CHAPTER- I

INTRODUCTION AND CONCEPTUAL FRAMEWORK

1. INTRODUCTION

Human life the best creation of God has got two aspects: the biological and sociological or cultural. While the former is preserved and transmitted by food and reproduction, the later is preserved and transmitted by “Education”. The Biological aspect is found in plants and animals life also. But the sociological or cultural aspect is the rare distinction of human life alone. It is only ‘Man’ who is capable of being educated. Through education he tries to seek new ideas and new ways of life and he promotes his intelligence and knowledge. (Ecology, 1995, pp203)

1.1 SCIENCE EDUCATION

Science is an attempt to make the chaotic diversity of our sense experience corresponds to logically uniform system of thoughts “Science is the human endeavor that seeks to describe with ever increasing accuracy, the events and circumstances that occurs or exists within our natural environment”. Science in modern life has the following values: (i) intellectual value (ii) practical value (iii) cultural value (iv) vocational value (v) moral value (vi) aesthetic value and (vii) psychological value. Science has different branches – physics, chemistry botany, zoology, physiology, environment; these subjects are included in the school curriculum in a compartmentalized manner. The importance of science education is that no person can live intelligently in our modern society without at least a layman’s understanding of science and its impact. (Environmental Education, 2003, pp46)
1.2 VARIOUS BRANCHES OF SCIENCE

Science mainly has the following branches (a) Mathematics (b) Physical science and (c) Biological sciences.

a. **Mathematics**

Study of mathematics imparts speed and accuracy to teachers. Mathematics has other subdivisions like Geometry, Algebra, and Trigonometry.

b. **Physical science**

This branch of science is in close touch with mathematics. All the laws and theories in physical science are formulated on the basis of mathematics. This branch is again divided into physics and chemistry. Physics deals with the study of matter and energy mainly. Chemistry gives importance to the composition of materials and internal structure.

c. **Biological science**

It is also one of the branches of science. It deals with the study of living organisms. This branch of science is composed of two branches namely Botany and Zoology. Botany deals with plants and Zoology deals with animals (Modern Science Teaching, 2008 pp9)
1.3 THE UNIVERSE

The Universe initially consisted of a very hot, dense fireball of expanding, cooling gas. After about one million years, the gas began to condense into localized clumps called protogalaxies. During next five billion years, the protogalaxies continued condensing, forming galaxies in which stars were being born. Today, billion of years later, the universe as a whole is still expanding. Although there are localized areas in which objects are held together by gravity, for example many galaxies are found in clusters.

Small ‘ripple’ in the temperature of the cosmic background radiation are through to be evidence of slight fluctuations in the density of the early universe, which resulted in the formation of galaxies. A galaxy is a huge mass of stars, nebulae, and interstellar material.

1.3.1 SOLAR SYSTEM

The Solar System is the sun and the objects that orbit the Sun. These are a planetary system (of eight planets) and various secondary bodies: dwarf planets and other small objects that orbit the Sun directly, as well as satellites (moons) that orbit many planets and smaller objects. The Solar System formed 4.6 billion years ago from the gravitational collapse of a giant molecular cloud. The four smaller inner planets, Mercury, Venus, Earth and Mars, are also called the terrestrial planets. All planets have almost circular orbits that lie within a nearly flat disc called the ecliptic plane. Six of the planets, at least three of the dwarf planets, and many of the smaller bodies are orbited by natural satellites, usually termed "moons" after Earth's Moon. Each of the outer planets is encircled by planetary rings of dust and other small
objects. Most of the planets in the Solar System possess secondary systems of their own, being orbited by planetary objects called moons. (Kevin William, 2012)

1.3.2 EARTH

The Earth is the third planet from the Sun. It is the densest and fifth-largest of the eight planets in the Solar System. It is also the largest of the Solar System's four terrestrial planets. It is sometimes referred to as the World or the Blue Planet. Earth formed approximately 4.54 billion years ago, and life appeared on its surface within its first billion years. Earth's biosphere then significantly altered the atmospheric and other basic physical conditions, which enabled the proliferation of organisms as well as the formation of the ozone layer, which together with Earth's magnetic field blocked harmful solar radiation, and permitted formerly ocean-confined life to move safely to land. The physical properties of the Earth, as well as its geological history and orbit, have allowed life to persist. Over 70% of Earth's surface is covered with water, with the remainder consisting of continents and islands. Earth's poles are mostly covered with solid ice.

