Introduction
CHAPTER – I
INTRODUCTION

Environment is an organism’s surroundings. Environment includes other plants and animals as well as non living constituents such as water, air, light, soil and temperature (Douglas and Downey, 1981). Environment is derived from French words environ or environner meaning “around” which in turn originated from the old French words virer and viron which means a ‘circle’. Etymologists frequently conclude that in English usage at least, environment is the total of all things or circumstances around an organism – including humans (Young, 2003).

Safra (2002) has defined environment as the complex of physical, chemical and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival. Environment is taken to mean all those which are physical, chemical, organic and non organic components of the atmosphere, lithosphere and oceans. Environment is the aggregate of external conditions that influence the life of an individual or the population, specifically the life of man (Shrivastava, 2004).

In spite of all that has been written in recent years there is still widespread confusion about what environment means. To many people, both government and public, the environment continues to be essentially ‘green’. Further, the word implies something secondary to what it surrounds, and less important, even although we depend on it totally, every moment of our lives, and continually change it just by living. It is therefore constantly necessary to remind people that our environment is the totality of what we live in, natural or constructed, spatial, social and temporal. It is an extension of ourselves, its health requiring the same care as our own health. Because we share it with
other people its care is a shared responsibility. The parts that are familiar and significant to us connect by many complex links to unfamiliar systems, and to a global environment which includes the significant worlds of people and other organisms unknown (Smyth, 2006).

The concept of each individual organism and its environment as an integral system constituting a single ecological unit (the ‘fundamental particle’ of ecology) was explored by Patten (1982). This concept still offers educators a challenging and potentially fruitful way of relating people and their environment to each other.

1.1 MAJOR ENVIRONMENTAL ISSUES AND PROBLEMS

Today the environment of the entire globe is disturbed. Population explosion, increase in depletion of physical resources, environmental pollution, exploitation of natural resources and technological growth are the factors resulting in present deterioration of the world’s environment. This is the result of man’s abuse towards environment. The adoption of science and technology without the care of ethics and morality has made man arrogant and dangerous. Some problems that rank high on any list of environmental issues are as follows:-

1.1.1 POLLUTION

Pollution can be defined as unwanted or detrimental changes in a natural system. Usually, pollution is associated with the presence of toxic chemicals in some large quantity but pollution can be caused by the presence of excess quantities of heat or by excessive fertilization with nutrients (Freedman, 2003). Pollution is the presence of impurities in the environment. The Impurities, called pollutants, may be of natural or man-made origin. Natural pollutants include pollen and dust. The most serious and persistent types of pollution result
from man's activities -especially in technologically advanced and heavily populated areas (Dougals & Downey, 1981). Different types of pollution are as follows:

1.1.1.1 Air pollution

Air pollution is a general term that covers a broad range of contaminants in the atmosphere. Pollution can occur from natural causes or from human activities (Brimblecombe, 2003). Natural pollutants include dust, pollen, and smoke from forest fires. Most man-made pollution is directly or indirectly caused by burning, particularly of coal and other for the production of heat and power (Douglas & Downey, 1981).

Major air pollutant carbon monoxide comes largely from motor vehicles with lesser amounts from nonautomotive engines, open fires and industrial processes; suspended particulate matter includes particles of solids or liquids, ranging in size from those that are visible as soot and smoke to those that are so miniscule that they can be seen only through an electron microscope; sulfur oxides are produced when sulfur-containing fuel is burned and ores are smelted; hydrocarbons represent unburned, wasted which is a major air pollutant because of its role in the formation of ozone and associated photochemical oxidants; nitrogen oxides are formed when the nitrogen in fuel and air combines with oxygen in high-temperature flames during combustion; ozone is produced from the reaction of nitrogen oxides with gaseous hydrocarbons in the presence of sunlight; toxic substances-asbestos, beryllium, mercury and vinyl chloride are recognized hazardous substances requiring special controls for their production, manufacture, and use (Middleton, 1995).

In the classical polluted atmospheres filled with smoke and sulfur dioxide, a range of bronchial diseases were enhanced. In photochemical smog, eye irritation from the secondary pollutant peroxynitrate (PAN) is one of the most characteristic direct
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effects of the smog. High concentrations of carbon monoxide in cities where automobiles operate at high density mean that the human heart has to work harder to makeup for the oxygen displaced from the blood’s hemoglobin by carbon monoxide. This extra stress appears to reveal itself by increased incidence of complaints among people with heart problems. Lead, from automotive exhausts, is thought by many to be a factor in lowering the IQs of urban children. Air pollution also affects materials in the urban environment. The acid gases, particularly sulfur dioxide, increase the rate of destruction of building materials. Metals also suffer from atmospheric acidity. In the modern photochemical smog, natural rubbers crack and deteriorate rapidly (Freedman, 2003).

PICTURE 1.1 AIR POLLUTION COMING FROM A SMOKESTACK

1.1.1.2 Water pollution

Among the many environmental problems that offend and concern us, perhaps none is as powerful and dramatic as water pollution. Ugly, scummy water full of debris, sludge and dark foam is surely one of the strongest, most easily recognized symbols of our misuse of the environment. Pollution control standards and regulations usually distinguish between point and not point pollution sources. Factories, power plants, sewage treatment plants, underground coal mines and oil wells are classified as point sources, because they discharge pollution from specific location, such as drain pipes, ditches or sewer outfalls. In contrast, non point sources of water pollution are scattered or diffused, having no specific location where they discharge into a particular body of water. Non point sources include runoff from farm fields, golf courses lawns and gardens, construction sites, logging areas, road, streets, and parking lots (Cunningham, 2003a).

