners to understand the human environment in its totality and in the process develop a broad perspective and an empirical, reasonable and humane outlook. Man's struggle with environment in the past and even today, the use of his powers and resources for his development and the essential unity of human civilization constitute the main themes of social science curriculum.

The well-organized democratic societies of today hinge on harnessing the developments of science and technology for the benefit of people. Their maintenance and progress can be ensured only through education, enabling the young learners in our schools grow up as mature, well-informed, responsible citizens of tomorrow, capable of managing, maintaining and further improving the society. Thus, the proper transaction of the social sciences curriculum becomes of critical importance. The social science curriculum draws its content mainly from four social sciences viz., geography, history, civics and economics and some parts of sociology. The elements drawn from these five disciplines help learners understand various dimensions of their social environment. Social Sciences provide a socio-spatial-temporal view of the development of human society, and thereby help the learner to understand the inner working of human society in totality; the pressures and the forces that operate on it, and the various processes that serve as checks and balances to maintain it. In order to enable the learners to
understand human society in a holistic manner, it is essential that the social sciences curriculum be transacted in an integrated manner and not as a mixture of discrete disciplines.

The modern world is shrinking fast. Globalization, open market economy, liberalization and terrorism have brought societies the world over closer to each other. The social sciences curriculum should enable learners to understand the processes of social change working in society, and the process of development and its effect on the system of governance at all levels-local, state and national, and how they can strengthen it. The curriculum should enable students to think globally and act locally.

15.7.1 Primary Stage Social Science Learning

At the primary stage, social sciences are part of Environment Studies (EVS) but for classes I & II, the basic lessons are taught through a newly introduced paper 'The Art of Health and Productive Living' (AHPL). The AHPL curriculum focuses on the development of skills, habits, and attitudes towards (a) health care of self, and; (b) social values and skills. The learning experiences provided for the inculcation of social values and skills include participation in group songs, helping friends, taking interest in group work of various school and social activities and staying and working with friends, insistence on punctuality and regularity, honesty and truthfulness, showing concern for others and appreciating the good qualities of others. Besides, familiarizing oneself about the availability of various facilities like office, primary health center and making use of these, visiting of local historical places are included in the social sciences component of the AHPL curriculum.

The EVS curriculum for classes III - V is built around four themes viz., Learning to Know, Learning to Do, Learning to Live Together and Learning to Be. The social science component in the EVS curriculum is meant to enable the learners to:

- develop an understanding of social, cultural, natural and man-made environment and their interdependence;
- develop healthy attitude towards dignity of labour;
- develop skills of reading a map, locating places in the map and using the globe;
- develop social skills and values e.g. caring, sharing, cooperation, tolerance, working for common good etc;
- learn to live in harmony with environment and people of different communities and faiths;
- recognize and appreciate contributions made by people in the past and now for the community welfare;
- respect rules made by the community for people’s welfare;
- understand and play one’s appropriate role as an individual in home, school and community;
- practice positive values specific to their context e.g. truthfulness, honesty, brotherhood, patriotism etc;
- show and promote concern for others and environment; and
- appreciate culture and traditions and take pride in being an Indian.

It is to note that this curriculum lays the foundations for responsible citizenship of young learners.
At the upper primary stage students learn in detail about the country i.e. India and the world. The interaction among various components of environment is presented to them through processes and patterns e.g. patterns of rainfall in different regions and of urban and agricultural land uses. They learn about India’s past through study of selected events and developments- social, cultural and scientific. They learn about our ancient cultural heritage and also about other civilizations and the contribution of Indian civilization to the common human heritage. Study of contemporary society, its set-up, its social, political, economic and cultural institutions, its administration and governance deepens learners’ understanding about it and the country. Through the social sciences curriculum at the upper primary stage, learners become familiar with social skills as well as civic competencies.

The evolution of human society is a dynamic process and modern societies are continuously changing because of internal pressures and processes and external factors. At the upper primary stage, the students learn that the present is just a small segment of a much longer continuum of development and evolution of society. They also learn that just as the past of a society determines to a great extent its present, the present in turn will contribute to its future shape.