The Moon's gravitational interaction with Earth stimulates ocean tides, stabilizes the axial tilt, and gradually slows the planet's rotation. The planet is home to millions of species of life, including humans. Both the mineral resources of the planet and the products of the biosphere contribute resources that are used to support a global human population. The distance of the Earth from the Sun, as well as its orbital eccentricity, rate of rotation, axial tilt, geological history, sustaining atmosphere and protective magnetic field all contribute to the current climatic conditions at the surface. (Kevin William, 2012)
1.3.3 BIOSPHERE

Biosphere is the region around the earth extending to a height of approximately 20 k.m. which supports life. Approximately 3,50,000 species of plants including algae, fungi, mosses and higher plants and 11 million species of animals ranging from unicellular protozoa to man inhabit the biosphere. The biosphere is a micro-macro-ecosystem. The air, the water, the man, the animals, the plants, the soil and bacteria are all interlinked and inter-twined in a life sustaining system called environment. The rhythm of environment depends upon a whole set of delicately balanced system, network, chains and channels, propelled and sustained by the overall energy (99.98%) received from the sun.

The biosphere is divided into a number of biomes, inhabited by broadly similar plants and animals. On land, biomes are separated primarily by differences in latitude, height above sea level and humidity. The Earth is the largest and densest of the inner planets, the only one known to have current geological activity, and the only place where life is known to exist. Its liquid hydrosphere is unique among the terrestrial planets, and it is the only planet where plate tectonics has been observed. Earth's atmosphere is radically different from those of the other planets, having been altered by the presence of life to contain 21% free oxygen. (Tansley, 1935)

1.3.4 HABITATS

Habitat is the place or the abode where the organisms live. The three major habitats of the earth are marine (Holobiotic), Fresh water (Limnobiotic) and land (Geobiotic). The living organisms inhabit anyone of these habitats. A habitat consists of both abiotic and biotic factors. The abiotic are the non-living factors such as the
soil, water, climate, minerals and gases. They influence the living organisms either directly or indirectly. Hence, they are described as ecological and biological factors. Both abiotic and biotic factors of an environment form an ecological ecosystem. (Elton, 1949)

1.3.5 ECOSYSTEM

An ecosystem is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows. As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment, they can be of any size but usually encompass specific, limited spaces (although some scientists say that the entire planet is an ecosystem).

Energy, water, nitrogen and soil minerals are other essential abiotic components of an ecosystem. The energy that flows through ecosystems is obtained primarily from the sun. It generally enters the system through photosynthesis, a process that also captures carbon from the atmosphere. By feeding on plants and on one another, animals play an important role in the movement of matter and energy through the system. They also influence the quantity of plant and microbial biomass present. By breaking down dead organic matter, decomposers release carbon back to the atmosphere and facilitate nutrient cycling by converting nutrients stored in dead biomass back to a form that can be readily used by plants and other microbes.
1.3.6 ECOSYSTEM PROCESSES

Energy and carbon enter ecosystems through photosynthesis, are incorporated into living tissue, transferred to other organisms that feed on the living and dead plant matter, and eventually released through respiration. Most mineral nutrients, on the other hand, are recycled within ecosystems. (Tansely, 1935)

Ecosystems are controlled both by external and internal factors. External factors, also called state factors, control the overall structure of an ecosystem and the way things work within it, but are not themselves influenced by the ecosystem. The most important of these is climate. Climate determines the biome in which the ecosystem is embedded. Rainfall patterns and temperature seasonality determine the amount of water available to the ecosystem and the supply of energy available (by influencing photosynthesis). Parent material, the underlying geological material that gives rise to soils, determines the nature of the soils present, and influences the supply of mineral nutrients. Topography also controls ecosystem processes by affecting things like microclimate, soil development and the movement of water through a system. This may be the difference between the ecosystem present in wetland situated in a small depression on the landscape, and one present on an adjacent steep hillside.