Another method of classifying pollutants that enter water as a result of man’s domestic, industrial, or other activities is to distinguish between conservative and non conservative pollutants. Conservative pollutants are those that are not altered by the biological processes occurring in natural waters. These pollutants are for the most part inorganic chemicals, which are diluted in receiving water but are not appreciably changed in total quantity. Industrial wastes contain numerous such pollutants, including metallic salts and other toxic, corrosive, colored and taste-producing materials. Non conservative pollutants, on the other hand are changed in form or reduced in quantity by chemical and physical processes involved in biological phenomena occurring in water (Scott, 1995).

Thousands of different natural and synthetic organic chemicals are used in the chemical industry to make pesticides, plastics, pharmaceuticals, pigments, and other products that we use in everyday life. Many of these chemicals are highly toxic. Exposure to
very low concentrations can cause birth defects, genetic disorders, and cancer. Some synthetic chemicals are resistant to degradation allowing them to persist in the environment for many years. Contamination of surface waters and groundwater by these chemicals is a serious threat to human health (Cunningham, 2003a).


1.1.1.3 Noise Pollution

Simply defined, noise pollution is any unwanted sound or any sound that interferes with hearing, causes stress or disrupts our lives. Noise comes from many sources. Traffic is generally the most omnipresent noise in the city. Cars, trucks, and buses create a roar that permeates nearly everywhere. Around airports, jets thunder overhead, stopping conversation, rattling dishes, some times even cracking walls. Jackhammers rattle in the streets; sirens pierce the
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Air; motorcycles, lawnmowers, snowblowers, and chain saws create an infernal din; and music from radios, TVs and loudspeakers fill the air everywhere (Cunningham, 2003b).

![Picture 1.3 NOISE POLLUTION CAUSED BY AIRCRAFT](http://www.topnews/files/noise-pollution.jpg)

Noise levels in the world’s urban centers have been rising steadily in our highly mechanized society to a point where noise intensity and chronicity are a hazard to public health. According to one survey of various cities, noise levels are rising at the rate of a decibel per year. A sudden noise affects the autonomic nervous system, which has as one of its functions the regulation of the blood vessels. Studies have found that vasoconstriction of the precapillary blood vessels increases at the onset of noise and persist even longer than the noise sometimes as long as 25 minutes after cessation of the noise. During vasoconstriction, there is a decrease in cardiac output and an increase in diastolic pressure. The greater the noise intensity and band width, the greater the vasoconstriction during sleep as well as wakefulness (Rosen, 1995).
1.1.1.4 Soil Contamination

Soils can be contaminated by many human actions including the discharge of solids and liquid pollutants at the soil surface; pesticide applications; subsurface releases from leaks in buried tanks, pipes and landfills; and deposition of atmospheric contaminants such as dusts and particles containing lead. Common contaminants include volatile hydrocarbons—such as benzene, toluene, ethylene, and xylene (BTEX compounds) found in fuels; heavy paraffin and chlorinated organic compounds such as polychlorinated biphenyl (PCB) and pentachlorophenol (PCP) in organic compounds such as lead, cadmium, arsenic and mercury and radionuclides such as tritium. Often soil is contaminated with a mixture of contaminants. The nature of soil, the contaminant’s chemical and physical characteristics, and environmental factors such as climate and hydrology interact to determine the accumulation, mobility, toxicity and overall significance of contaminant in any specific instance (Batterman, 2003).

PICTURE 1.4 SOIL CONTAMINATION BY OIL SPILLS

1.1.2 ACID RAIN

Acid Rain is the common term for rain or other precipitation of higher than normal acidity. In extreme cases the acidity may reach a pH of 32—nearly as acid as a carbonated beverage. The existence of acid rain was first documented in 1852 by Robert A. Smith, a British chemist (Burgess, 1995).

Acid deposition results from the deposition of airborne acidic pollutants on land and in bodies of water. These pollutants can cause damage to forests as well as to lakes and streams. The major pollutants that cause acidic deposition are sulfur dioxide (SO$_2$) and nitrogen oxides (NOx) produced during the combustion of fossil fuels. In the atmosphere these gases oxidize to sulfuric acid (H$_2$SO$_4$) and nitric acid (HNO$_3$) that can be transported long distances before being returned to the earth dissolved in rain drops (wet deposition), deposited on the surfaces of plants as cloud droplets, or directly on plant surfaces (dry deposition) (Bloom, 2003).

![Picture 1.5 EFFECT OF ACID RAIN ON STATUES](http://en.wikipedia.org/wiki/acid_rain, 2008)

Long-term exposure of acid sensitive materials used in building contraction and in monuments (e.g. zinc, marble, limestone and some sandstone) can result in surface corrosion and deterioration.
Monuments tend to be the most vulnerable because they are usually not as protected from rainfall as most building materials (Bloom, 2003). Acid rain has been associated with death of fish in ponds and lakes, death of forest trees, and with changes in soil chemistry. In some regions, especially parts of northeastern North America and western Europe, acid rain has been associated with the decline of forests and with the destruction of fish and other water life (Burgess, 1995).