The major objectives of the social sciences curriculum at this stage are to enable the learners to

- develop an understanding about the earth as the human habitat;
- develop an understanding of the evolution of human societies and civilization in India and elsewhere in the world with their interconnections;
- develop an appreciation of the contributions made by different societies and civilizations to the progress of human-kind as a whole and India’s contribution to the world civilization and vice versa;
- develop an appreciation of the growth of various components of the Indian culture and take legitimate pride in India’s achievements in different periods and in different parts of India and the world;
- understand and appreciate the diversities in lands and people of India and the world and their interdependence;
- understand contemporary India and the world and become aware of the current processes of change and related issues and challenges;
- develop an understanding of natural and human resources and their potentialities for a better tomorrow;
- develop an understanding of the structure and functioning of civic, political, and economic institutions;
- develop an awareness of the various social and economic challenges facing the country;
- acquire the necessary skills and abilities, both academic and social to differentiate between fact and opinion, and think critically and creatively, communicate effectively and cooperate with others and respond to their needs; and
- develop a scientific temper and pro-active attitude to face challenges and unfamiliar situations with confidence.

The students through the prescribed social sciences curriculum learn substantially about the Earth, our habitat, people and society during the ancient the medieval and the modern period, community and its development, our environment, people and
government, resources and development in India and the world, and the major issues and challenges.

15.7.3 Secondary Stage Social Science Learning

The social science curriculum at the secondary stage has its focus on contemporary India, the processes and patterns of man-environment interaction and issues related to environment, its resources and developments in country’s past e.g. struggle for independence, the contributions of various sectors of society, especially the women; social, economic and political developments in free India. The students also learn about the various challenges that we face as a nation (e.g. poverty, illiteracy, corruption, anti-social practices), and about the citizen’s fundamental rights and duties. They also learn about India’s role in the world peace, international cooperation and decolonisation. The major objectives of the social sciences curriculum at this stage are to enable the learners to:

- develop an understanding of change and development as processes in time and space that enable societies to evolve;
- develop an understanding of contemporary India in its historical perspective, of the basic framework of the goals and policies of national development in independent India, and of the process of change with appropriate connections with world development;
- deepen their knowledge and understanding of India’s freedom struggle and its values and ideals and contribution of various sections of society;
- understand the values enshrined in the Indian Constitution and prepare for their roles and responsibilities as effective citizens of a democratic society;
- deepen their knowledge of India’s environment in its totality, the interactive processes and effects on future quality of life of our people;
- understand the diversity in the land and people of India and appreciate its underlying unity;
- appreciate the richness and variety of India’s heritage, both natural and cultural, and the need for its preservation;
- understand the issues and challenges of contemporary India-environmental, economic and social, as part of the development process;
- learn to live in a confident, stress free and responsible manner and participate effectively in the community;
- develop scientific temper, spirit of inquiry and follow rational and objective approach in analyzing, interpreting and evaluating data; and
- develop academic and social skills e.g. critical thinking, communicating effectively both in visual and verbal forms, cooperating with others, taking initiative and providing leadership for solving problems.

The social science curriculum at the secondary stage is built around six themes viz., India in the twentieth century world, making of a modern nation, land and the people, heritage of India, resources and their utilization, and economic and social development. The first three themes are for class IX and the rest are for class X.

At the senior secondary stage, there is no composite social sciences curriculum. Various social sciences e.g. History, Geography, Economics, Political Science and Sociology are chosen by students according to their preferences, and they take the CBSE examination for these. Each of these social sciences has a distinct set of objectives based on the nature of the discipline and carefully chosen subject matter.
Values and Attitudes through Learning Social Sciences

Learning social sciences promotes various values and helps to develop positive attitude towards various aspects of our social and political life. Chief among the values promoted through learning of social sciences are the following:

1) Secularism and respect for all religions, sects and faiths. These are very important values in the composite culture because followers of nine religions live amicably in our country. Besides, secularism is a basic value emphasized by our Constitution. Secularism is the essential characteristic of our multicultural society.

2) Tolerance for others' faith and viewpoint. This is an essential value of democratic way of life. Without tolerance for each other’s faith and views, our society cannot exist.

3) Respect for the Constitution and faith in the supremacy of law. Through social sciences, students learn about the supremacy of the Constitution and the law of the land. This promotes the hope that when these learners grow up, they would become law abiding citizens.

4) Legitimate pride in India, her people, heritage and national symbols. Through learning social sciences, students can learn that legitimate pride in one’s country, its people and traditions does not mean hatred for others.

5) Responsibility for one’s community and nation and concern for their people.

Social sciences help the learners to develop positive attitudes towards participation in political processes, social and economic life, democratic way of social life, cooperation with others, mutual concern for each other’s welfare and the desirability of negotiation and consensus building.

In fact, social sciences curriculum, if properly transacted through collaborative groups and projects can more than any other curriculum lead to inculcation of values and attitudes and social skills without which our collective welfare may remain considerably unrealized.