Unlike external factors, internal factors in ecosystems not only control ecosystem processes, but are also controlled by them. Consequently, they are often subject to feedback loops. While the resource inputs are generally controlled by external processes like climate and parent material, the availability of these resources within the ecosystem is controlled by internal factors like decomposition, root
competition or shading. Other factors like disturbance, succession or the types of species present are also internal factors. Human activities are important in almost all ecosystems. Although humans exist and operate within ecosystems, their cumulative effects are large enough to influence external factors like climate.

1.3.7 BIODIVERSITY

Biodiversity refers to the range of life forms on the earth, from microorganisms such as viruses, bacteria and protests through the multi-cellular kingdoms of plants, animals and fungi. Plant biodiversity as a national and global resource is extremely valuable.

The need for preservation of biodiversity is to

i. sustain and improve agricultural, forestry and fisheries production.

ii. act as a buffer against harmful environmental changes.

iii. prove raw materials for scientific and industrial innovations.

iv. safeguard and transfer the biological richness to future generation.

(Environmental Education, pp164)

1.3.8 IMPORTANCE OF FOOD WEB

Food web is the transfer of food from the source in plants through herbivores to carnivores. The number of food chains linked together is called food web. Each species has its own seasonal cycle. Besides this the food of any organism often varies. For these reasons the balance between the number of predators and their prey is constantly fluctuating. The prey population increases until the predator begins to
multiply eventually exterminating the prey and itself declining in numbers to extinction.

1.3.9 INTERACTION BETWEEN MAN AND NATURE

Man is the most dominated biotic factor occupying the highest rung of the evolutionary ladder. Like other living organisms. He is also very much affected by abiotic and biotic factors of the environment. He breaths the air from the atmosphere, gets water from the hydrosphere and consumes food from the lithosphere. Man is thus closely associated with his natural environment. By his intelligence he dominated the earth and enjoys the natural resources for his own material benefits. Pre-historic man was completely dependent on natural environment and had a thorough knowledge of it. Later he gave up the nomadic life and settled down and practised agriculture. This was the turning point in the cultural evolution of man.

Now he has inhabited almost all biomes of the earth, and those ecosystems he is the secondary or even tertiary consumer. From the beginning to till today the global human population has been increasing only in arithmetic ratio, resulting in many environmental problems. Early man was in absolute communion with his environment. He was part of the intricate web of life on earth. Now the condition of the human environment is rather a pathetic and precarious affair. (Elton, 1927)

Environmental problems such as deforestation, environmental pollution, proliferation of atomic weapons, storage of radioactive waste in the natural environment, misuse of land, over exploitation of natural resources have caused ecological crises. The ecological crises have caused global warming, depletion of ozone layer in the atmosphere, desertification and so on. This is because the greedy
man has broken a fundamental law of nature, Instead of adapting ourselves to merge
with nature, we have only succeeded in forging ecological disharmony.

1.3.10 PECULIAR CHARACTERISTICS OF HUMAN BEING

Though learning is universal and applicable to all living organisms, man
because of his superiour learning behaviour is able to control his environment and all
other organisms in it. Because of their superior learning behaviour, human beings
emerge as par excellence among all living organisms. Speaking, laughing and
resorting to finer and gentle recreations, acquiring fine motor abilities. Owing culture
and practising different fine arts are all unique to human being only.

1.4 LANGUAGE DEVELOPMENT

Man is gifted with a rare quality of speech which is restricted to other living
beings. No doubt, birds, insects and animals produce particular sounds in a given
situation but these sounds cannot be called ‘speech’ and hence they do not ‘talk’.
Man alone of all creations is endowed with the power of speech. There were only
sounds and gestures and shouts in the days of the cave dwellers. In those ancient times
when life began, man used a lot of sounds and signs to attract attention, to describe
things and to get what he wanted. Even animals and birds communicate with one
another through sounds and smells. They cannot speak. Deer are said to identify their
herd through smells left on trees by other deer. Bees are said to communicate through
their intricate dancing and peculiar buzzing. All communication among animals and
birds has remained instinctive. But man has made a quantum jump from his primitive
handicaps and acquired the power of using language with marvelous effect.
Man has the ability to use his brain for identifying and naming objects, classifying them and using them for his need. By means of speech he mixes with his fellows, co-operates with them and makes his life orderly and systematic. Speech alone, of all human activities, makes life on earth bearable or unbearable. The word ‘Language’ itself means speech. Speech is thus a unique possession of man and distinguishes him from animals. (Teaching of English, 2005pp55)