### 1.1.3 DEFORESTATION

Deforestation is the complete removal of a forest ecosystem and conversion of the land to another type of landscape. It differs from clear-cutting, which entails complete removal of all standing trees but leaves the soil in a condition to regrow a new forest if seeds are available. The major direct causes of topical deforestation are the expansion of shifting agriculture, livestock production, and fuelwood harvest in drier regions. Forest conversion to permanent cropland, infrastructure, urban areas, and commercial fisheries also occurs. The environmental costs of deforestation can include species extinction, soil erosion, flooding, reduced land productivity, desertification and climate change and increased atmospheric carbon dioxide. Deforestation can alter local and regional climates because evaporation of water from leaves makes up as much as two-thirds of the rain that falls in some forest. Without trees to hold back surface runoff and block wind, available moisture is quickly drained away and winds dry the soil sometimes resulting in desert-like conditions. Another potential effect on climate is the large scale release into the atmosphere of carbon dioxide stored as organic carbon in forests and forest soils. In 1980, tropical deforestation released between 0.4 and 1.6 billion tons of carbon into the atmosphere, an amount equal to 10-40 percent of that from fossil fuels (Sucoff, 2003).
1.1.4 GLOBAL WARMING

The greenhouse effect is a natural phenomenon that traps radiation within the earth's atmosphere. Natural green-house gases include water vapor, carbon dioxide, nitrous oxide, methane and ozone all essential to support life. The enhanced greenhouse effect, the direct result of human activities, increases concentrations of these gases in the atmosphere and leads to pollution of the lower atmosphere and contributes to global warming. These gases let in sunlight but tend to insulate earth against the loss of heat, as do the glass walls of a greenhouse. A higher concentration of the greenhouse gases means a warmer climate. For example, the twentieth century has been 10 warmer on worldwide average than the nineteenth century- warming at a rate 20 times faster than average (Rehkoph, 2003).

Some forecasts anticipate that by the end of the next century, the amount of carbon dioxide in the atmosphere may increase to as much as two or three times its pre-industrial level. Researchers estimate that this could result in a global average temperature increase of 2 to 6° F (1 to 3.5° C). This rise in temperature could:
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- Cause sea levels to rise and flood low-lying coastal areas worldwide.
- Shift climate zones too fast for many plants and animals to adjust.
- Affect agricultural production and water resources.
- Affect human and animal health.

**Global warming: Causes and effects**

Earth's temperature has risen about 1 degree Fahrenheit in the last century. The past 10 years of warming have been attributed to human activity.

The United States was responsible for 20 percent of the global greenhouse gases emitted in 1997, during the past 100 years.

Most of the world's emissions are attributed to the United States' large-scale use of fuels in vehicles and factories.

Some predictions for local changes include increasingly hot summers and intense thunderstorms.

Damaging storms, droughts and related weather phenomena cause an increase in economic and health problems. Warmer weather provides breeding grounds for insects such as malaria-carrying mosquitoes.

**PICTURE 1.7 GLOBAL WARMING CAUSES AND EFFECTS**


1.1.5 OZONE DEPLETION

Ozone is a toxic, colorless gas. A variant of normal oxygen it has three oxygen atoms per molecule rather than the usual two. Ozone occurs naturally in the ozonosphere (ozone layer), which surrounds the earth protecting living organisms at the earth's surface, from ultraviolet radiation (Finch, 2003).
The use of fluorocarbon-11 and fluorocarbon-12 as aerosol propellants and refrigerants is worldwide. Fluorocarbons have increased in use to such an extent that their effects on ozone are the most important direct threat to the earth's ozone layer. Estimates indicate the possibility of a 3% to 7% reduction in the total ozone content of the atmosphere—a reduction that would have serious health and ecological consequences—as a result of the continued industrial use of these gases at about the present level. Because of the slow diffusion of gases into the stratosphere, the expected time to reach such ozone reductions would ordinarily be about 100 years. A return of the atmosphere to natural (pre industrial) conditions after a complete halt in the atmospheric release of these gases could also be expected to take more than a century. Serious as the global depletion of the protective ozone layer is, an atmospheric phenomenon first observed in the mid-1970s and confirmed by the British Antarctic survey, an expeditionary team of scientists who made careful measurements over Halley Bay in Antarctica from 1957 to 1985, poses a more immediate threat to the ecology of the polar regions. The team discovered variations of the ozone layer over Antarctica from season to season (even from day to day) with the mean ozone concentration remaining relatively stable. Beginning in 1974 however and continuing to 1985 the team observed a steady and precipitous decline of the mean ozone levels over the Antarctic region to levels of less than 10%. The hole in the ozone layer covered Antarctica entirely and showed no signs of periodicity (Crutzen, 1995).

The major consequence of the thinning of the ozone layer is the penetration of more solar radiation, especially Ultraviolet-B (UV-B) rays, the most dangerous type, which can be extremely damaging to plants, wildlife, and human health. Because UV-B can penetrate the ocean's surface, it is potentially harmful to marine life forms and indeed to the entire chain of life in the seas as well. UV-B can kill and affect the reproduction of fish, larvae and other plants and animals,
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especially those found in shallow waters including phytoplankton which forms the basis of the oceanic food chain/web. The National Science Foundation reported in February 1992 that its research ship, on a six week Antarctic cruise, found that the production of phytoplankton decreases at least 6-12% during the period of greatest ozone layer depletion, and that the destructive effects of UV radiation could extend to depths of 90 ft (27m.) (Regenstein, 2003).