Check Your Progress 5

Note: Write your answers in the space given below.

1) Why must the social sciences curriculum be transacted in an integrated manner?

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2) What do students of classes I & II learn through The Art of Healthy and Productive Living?

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3) Around what themes is the EVS curriculum for classes III - V built?

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4) List three main topics learnt by students of upper-primary stage in social sciences curriculum.

   a) .................................................................
   b) .................................................................
   c) .................................................................

5) Answer by writing T (True) or F (False) against each of the following statements.

   a) Students at the secondary stage learn primarily about the contemporary world. (  )
   b) Students learn about the challenges modern India faces in class VIII. (  )
   c) Students of secondary stage learn about India in the twentieth century world. (  )
   d) Collaborative work and group projects can help the students to assimilate inherent values in social sciences curricula at the school. (  )

15.8 ART EDUCATION

Art Education has been a significant curricular area of school education. Its purpose is to ‘develop aesthetic sensibility among learners so as to enable them to appreciate the beauty in nature, line, colour, form, movement, sound, rhythm, harmony and balance’ (Guidelines and Syllabi for Upper Primary Stage, 2001, 71). Art education promotes creative expression and helps to develop appreciation of the oneness of human family and of human heritage. The rock paintings at Bhimbetka, near Bhopal, provide us an amazing insight into various modes of creative expression of the primitive man.

Art education as a curricular area cuts across national boundaries, political ideologies and school systems. It figures in almost all school education curricula of general (i.e. undifferentiated) education. The urge to express oneself creatively and aesthetically has been a typical characteristic of humankind. Human beings have always tried to express beauty in nature through various modes of creative, aesthetic expressions and derive joy as well as experience a sense of fulfillment and enrichment from it. However, as a curricular area of school education, Art Education has respected children’s characteristics peculiar to their various developmental stages. This is best reflected by stage-specific curricula in Art Education.

15.8.1 Art Education at Primary Stage

NCFSE (2000) takes a broader and more realistic view of art education at the primary level and calls it The Art of Healthy and Productive Living (AHPL). It represents a merger of what earlier existed as three distinct areas viz., Art Education, Work Experience, and Health and Physical Education. Through this seamless merger, AHPL seeks to provide meaningful learning experiences that would support all round development of the child’s personality. NCFSE (2000) recommends that learning experiences in the context of AHPL should be "organized keeping the child in central focus involving students in activities commensurate with their developmental stage. Activities related to health will get a prominent place so that children acquire necessary skills, attitudes and habits to keep themselves healthy ... Children will be initiated into preliminary yogic exercises and will be exposed to various soothing experiences in the field of music, drama, drawing and painting and clay-modeling ... All these activities need to be presented in an integrated manner for which themes will be identified
and teachers will make use of available resources and harness community support…” (p. 47)

Learning experiences relating to AHPL should enable the learners to:

- develop regular habits and attitude to meet the natural needs of the body;
- understand the functions of different parts/organs of the body and develop habits to keep them clean and healthy;
- develop sensitivity towards their immediate environment and understand the interdependence between humans and the environment;
- develop values such as cooperation, tolerance, caring and sharing;
- develop physical, mental and emotional well-being through yoga and games;
- nurture self-expression and creativity through visual and performing arts;
- develop human values like honesty, truthfulness, respect for others, punctuality, regularity and appreciate these in others;
- appreciate the local as well as national cultural heritage;
- develop feelings of patriotism, nationalism and take pride in being an Indian; and
- develop awareness to protect and conserve India’s historical and cultural heritages.

These objectives constitute the relatively more important learning outcomes of teaching AHPL.

The Guidelines and Syllabi (2001) recommend that teaching-learning strategies for AHPL should be based on activities that are perceived as interesting and joyful by learners, are related to children’s background and immediate environment and provide scope for children’s creative expression through various art forms. The Guidelines and Syllabi (2001) make it explicit that instead of formal evaluation of AHPL-related learning, children should be assessed informally and on a continuous basis. If necessary, remedial instruction may be provided to children who need it.