1.4.1 INTELLECTUAL DEVELOPMENT

Intellectual development is the gradual growth of cognitive abilities –ability to attend, perceive, to discover, to recognize, to imagine, to judge, to conceptualise, to remember, to learn, to reason, to take decision, to solve problems and to indulge in meaningful speech and also to consequent growth in knowledge and adjustment to environment. Cognitive development is influenced by nutritional, emotional and social factors.

1.4.2 INTELLIGENCE

The term intelligence is used to denote powers or capacities of individuals. It differs from one individual to another and from one species to another in terms of the range and depth of the operation. The nature of intelligence was first thought of by a brilliant English scientist Sir Francis Galton. In his book “Hereditary genius” (1869) intelligence was reflected as a hereditary trait.

“Intelligence is the innate capacity to solve the problem in the light to past experience and knowledge”. Wood worth (1948)
1.4.3 MULTIPLE INTELLIGENCE

Howard Gardner (1996) has proposed a theory of multiple intelligence, in which intelligence comprises multiple independent constructs, not just a single, unitary construct. This multiple intelligence theory represents a definition of human nature from a cognitive perspective i.e. How we perceive; how we are aware of things. Gardner’s eight intelligences are described as follows.

i. **Verbal Linguistic Intelligence**

ii. **Logical-Mathematical Intelligence**

iii. **Spatial Intelligence**

iv. **Bodily-Kinesthetic Intelligence**

v. **Musical Intelligence**

vi. **Naturalistic intelligence**

vii. **Inter Personal Intelligence**

viii. **Intra Personal Intelligence**

1.5 NATURALISTIC INTELLIGENCE

Naturalistic Intelligence is an ability to recognize animals and other parts of natural environment such as rocks, trees, flowers and clouds. The ability to detect and understand phenomena in the natural world constitute naturalistic intelligence. Teachers possessing this type of intelligence may have a strong affinity to the outside world or nature. They may enjoy subjects, shows and stories that deal with animals or natural phenomena. They always like to collect, classify or read about things from nature-rocks, fossils, butterflies, feathers, shell and the like. They have highly-
developed skills of sensory perception. They are also interested in taking care of plants and animals. These people may like doing activities related to nature.

**1.5.1 CHARACTERISTICS OF NATURALISTIC INTELLIGENCE**

i. Interested in subjects such as botany, biology and zoology

ii. Good at categorizing and cataloguing information easily

iii. May enjoy camping, gardening, hiking and exploring the outdoors

iv. Doesn’t enjoy learning unfamiliar, topics that have no connection to nature

v. Collects rocks, shells and insects and knows the differences

vii. Understands difference weather patterns

**1.5.2 IMPORTANCE OF NATURALISTIC INTELLIGENCE**

Teachers possessing naturalistic intelligence

i. Have the ability to notice patterns and things from nature easily

ii. Develop aesthetic sense

iii. Have keen senses and observe and remember things from their environment and surroundings.

iv. Develop ability to make keen observations about natural changes, interconnections and patterns.

v. Can easily learn characteristics, names, categorizations and data about objects or species found in the natural world.

vi. Develop ability to notice the subtle differences in the world of nature.
vii. Develop heightened awareness and concern for the environment and for endangered species.

viii. Develop strong affinity to the plant and animal species of nature.