PICTURE 1.8 IMAGE OF THE LARGEST ANTARCTIC OZONE HOLE EVER RECORDED (SEPTEMBER 2006)


For fulfilling the dream of sustainable development not just for another century but for thousands of years, there is a need to learn a way of life that can be sustained. The real solution of environmental problems can be sought by educating people.

1.2 ENVIRONMENTAL EDUCATION

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental
education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality (IUCN, 1970).

In its most basic form, environmental education implies learning about the environment. Lucas (1972) suggested that environmental education is education in, about, and for the environment. This simple description reinforces the different purposes that environmental education often serves: programs provide opportunities to explore nature in the outdoors, information about conservation and environmental issues, and opportunities to gain knowledge and skills that can be used to defend, protect, conserve, or restore the environment.

According to Ramsey et al. (1992) "environmental education can mean concepts in ecology, outdoor education, environmental science or instruction about issues". Megenity (1995) has defined, environmental education as a multidisciplinary approach to the study of humanity’s problems of maintaining a liveable earth.

According to McCue (2003), “what environment education means depends on one’s perspective, some see it as a teaching method or philosophy to be applied to all subjects; others see it is a distinct discipline, something to be taught on its own”.

Many environmental educationists and scholars (e.g. Fien, 1993; Gough, 1992; Gough, 1997) hold that environmental education should adopt a holistic, three-fold approach known as education about, in and for the environment. Education about the environment emphasizes the development of environmental awareness, knowledge, and understanding. In such an approach, ecological concepts and technical solutions to environmental problems are addressed. Education in the environment encourages outdoor activities that afford personal experience within the environment as well as child-centered and activity-based learning. Education for the environment entails active participation in solving environmental problems (Tilbury,
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As environmental education evolved, its definitions have been researched, critiqued, revisited, and expanded. Perhaps what distinguishes environmental education from outdoor and experiential education is its focus on developing the core concepts and skills that environmentally literate citizens need for responsible action. Only through a comprehensive, cohesive program can the ultimate goal, environmental literacy, be achieved (North American Association for Environmental Education, 1999).

The environment, in particular, is a topic not easily confined to school hours and years as both the issues related to the environment and our knowledge and understanding of environmental processes are ever-changing. Since most individuals in the developed world feel some kind of concern for environmental quality (e.g., Uzzell, 2000; Reid, et al., 2004), whether to stay knowledgeable and current about environmental issues or just to be reassured that they are not doing anything really terrible, learning about the environment has become a lifelong commitment for many people. In addition, environmental education is more of an approach than a discipline; environment from this perspective becomes an integrating concept, a way of thinking about how humans fit within the biological and physical world (Leiberman & Hoody, 1998). Because of this, environmental education has always been hard to slot into the rigid, disciplinary-focused curriculum of traditional schooling.

It has been suggested that environmental education should be a continuing (lifelong) learning process through which awareness, knowledge, skills and values are acquired that aid environmental problem-solving with a sustainable future in mind for both present and future generations (Vaughan et al., 1993). In recent years, in the field of education, and especially within the subject environmental education, a variety of innovative programmes have been developed and applied. These have been essentially based on active pedagogical
methods, for example Problem solving, Case study, Field study, Project method, and Modelisation-Simulation (Case, 1979; Branch, 1983).

Numerous studies indicate that teachers and students in many parts of the world are addressing outcomes relevant to environmental education and that students in many schools are actively involved in local environmental projects (Scoullos, 1999). Experiences such as planting trees, cleaning creeks, collecting information and taking positive action in the local environment are often incorporated into these programmes and students report having learned new information, skills, attitudes and approaches to environmental problems.

Environmental education programmes can potentially reach a wider audience than the student population through the process of intergenerational influence (Ballantyne et al., 1998). Some environmental education activities and approaches, for example, encourage students to discuss environmental issues and actions with their parents and other adults in the community. Jacobson (1995) stated that environmental education programs for wildlife should increase public knowledge and stimulate action for natural resource management.

The aim of environmental education is to educate citizens to act favourably towards the natural and social environment through their lives. There are very specific favourable behaviours pursued in some environmental education designs. For example, in advertising campaigns focused only on solving a particular environmental problem (e.g. reducing water consumption; recycling paper; avoiding operations that can bring about forest burning). However, there are also environmental education approaches with wider aim. They also deal with specific cases, often using methods based on pupils' active involvement in the resolution of real (Bardwell et al., 1994; Tilbury, 1995) problems. These approaches aim to make citizens also protect
and improve the environment in other situations they may face across their lives.

1.2.1 HISTORY OF ENVIRONMENTAL EDUCATION

Environmental education is a concept, although not widely used until the 1960s, which has been influenced by some of the great philosophers and educators of the 18th and 19th century: Goethe, Rousseau, Humbolt, Haeckel, Dewey and Montessori to name a few (Palmer, 1998). Over time, the idea of environmental education, as it could be explained, began to gain strength as the scientific methodologies became more refined and in doing so, humans discovered the effects they were having on the environment. Although environmental education can trace its lineage, at least partly, to outdoor education, it is considered a distinct field (Disinger, 2001).