15.8.2 Art Education at Upper Primary Stage

At the upper primary stage, AHPL becomes more focused and it is called ‘Art Education’. Its major objectives at the upper primary stage are:

- to enable the children to identify feelings, thoughts, emotions and fantasies in interactions with environment;
- to help learners organize thought processes and experiences and express these through a variety of media viz., body movements, sound, graphics, painting etc;
- to help children discover and identify their potentials, experience their individual self and relate it to their surroundings through different modes of expression;
- to help develop self-dignity, originality, self-expression, individuality and initiative through creative experiences;
- to help develop a sense of expression, organization and a sense of design;
- to inculcate liking for order in art activities and personal life;
- to develop team spirit through group activities; and
- to develop understanding and appreciation of one another’s cultural heritage.
The Art Education syllabus at this stage consists of three areas viz., visual arts, performing arts and creative drama. Under visual arts, two dimensional pictorial experiences are to be provided through drawing and painting, printing and designing, collage making and applied designing including free handwriting and calligraphy. Experiences and activities related to three dimensional objects and sculpture include making shapes and forms with clay, making 3-D objects with waste material and preparing masks and puppets. Group activities in this context would include study trips to botanical and zoological parks, art exhibitions and work places of craftsman and artists, chorus singing, community singing and organized visits to art galleries and museums.

Syllabus for performing arts include theory of music (basic concepts e.g. sangeet, nad, shrut, swar, saptak etc.;) and life sketch of a reputed musician of India; knowledge of ragas (e.g. Rag Bhupati, Rag Yaman and Rag Bilawal etc;) and rhythm, knowledge of songs (e.g. Teen Tal, Kaharva, Dadra, Jhaptal), including patriotic and devotional songs, National Anthem and Vandematram, flag songs and welcome songs.

The syllabus in respect of creative drama includes activities that can be enacted through rhythmic movement, and mime with speech, music and rhythm. Various activities under this can include recitation of poetry, acting, characterization, improvisation and group work e.g. producing and staging a play.

15.8.3 Art Education at Secondary Stage

At the secondary stage, art education explores various means of communication viz; verbal as well as non-verbal. Awareness of various art forms, use of various art materials, tools and instruments, developing a sense of space organization, design and order, as well as aesthetic sensibilities are the major concerns in art education at this stage. The objectives of art education at the secondary stage are to:

- help students to consolidate earlier experiences and knowledge related to art education;
- enable learners to become aware of new media and techniques and use these for creative expression;
- help students become aware of folk arts, local specific arts and other cultural components of our national heritage;
- enable students to use artistic and aesthetic sensibility in everyday life;
- develop as a balanced social being through projects on national and cultural heritage;
- develop acquaintance with the life and work of local artists;
- develop creative expression through locally available material; and
- refine one's sense of appreciation of the beauty of nature and the basic elements of art forms.

The syllabus for art education at the secondary stage has three components viz., visual arts, performing arts, and creative writing and poetry. Under visual arts, the learners are expected to work on two-dimensional as well as three-dimensional objects. These include learning experiences of various types e.g. drawing and painting, collage making, print making, photography, computer graphics (wherever necessary resources are available), clay modeling, pottery, carving and sculpture and construction of objects. Under performing arts, learning experiences are to be related to vocal and instrumental music, movement and dance, creative drama and puppetry.
15.8.4 Values and Attitudes through Art Education

Art Education promotes values that are not easily fostered through other subjects; chief among these are the following:

- **Creativity**: Through art education children learn to perceive the common and the routine in new perspectives. They learn to do so by extending their unique or alternative perceptions so that a new holistic experience takes shape. This capacity to perceive things in alternative perspectives and arrive at a different yet valid re-arrangement of parts is the hallmark of a creative mind. All too often, routine and pedestrian classroom teaching dulls children's creativity and compels them to think convergently instead of divergently.

- **Imagery and Intuition**: Art education promotes imagery and intuition in children. Art education can support the development of children's imagery in a special way. Adams and Ham (1994, 271-273) describe various activities that not only enable children to develop imagery and intuition but also determine what would come next using their mental pictures.

- **Non-Verbal Communication**: Art education encourages learners to develop their non-verbal communication. Whatever form art education may take, it will surely promote the child's capacity to communicate complete meaning. Besides, it can equip learners with skills to understand and respond to non-verbal communication from others. After all, reading an artist's symbols is as much a skill as reading print or video images.

- **Aesthetic Sensibility**: It is through art education that learners can be enabled to develop and use aesthetic sensibility. A work of art, whatever the medium, is characterized by form, order, harmony, beauty, meaning, mystery and quality. Through art education, these aspects of aesthetic sensibility can be promoted among learners.

- **Complete Attention to the Task**: Art education provides invaluable practice and opportunity to learners to devote complete attention to the task, to immerse themselves totally in the job, to identify themselves completely with the role/character being played by them. This ability to devote one's complete attention to the task in hand has immense transfer value for learning other subjects.