1.5.3 DIMENSIONS OF NATURALISTIC INTELLIGENCE

The investigator has developed five dimensions of naturalistic intelligence. They are mentioned below.

i. ADMIRATION

Admiration refers to a favourable judgment or a feeling of delighted approval and liking or the feeling aroused by something strange and surprising. According to Joseph Addison “Admiration is a very short-lived passion that immediately decays upon growing familiar with its object, unless it be still fed with fresh discoveries, and kept alive by a new perpetual succession of miracles rising up to its view”. In the present context, admiration of nature refers to appreciation of nature. Admiration of nature means to get attracted by the daily phenomenon in nature like rain, waterfalls, rainbows, meadows, flowers, sunrise, sunset and so on.

ii. OUTDOOR ACTIVITIES

Outdoor activities mean activities done in nature away from civilization. Outdoor activities are practised for the purposes of enjoying scenery and nature, relieving stress, finding peace in nature, enjoying life and finding relaxation. Outdoor sport is also frequently used as an extremely effective medium in education and team building. In the present context, outdoor activities refer to all the activities that are done in the open. Teachers having naturalistic intelligence are interested in
outdoor activities like gardening, trekking, hiking, nature walk, camping, farming, canoeing, rafting, caving and climbing.

iii. GLOBAL WARMING

Abnormal increase of the temperature in the environment due to the continuous accumulation of gaseous pollutants.

iv. BIOPHILIA

The term ‘biophilia’ literally means love of living systems. In the present context, ‘biophilia’ refers to the positive emotional response of an individual towards plants and animals i.e., showing affinity and taking care of plant and animal species.

v. SCIENTIFIC HOBBIES

Scientific hobbies refer to certain hobbies with regard to science and its inventions and discoveries. Scientific hobbies can provide the knowledge of technical side of science and also helps in correlating the science with everyday life and environment. Scientific hobbies include visiting science museum, keeping aquarium, collecting sea shells, feather collection, specimen collection, and photographs collection related to nature.

1.6 ENVIRONMENT

The word ‘Environment’ is derived from the French word ‘environner’ which means to encircle or surround. The environment is the surrounding objects and circumstances of a life of person.
The environment is the sum of all physical, chemical, biological and sociological factors which compose the surroundings of man.

To environon—to be around—the immediate surroundings “Anything that surrounds us constitutes environment”. It comprises of abiotic (non-living), biotic (living) and the human components. All these components are deeply inter-related and interwoven.

The environment simply does not continue with above-mentioned factors alone. For human, many biotic factor and social factors like heritage, belief, and religion matters.

1.6.1 INTERACTION BETWEEN MAN AND ENVIRONMENT

The survival of the human beings mainly depends upon their harmony with nature. There is a close interaction between these two, i.e., man and the nature. His privilege to use the earth’s resources can be compensated by his responsibility to cherish, to protect and to use them carefully. If man degrades the nature; nature is not going to help and the disaster is inevitable. Man exploits and uses the resources from the earth for his well being. The resource utilization pollutes the environment in many ways. Therefore the understanding of such impact of resource utilization against the environment is essential. We should protect the natural gifts like soil, water, air, forest and become the guardian of the earth.

It is our prime duty of each and every one of any nation to know and become familiar about the environment and its related issues like pollution, natural resource management, need for protecting the environment and impact of resource utilization.
This task can be achieved only through the educational process. Therefore, through educational process that man’s attitude towards environment is to be shaped.

One of the Chinese perception stresses the importance of education in this way

“If you plan for one year, plant paddy;
If you plan for ten years, plant trees;
If you plan for one hundred years, educate the people”.

(Environmental Education, pp342)

1.6.2 ENVIRONMENTAL EDUCATION

“Environmental education is a way of implementing the goals of environmental protection. It is not separate branch of science. It should be earned out according to the principles of life-long integral education” (UNESCO seminar at Jammi ,1976)

Environmental Education is the process of recognizing values and clarifying in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biographical surroundings. Environmental education is regarded as a permanent process.

Through this process, individuals and the community gain awareness of their environment and acquire knowledge, values, skills and experiences about it. These together with the determination to progress enable them to act individually and collectively to solve present and future environmental problems.
Many educationists and philosophers such as John Dewey and Adams propagated the idea that the learning of the young children took place through contact with environment. Rousseau has suggested that education should be given, to the children through the nature. So preserving the earth’s environment will be one of humanity’s most urgent concerns in this century to human health living.