Palmer (1998) points to the 1968 Biosphere Conference in Paris organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a critical point in the development of environmental education. The objectives of this conference were to define a meaning for environmental education as well as establishing curriculum materials for its instruction at all levels of education, the technical training of it, and promoting awareness of global and local environmental issues.

At an international level, environmental education gained prominence during the 1972 Stockholm Conference on the Environment. Recommendation 96 of this conference recommended environmental education as a critical means to address the world’s environmental crises. This recommendation was addressed at the 1975 International Environmental Workshop in Belgrade, Yugoslavia, which resulted in the Belgrade Charter (Barry, 1976).

The Belgrade Charter provides a widely accepted goal statement: The goal of environmental education is to develop a world population
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that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones (UNESCO-UNEP, 1976).

The Belgrade Charter was further refined at the Intergovernmental Conference on EE in Tbilisi, Republic of Georgia in 1977: Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values (UNESCO, 1977). This declaration suggests that the basic aim of environmental education is to help individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic, and cultural aspects and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment (UNESCO-UNEP, 1978).

Unfortunately many of the environmental education programs and activities that were developed in the wake of Tbilisi lacked a clear direction and were inconsistent or failed to achieve the goals set forth by the Tbilisi and Belgrade documents. In response to this lack of coordination, Hungerford et al. (1980) proposed that the superordinate goal of environmental education is to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic
equilibrium between quality of life and quality of the environment.

Hungerford et al. developed a framework to guide the development of environmental education curricula in a manner that would be consistent with guiding principles established at Tbilisi.

Level 1: Ecolological Foundations
Level 2: Conceptual Awareness - Issues and Values
Level 3: Investigation and Evaluation
Level 4: Environmental Action Skills - Training and Application

1.2.2. MODELS OF ENVIRONMENTAL EDUCATION

Sterling and Cooper (1992) presented two models for the process through which individuals progress as they become environmentally educated. Both models include all five categories mentioned in the Tbilisi Declaration. The first model is linear (Figure. 1.1). It assumes that the person passes the stages of environmental education in a strict order one by one.

But, as the authors mentioned, a person may go through the stages of the process in a different order. A student can complete one or several stages simultaneously. It proves that Environmental Education is more complex and interrelated than the suggested linear model. Thus, Sterling and Cooper (1992) present another version of the model (Figure.1.2) in which all elements are interrelated and mutually reinforcing.
Ukrainian researchers Klimov and Ukolov (1994) suggested another model of ecological education. The term “ecological education” is used as a synonym to “environmental education” in Ukraine as well as in many countries of the former Soviet Union and Central and Eastern Europe (Sterling and Cooper 1992). According to this the system of ecological education consists of four components: cognitive, normative, values and action (Figure 1.3).
**FIGURE 1.3 ELEMENTS OF ENVIRONMENTAL EDUCATION BY KLIMOV AND UKOLOV (1994)**


The cognitive element assumes fundamental knowledge about the interaction of man and the environment, basic understanding of the aims and goals of nature conservation process, and global environmental problems and the ways of solving them. Values include the understanding of value of the environment itself (cognitive, ethical, practical values, etc.), the ability to manage human activities within the environment and to foresee the possible changes in the environment as the result of these activities at different levels. The normative element presupposes the ethical, aesthetical and ecological norms of the usage of the environment and the behavior patterns for individuals, groups and society in the environment. The “action” element assumes the activities and methods directed toward the
development of cognitive, practical and behavioral ecological skills (an ability to evaluate the situation, the choosing of the solution, the development of personal features of the student, etc.).

Giolitto et al. (1997) suggested a static model according to which there are three dimensions in environmental education: cognitive, ethical and “action” dimensions (Figure 1.4). The first cognitive dimension includes the level of environmental knowledge and skills, which can help to learn, understand and protect the environment. The second one ethical assumes the development of values. The last dimension action includes the development of special behavior patterns and positive attitudes towards the environment.


The 3-dimensional model was suggested in 1974 by the Schools' Council in UK and later published by Lucas (1979). It has been mentioned frequently by different researchers (e.g. Palmer 1997, 1998; Uzzel, 1999) and adapted according to the development of society. As mentioned by Sterling & Cooper, 1992; Palmer, 1997, 1998; Uzzel
1999 and others, there are three components in the model, which are used for Environmental Education organization and planning. They are education About, For and Through /In /From environment (Figure 1.5).

According to Palmer (1997, 1998), the model (Figure 1.5) consists of two subsystems - formal and informal education - both of which include the three above-mentioned components.

Education ‘About’ the environment is usually a part of formal education and has an empirical character. The main aim is to develop knowledge about nature and natural systems using research activities and to form an understanding of the environment, its values and the
complex interactions of the elements of the natural and human systems. Education Through/In/From the environment sees nature as a tool and resource of the learning process in order to develop research activities of a child, to form the individual experience, to develop a wide range of skills of investigation and communication. The aesthetic element predominates here. This component is a part both of formal and informal education. Education 'For' the environment reflects the ethical element of environmental education. It puts the emphasis on the development of a personal ethic, a sense of responsibility and informal concern for environment. Its aim is to form positive caring attitude towards the environment (Sterling & Cooper, 1992; Palmer, 1997, 1998; Uzzel, 1999).