- **Appreciation**: Art education can promote the skill of appreciating the work of others on the basis of accepted criteria. Learners can also appreciate the labour and the devotion that goes into the making of a work of art. Art education can also make learners aware about the possible flaws that can mar the effect of a work of art.

Art education can introduce students to that sense of wonder and awe which is embodied in a real work of art. This sense of wonder and awe can enable students to engage in shared search for meaning and interpretation of their experiences.

In the end, we would do well to remember the words of Voltaire who was convinced that without knowledge of arts children would remain as ignorant as without knowledge of literature or mathematics.

15.9 LEARNING FOR MASTERY

It is expected that so far as the basic elements of curriculum-based learning are concerned, these should be mastered by all learners. Learning for mastery leads to mastery learning. It is normally denoted by the expression 100/100. The first number represents the percentage of competencies to be achieved while the second denotes the percentage of students who actually achieve the competencies represented by the first number. Ideally, the learners should achieve 100/100 (or 100' 100) learning, but
Organising Learning

too often it does not happen because of various reasons e.g. individual differences related to intelligence, motivation, available academic and emotional support at home, level of learner's reading and listening comprehension, learning deficiencies related to previous learning and allied academic areas etc. Normally mastery learning is assumed to have taken place if students are able to achieve 90°90 (in subjects like math) or even 70°70 (in languages). Learning for mastery is a key concept for Minimum Levels of Learning (MLLs) especially at the primary stage. The progress of the entire class cannot be slowed down just because a few students are not able to perform like others. The teachers have no other option except to redefine mastery learning at a little lower level; instead of waiting endlessly for 100/100, they may feel that 80/80 would be acceptable for a specific group of learners in their specific subjects.

How to Promote Learning for Mastery

Learning for Mastery, like learning, does not happen somehow and by itself; it has to be planned for. At the primary stage, the teacher can use child-centered pedagogy and activity-based learning. Teaching should be at the learner's level of understanding and if possible through a style that is closest to the learner's preferred style of learning. It is better to aim at a little over learning instead of under-learning. And through repeated use of questions, the teacher should obtain feedback whether (s) he is teaching effectively and to what extent.

At upper primary and secondary stages, the teacher should provide for individualized learning through programmed self-learning materials and Personalised System of Instruction (PSI). Besides, teachers can use individualized assignments suitable for learner's ability level and provide more practice, and also use collaborative techniques of teaching-learning. These measures will increase learners' interactions and peer learning.

Check Your Progress 6

Note: Write your answers in the space given below.

1) Briefly describe why art education should be a part of general education.
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2) What do students learn about visual arts at the upper primary stage?
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3) Explain 'aesthetic sensibility' as a value promoted by Art Education.
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4) Describe why the target of 100/100 learning for mastery is normally hard to achieve.
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15.10 LET US SUM UP

Through this Unit on Curriculum Based Learning, you have learnt a good deal about the nature of school curriculum, their types and the controversial aspects of any school curriculum especially the National School Education Curriculum and the hidden curriculum.

In terms of its content, it is a rather heavy unit because the subject curricula have been dealt with in terms of three stages of school education viz., the primary, the upper primary and the secondary, which also includes the senior secondary. Under subject curricula, we have learnt in detail about the objectives, the content and the methodologies of teaching and learning of (a) languages - Hindi and English, though at some places Sanskrit was also discussed, (b) Mathematics, (c) Science and Technology, (d) Social Sciences and (e) Art Education. The recently developed National Curriculum Framework for School Education (2000) and the four-volume Guidelines and Syllabi (2001) provide a contemporary focus and futuristic orientation to our school curricula. In addition to the aforementioned aspects of subject curricula, we have studied about the values and attitudes that can be promoted through these curricula. The objectives and the content of each subject curriculum define and describe 'what' student learn, while the methodologies of teaching-learning describe 'how' this learning is expected to be promoted. You will find it necessary to often revisit this Unit because much of it is directly concerned with what happens in the classroom to promote student learning.

15.11 UNIT END EXERCISES

1) Choose a curriculum subject (primary/secondary/senior secondary) according to your academic expertise and analyse the content of the textbooks with reference to the objectives of teaching the subject at that level. Do the contents and objectives match? Is the content difficulty level according to the cognitive ability of children of that particular age group?

2) Does the curriculum content you have chosen include local knowledge? If not, how will you include some local knowledge into your school curriculum framework?

15.12 REFERENCES AND SUGGESTED READINGS