1.6.3 AWARENESS OF ENVIRONMENTAL EDUCATION

Environmental awareness means to help social groups and individuals to acquire an awareness and sensitivity to the total environment and its allied problems. The importance of environmental awareness cannot be over emphasized we must understand that the environmental awareness will improve the quality of life. “Protect, preserve and improve the environment” the terms environmental education and environmental awareness are used interchangeably for the same meaning but there is significant difference in these two terms. The study of physical, biosciences, geography and agriculture. Provide the environmental awareness. But the awareness does not help in developing skills and attitudes for improving of environment. (Environmental Education, pp97)

1.6.4 COURSE OF ENVIRONMENTAL EDUCATION

The course of environmental education has been classified in the following four stages;

a. Primary Education

b. Secondary Education

c. Higher secondary Education
a. Primary Education

The emphasis should be mostly (75%) on building up awareness, followed by real life situations (20%) and conservation (5%). Thus attempt should be made to sensitize the child about environment. The content to be used is surroundings from home to school to outdoor situations. Teaching strategy includes audio-visual aids and field visits.

The National Council of Education and Research Training (NCERT) has been playing vital role in designing syllabi, text books, guide books, chart, kits, teaching materials and aids both for students and teachers.

b. Secondary Education

At secondary level, the objective must be real life experience, awareness and problem identification. The contents to be used those used at primary school level supplemented with general science. Teaching practical and field visits are to be done.

c. Higher Secondary Education

At Higher secondary level, the emphasis is laid on conservation assimilation of knowledge problem identification and action oriented work. There should be proper teaching, practical and fieldwork. Developing countries including India face problems of lack of resource materials, funds and trained instructions and teachers at secondary school stage. (Environmental education, pp35)
1.6.5 FORMAL ENVIRONMENTAL EDUCATION

The content of environmental education has three components-i. Awareness ii. Conservation iii. Sustainable development.

i. **Awareness:** It includes making the individual conscious about physical, biological, social and cultural aspects of environment. The environment is linked with the life support system which in itself has components: air, land, water, flora, fauna and sun-light. These components have dynamic relationship. Man is the most important organism and has great responsibility.

ii. **Conservation:** It means utilization of natural resources not only the present but also by the future generation. It does not include the process of exploitation.

iii. **Sustainable development:** It aims at the wise utilization of resources for development. All resources are finite and there is also a limit to the growth of living systems. Thus, efforts should be made to utilize the resources wisely and intelligently.

1.6.6 EDUCATION

Education is the process through which the experiences of the race, comprising knowledge, skills and attitudes are transmitted to individuals who are the members of the race, concepts change and attitudes and skills undergo alternations. Education is an abstract entity and its concept is dynamic. The four fundamental data
of education namely, the educand, the influence of the environment, the heredity and the time are dynamic.

John Dewey, “Education is the process of living through a continuous reconstruction of experience. It is the development of all those capacities in the individual which will enable him to control his environment and fulfill his possibilities” (Bhat and Bhatia, 1986). According to Raymont, “Education is the process of development which consists of the passage of human being from infancy to maturity, the process whereby he adapts himself gradually in various way to his physical and spiritual environment. (Sataya-Shaida , 2007).

1.6.7 STRUCTURE OF EDUCATION

For the progress of the country, education is very important. In any country, education shapes the character and develops the intelligence of the individual. In India formal education is given to the individuals through primary, secondary and higher secondary stage. The present pattern of higher secondary education follows 10+2+3 pattern.

A. Primary Education

Primary education covers from standard I to VII. Universal and compulsory primary education, as envisaged in the Constitution of India, emphasizes the fact that all citizens of the country should be educated compulsorily up to a minimum level of education. Hence, this is considered as the most important aspect of schooling. Article 45 of an Indian constitution gives much importance to primary education.
**B. Secondary Education**

As primary education is indented to provide the minimum essential to children, secondary education helps children to become full members of a complex society. All round development of the child takes place at this stage.

**C. Higher Secondary Education**

This scheme comes after secondary education. Mainly higher secondary education is for a period of two years and thus it follows the pattern 10+2+3 i.e. 10 years of general education, followed by 2 years of higher secondary education and 3 years of university education. In the modern parlance at all India level, higher secondary education, means the education which comes after X standard.