It is necessary to mention that it was Palmer (1998) who first stated that for the development of Environmental Education it is necessary to use not a static but dynamic variant of the model that takes into account individual peculiarities and personal experiences of students (Figure 1.6). In this case three areas of the model are spheres which rotate constantly. The other difference is that the key element of the model is "formative influences." This element can become more important than the influence of the formal educational programs because it represents the combination of personal experience and formal education. Without taking this factor into account it is impossible to develop a sufficient level of knowledge, skills and values which will form environmental ethics and awareness. Although formative influences use the experience of formal educational programs, they exist independently from programs. That is why it should be considered as a basis for the whole process of environmental education development (Bartosh, 2003).
1.2.3 ENVIRONMENTAL EDUCATION IN INDIA

The National Policy on Education (1986) has envisaged protection of the environment as the core element of education at all levels. It should be developed as one value among the children. The policy has also recommended the creation of environmental consciousness among all ages starting with school education. The section in the policy document states: “There is paramount need to create a consciousness of environment. It must permeate all ages and
all sections of the society beginning with the child. Environmental consciousness should inform teaching in schools and colleges. This aspect will be integrated in the entire educational process.”

The average of the environmental concepts in the curricular materials developed by the NCERT as part of implementation of the National Policy on Education (1986) has been considered to be adequate by the national and international aspects in environmental education. However, further strengthening of environmental education components would continue. Science and social studies are the two main subject areas with intensive coverage of environmental topic. Several topics covered in science, geography, biology, chemistry, and economies would help in understanding the structure and functioning of the environment. Environmental problems and issue are also included at appropriate places. There are several poems and stories on trees, insects, animals, in language subjects like Hindi and English to create interest and motivate the children to contribute to the protection of the environment.

The Department of Education in Science and Mathematics of NCERT has undertaken a project in 1993 to analyse the school curricula developed by the council as part of the implementation of National policy on Education (1986). The analysis was done to identify the environmental education concepts and activities vis-à-vis the universal objectives of environmental education (awareness, knowledge, skill, attitudes, participation) as agreed at the Tbilisi conference (1977). This exercise also helped in the identification of the strengths and weaknesses of NCERT curricula in terms of expectations of Environmental Education (Kaur et al., 2006).

The University Grants Commission (UGC) has been directed by the Supreme Court to take proper steps to prescribe a course on environment and consider the feasibility of making environment a compulsory subject at every level of college education. The UGC invited proposals from the universities for introduction of courses in
Environmental Education and the following programs were approved:

- Proposals for organizing workshops, seminars/refresher courses on environmental awareness;
- Projects on 'Fly ash' accumulation for its mass scale utilization;
- Introduction of special paper on Environmental Education at post-graduate level in different disciplines; and
- Introduction of M.Sc. course in Environmental Education program; to telecast nearly 100 episodes on environmental awareness through its country-wide classroom program and preparation of a booklet for colleges as foundation course at undergraduate level and popular literature like handouts, pamphlets on environmental awareness. Ministry of Environmental and forest interacts actively with UGC, NCERT (National council of Educational Research and Training) and the MHRD (Ministry of Human Resources Development) for incorporating environmental concepts and issues in the curricula of schools and colleges (Bhattacharya & Deb, 2006).

The centre for Environment Education (CEE), Ahmedabad was set up in 1984 to develop and carry out nation wide environmental education programmes and activities. Highlights of the activities of the centre during the past years are as follows:

- An Exhibition package consisting of a set of posters on the theme of environment supported by a Manual (English & Blank). In Blank space language of choice can be filled. The South Asia Cooperative Environmental Programme (SACEP) has distributed 150 sets of these posters.
- Under the National Environmental Education Programme in Schools (NEEPS), training of teachers with environmental education materials was continued.
- A chart and booklet on ozone depletion have been developed for the Ozone Cell, Ministry of Environment and Forests,
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Government of India.

- CEE also developed Environmental studies books for standards III, IV and V based on NCERT curriculum.
- CEE modules for inclusions with B.Ed. course are developed and tried on colleges of Karnataka. Now it is included in the B.Ed. course by NCTE throughout the country.
- The adoption and translation of three CEE publications viz. Joy of Learning, Approaches to Environmental Education in Schools and Bird Observation Book into Assamese, Khasi, and Lusia with support from Ministry of Human Resources and Development.
- CEE is working with various other institutes to introduce Environmental Education course at all graduate and post-graduate levels.
- The programme for Leh-Ladakh is underway.
- The Gujarat State Archeological assigned work of preservation of 200 monuments in Gujarat state.
- Under ‘Taleem’ series, short term programme on ‘Environmental and Development Concerns’, ‘Women and Energy’ were organised every year for in-service professionals.
- Fortnightly issues of environmental news, features, articles etc. were brought out under CEE-NFS and supplied to newspapers, magazines, NGO’s etc.
- Various programmes for environmental development (soil and water conservation, tree plantation and animal protection) are also going side by side.
- Sunder Van Nature Discovery Centre was opened and number of people attended the appreciation camps organized by the Centre.
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- ‘Sampark’, the Hindi Edition of the UNESCO-UNEP newsletter ‘Connect’ is continued and widely distributed among NGO’s and others (Singh & Kaur, 2007).