**1.6.8 OBJECTIVES OF HIGHER SECONDARY EDUCATION**

The deciding stage of a student is the higher secondary level which is a crucial period in one’s life. At this stage, a student attains the mental growth that enables him to decide his future. He/she may have different opinions according to different thoughts. He/she has to decide whether to continue his studies, if continuing, what kind of course, whether in general or vocational stream at this stage.

i. According to Kothari commission, the main objective of the plus two course is to provide the students the opportunities for taking up the general courses or the vocational courses. The commission hoped that about 40% of students would enter active working life after discontinuing education at 10th standard, about 30% of students would take up vocational courses.
ii. Students would go in for general educational courses and the remaining 30% of students would take up vocational courses.

iii. Overcrowding in colleges would be reduced. Only those students with an academic bent of mind will go in for university education.

iv. According to Prof. Nural Hassan, former union Minister of education, “when Kothari commission report was accepted the school stage will be strengthened and the standards will improve because of increasing the school stage to 12 years, which will bring in better teachers and better facilities. Kothari commission was in favour of starting +2 course as a part of school education as in Tamilnadu. The extension of two years of school education will definitely improve standards i.e, the plus two stage will enable us to control expansion to some extent because an element of selective admission introduced at this point.

v. The standards of Higher Education will also improve as the students going into the universities will be better prepared and more mature.

1.6.9 NEED FOR HIGHER SECONDARY EDUCATION

For creating employment opportunities in villages, free and compulsory education for all, village development, life-oriented vocational education, community self-sufficiency, educational integration, National integration, and higher secondary education becomes necessary.

The 11+1+3 educational pattern has been replaced by 10+2+3 pattern. This change is based on Kothari commission committee report. (1964-66)
Various educational commissions, committees have recommended higher secondary education. Hartog committee in 1929 stressed the need for technical and vocational education at the end of middle stage.

In 1937 Abbot and Wood committee said that after high school, there should be two ways, one for college education and the other for vocational education.

In 1944 Sargent Report stressed the need for two kinds of secondary education one for general stream and the other for life-oriented vocational education.

In 1952-53, Dr. A. L. Mudaliar Education commission recommended higher secondary Education after High school education.

In 1962 Dr. Sampurnam Education committee recommended uniform educational system throughout India for emotional integration. In 1964-66 Kothari commission recommended 10+2+3 pattern. In 1973 National commission for Education system and procedures recommended diversification of subjects in higher secondary education.

According to 10+2+3 pattern, all students should study 10 years of high school education, two years of higher secondary education and 3 years of college education.

Higher secondary Education pattern is a complete education satisfying the vocational needs and national, emotional integration some states teach the two years of higher secondary education through separate Junior colleges. But the state of Tamilnadu shows more interest in rural development, higher secondary education is taught in higher secondary schools in rural atmosphere.
Diversification in the higher secondary level will enable to control the expansion of higher education. An element of selective admission can be introduced at this stage. The students will be mature enough to make a tentative decision about their future career. It will enable the higher secondary schools to prepare the gifted students intensively for the university education.

(Report of the Education Commission-pp 79)

1.7 TEACHER

The teacher is one who teaches. The word ‘teach’ is derived from an anglo-saxon word ‘Taecon’ meaning to ‘impart’, ‘to instruct’, ‘to train’, ‘to make aware of’.

In other words, when a person who has knowledge in any field tries to pass on his/her acquired and accumulated knowledge to any person who is ignorant about that kind of knowledge and needs that knowledge; it is an act of teaching. The act of teaching is as old as human civilization. Teachers enjoyed a very high respectful position and honour even the kings used to sit at their feet, due to the nobility of their profession as well as the sacrifice, service and dedication towards their duty.

“A teacher affects eternity; he can never tell where his influence stops”. John Adams (1735 – 1826).