1.2.4 OBJECTIVES OF ENVIRONMENTAL EDUCATION

The Tbilisi Intergovernmental Conference in Georgia, USSR in 1977 endorses the following objectives, for environmental education:

The categories of environmental education objectives are:

**Awareness**—to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

**Knowledge**—to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of the environment and its associated problems.

**Attitudes**—to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

**Skills**—to help social groups and individuals acquire the skills for identifying and solving environmental problems.

**Participation**—to provide social groups and individuals with an opportunity to be actively involved at all levels in working towards the resolution of environmental problems (UNESCO, 1977).

In the 1990s, a document entitled Kindergarten Environmental Education: Reference Materials was issued stipulating the following objectives for environmental education in Hong Kong (Curriculum Development Council, 1994):

- to enhance children’s understanding of and concern for the environment;
- to deepen children’s appreciation for the natural environment;
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To encourage children’s wise use of resources; and
to foster children’s positive attitudes towards protecting the environment.

This document provides the curriculum policy framework on environmental education to guide schools into the planning, design, and implementation of curriculum programs. It offers guidance, direction and encouragement without making any mandatory requirements.

The main objectives of environmental education are fostering an appreciation of the environment, and developing knowledge, skills, attitudes, values and a commitment that allows active participation in decision-making (North American Association for Environmental Education, 1999; Dillon & Teamey, 2002; Gough, 2002; Pedretti, 2002) and the involvement of students, teachers and the community in the educational endeavor. In order to educate environmentally literate and active students, various settings and teaching methods should be employed. These include classroom based and outdoor learning, project-based learning, using multiple resources, learning about socio-scientific controversies and involving the broader community (Tal, 2004).

A major objective of environmental education is encouraging the learners to be involved in their environment by posing questions, looking for relevant information, critiquing decision making processes and participating in such processes. Environmental educators aim at fostering in students an appreciation of the environment, and an understanding of their relationship with it and their responsibility for its future (Bruntland, 1987; North American Association for Environmental Education, 1999; Gough, 2002). EE promotes the use of higher-order thinking skills, encourages active learning at school as well as outdoors and brings together children and adults in order to make a contribution to the environment (Tal, 2004).
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Figure 1.7 ENVIRONMENTAL EDUCATION OBJECTIVES "TREE"


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1.3 OUTDOOR EDUCATION

Outdoor education is a learning climate for the things which can be learned best outside the classroom. Outdoor education has been defined in a variety of ways throughout its history. Those who influenced the field earlier on defined outdoor education with the needs of camping education in mind. For example, Sharp (1943), one of the earliest advocates of camping education, offered the following rationale for outdoor education: ‘That which can best be taught inside the schoolrooms should there be taught, and that which can best be learned through experience dealing directly with native materials and life situations outside the school should there be learned’.

Donaldson and Donaldson (1958) first defined outdoor education as “education in, about, and for the outdoors.” By examining this definition, one can determine that outdoor education can occur ‘in’ any outdoor setting like a school yard, swamp, industrial park, meadow, desert, zoo, state or national park, rainforest or the middle of the sidewalk. ‘About’ explains that the topic is the outdoors itself and those aspects related to the natural environment. ‘For’ states that the purpose of outdoor education is to ultimately make the ecosystem itself the beneficiary.

Outdoor education means learning in and for the outdoors. It is a means of curriculum extension and enrichment through outdoor experiences (Hammerman, 1980). According to Ford (1986) outdoor education means understanding, using, and appreciating the natural resources for their perpetuation. Outdoor education is matter of many relationships. These relationships concern not only the natural resources, but also people and society (Priest, 1986).

Outdoor education: (1) is a method for learning; (2) is experiential; (3) takes place primarily in the outdoors; but not exclusively, in the outdoor setting. Some aspects may occur indoors such as learning basic concepts before the field trip, preparation of
Outdoor education is a term that means different things to different people, cultures, and organizations. Common themes include an emphasis on direct experience of the outdoors for personal, social, educational, therapeutic, and environmental goals (Neill, 2003).

In 1967, Dr. John Passmore of University of Toronto organized and directed the first outdoor education conference at Geneva Park, Canada. He suggested that outdoor education can:

- Offer meaningful learning situations which should be an important part of every child’s education.
- Provide an opportunity for direct learning experiences.
- Stimulate students curiosity and permit them to discover the excitement and satisfaction of learning out-of-doors.
- Enable pupils to develop new interests and skills.
- Give them a much broader knowledge of ecological principles and their relationship to our quality of life (Passmore, 1972).

Students require a range of structured, sequenced, and developmentally appropriate learning opportunities in outdoor education. According to Health and Physical Education in the New Zealand Curriculum, Ministry of Education (1999) "In developing
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outdoor education programmes, schools should make use of the school grounds and the immediate local environment and make the most of opportunities for direct experiences that can be completed in a school day\textsuperscript{a}. During the last half of 1999, Education Outdoors New Zealand (EONZ) had a contract with the Ministry of Education to develop learning materials and provide professional development for teachers. EONZ focused on three areas: Development of units of work that was sequential from level 1 to level 5 of the curriculum, and in one topic area through level 6 to 7. Using the school and local environment to teach such activities. Writing learning activities that all teachers could use safely with students. The teachers realised they had the ability to teach outdoor education, the students really enjoyed the learning opportunities they were able to experience, and all this without having to go on a hike or sleep in a tent (Periam, 2000).

Many approaches to environmental education occur within the realm of outdoor education, where they are often blended with aspects of adventure education to create an experiential process of learning, taking place primarily in the out of doors that emphasizes relationships concerning people and natural resources (Priest, 1986).