1.7.1 ROLES AND RESPONSIBILITIES OF TEACHER

i) Acquiring ability to evolve and adapt methods and techniques suited to different situations and to evaluate their effectiveness.

ii) Acquiring ability to improvise and use audio visual aids suited to different classroom situations.

iii) Developing positive attitude towards teaching as a profession and create self-confidence as a teacher.

iv) Understanding the developmental needs of children at various stages of their growth.

v) Acquiring appropriate professional behaviour.

vi) Acquiring knowledge about the existing education system and the latest education policy of the country. (Teaching of Science, 2007 pp102)

1.7.2 ESSENTIAL QUALITIES OF AN EFFECTIVE TEACHER

Dr. Sarvepalli Radhakrishnan, a great teacher and former president of our country, gave the following advice to teachers; “We must be perpetual seekers of intellectual integrity and universal compassion”.

A teacher must love teaching and be committed to his profession. Teachers should be lifelong learners. They should not only teach the theory and practical of the subject but they must provide a good grounding on the civilization heritage and value system of the society. With the use of modern technology, the teachers should groom the students to become autonomous learners.
1.7.3 PRESENT DAY TEACHERS STATUS

The teacher in the emerging Indian Society has a very pivotal role, to play in the social reconstruction and in the transmission of wisdom, knowledge and experiences of one generation to another. Children are the potential wealth of a nation. They are always exposed to the information of the teacher. It is, therefore, necessary to realize that the emerging Indian society can achieve all-round development with the help of the teacher who acts as a powerful agency in transmitting its cherished values.

A teacher can help the country in the process of reconstruction. But so far we have not been able to harness this hugely useful manpower. This could be possible if teacher’s role is properly recognized and she/he is in a proper frame of mind to understand the problems of the country and make a sincere effort to create a climate in which society can move forward.

Dr. Radhakrishnan has aptly remarked, “Teacher’s place in society is of vital importance; he acts as the point of the transmission of intellectual tradition and technical skill from generation to generation and helps to keep the lamp of civilization burning”.

1.8 TEACHING

Teaching behaviour, by its very nature, exists in a context of social interaction, the acts of teaching lead to reciprocal contacts between the teacher and the pupils, and the interchange itself is called teaching. (Flanders, 1970).
1.8.1 CHARACTERISTICS OF GOOD TEACHING

i) Stimulation and inspiration are fundamental importance of teaching.

ii) Good teaching is not a pouring-in process. It is, in fact, a drawing-out process.

iii) Good teaching is not a passive act; it is an active process. It is dynamic.

iv) Good teaching is a mature skill.

v) Good teaching involves skill in guidance learning.

vi) Good teaching is well-planned.

vii) Good teaching is suggestive and co-operative.

viii) Good teaching should be based on democratic principles.

ix) Good teaching is a kind of human relationship.

x) Good teaching is both diagnostic and remedial.

1.8.2 SCIENCE TEACHERS

Science teacher is facing a new challenge today. He or she got a big role in shaping scientific minds of the new generation. A good science teacher encourages the students to take risks and always has a positive attitude. He/she understands that errors will be made in science and it is normal but they try many different methods of teaching that encourage students and create in them a sense of accomplishment. Science subject needs the student to think critically, using math and imagination to solve the routine of science. A science teacher must be trained in modern methods and techniques of science. New methods and techniques are being employed in the teaching of science. Desirable that a science teacher is trained and well versed in:
i. Development of aquaria, vivaria, terraria.

ii. Knowledge of preserving specimens of plants and animals.

iii. Techniques of evaluation.

iv. Maintenance and use of science libraries. (Science Teaching, pp152)

Teachers can help students to develop environmental knowledge and environmental attitude. We cannot expect that mere acquisition of environmental knowledge by students may necessarily help them solve their environmental problems.

The teaching community has the noblest reasonability of creating a new younger generation who will love to grow large gardens rather than just a single tree. The success of environmental education lies in creating an attitude in students to say that “the consequences of any of my actions will not affect the environment”.

Lucas (1980) has found that the knowledge about environmental matters does not produce necessary behaviours and attitudes that will preserve the environment. It is the responsibility of the teacher to provide the curriculum that will produce personal moral attitudes such as “I ought to consider the indirect consequences of my actions”.

1.9 CONCLUSION

The first chapter is chiefly concerned with the conceptual overview of the problem chosen for the study. The discussion on the Environmental awareness has been presented to highlight the conceptual positions with which this study was planned and conducted. The concurring chapter –II will deal with the background of this study i.e. the literatures reviewed related to the topic chosen.