Gardner (1991) found that scholastic knowledge "seems strictly bound to school settings" while outdoor education fosters "connected knowing," where education is part of, rather than separate from life. Unlike classroom learning, outdoor education uses the student's whole environment as a source of knowledge. The community, rather than the classroom, is the context of learning.

The child acquires environmental knowing (also known as environmental cognition) through direct (observations, sensory stimulation, movement in the space) and indirect (education, interpersonal communication, popular media) experiences of nature. When children lived on farms, had access to neighbourhood green spaces or natural backyards, these direct and indirect experiences could be made outside school. However, with the limiting of children's
environmental experiences, schools and school grounds are increasingly one of the few sites where this can happen. It makes good pedagogical sense to provide real-life experiences for children drawing on their natural curiosity. Science educators, especially in early childhood, have argued for many years that children learn best through discovery and interaction with concrete experiences (Fleer & Hardy, 2001). Why learn about frogs from a book or a computer screen when you could watch them growing day by day during class time and in your play, in a pond in the school ground! Allowing children to discover for themselves the patterns and order that exist in the natural world supports the link between experience and developing environmental cognition.

1.3.1 PHILOSOPHY FOR OUTDOOR EDUCATION

According to Ford (1986) when analyzed, the philosophy for outdoor education may be based on four premises:

1. A prime goal of outdoor education is to teach a commitment to human responsibility for stewardship or care of the land, to treat the land and all its resources with respect at all times and on all occasions.

2. Related to the goal of a land ethic or commitment to stewardship must be the belief in the importance of knowing certain facts or concepts. The cognitive purpose of outdoor education must be that of the interrelationship of all facets of the ecosystem. The understanding of basic ecological, sociological, and cultural principles is prerequisite to the commitment to an ethic of land stewardship.

3. The third aspect of outdoor education philosophy relates to the perspective of the human being in the outdoor environment. Not only do we need to know the natural environment for the survival of the species, we need to know it as a medium through
which we spend many hours of leisure.

4. A fourth philosophical belief is that outdoor education is a continual educational experience. It is not just one field trip, one week at outdoor school, or even a once-a-year event. It must be taught at all levels and pursued throughout life.

1.3.2 AIMS OF OUTDOOR EDUCATION

Some typical aims of outdoor education are to:

- Learn how to overcome adversity.
- Enhance personal and social development.
- Develop a deeper relationship with nature.

Outdoor education aims to: produce environmentally conscious citizens that develop lifelong knowledge, skills and attitudes for using, understanding and appreciating natural resources and for developing a sense of stewardship for the land (Ford, 1981).

According to Priest and Gass (1997) four aims of outdoor education are:

- Physical goals include physical fitness, weight loss, balanced dietary intake, physical movement and physical and health well-being. Physical goals may be preventative, educational, developmental, and/or rehabilitative (therapeutic).
- Spiritual programs aim to help development of spiritual knowledge and experience (e.g., many church and religious groups conduct camps for young people with a combination of spiritual instruction and other goals, such as fun recreation).
- Relationship / Family / Group / Community oriented programs aim to change the way a particular dyad, small group or community are functioning (as opposed to individual). The unit of interest/analysis in this case is not the individual. Team productivity and school climate are examples.
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- Environmental goals include having a positive impact on a specific ecosystem (e.g., native vegetation regeneration), environmental education knowledge (e.g., local area knowledge through awareness about global climate change), and environmental attitude.

Outdoor education aims to develop an understanding of our relationships with the environment, others and ourselves through interaction with the natural world. The ultimate goal of outdoor education is to contribute towards just, humane and environmentally sustainable communities (Outdoor Council of Australia, Statement of Objectives and Rules November 2002).

1.3 CRITICAL THINKING

Beyer (1985) defined critical thinking as a process in which the individual determines the “authenticity, accuracy, and worth of information or knowledge claims” and that it requires a number of separate skills. Robert Ennis was one of the first researchers to define critical thinking as “reasonable, reflective thinking that is focused on deciding what to believe or do” (Ennis, 1987).

Fulton’s (1989) definition of critical thinking was used by the Kellogg Center for Adult Learning Research at Montana State University. It focused on learners being able to create new ideas by analyzing information in another contextual situation. According to Philosophical Association (APA, 1990), Critical thinking is the process of purposeful, self-regulatory judgment, which drives problem-solving and decision-making.

“Critical thinking has been defined as utilizing a number of cognitive processes and attitudes that undergird intelligent action in diverse situations and fields. Critical thinkers are able to discern the thought patterns and beliefs in the works of others and to reflect upon their own beliefs, decisions, and actions” (Hirose, 1992).
“Critical thinking was defined as the evaluation of evidence relevant to a claim so that a reasonable conclusion about the truth of the claim can be made. . . (a) identify the claim used in an argument; (b) evaluate the evidence relevant to the claim, comparing and weighing evidence both for and against the claim; and (c) draw a reasonable conclusion about the truth of the claim” (Bensley & Haynes, 1995).

Although writers disagree about the definition of critical thinking, many agree that its focus is the analysis and evaluation of claims. . . . Critical thinking has many functions, such as (a) evaluating the arguments of others, (b) evaluating and gaining confidence in one’s own arguments, (c) resolving conflicts, and (d) understanding and coming to a resolution in complex problems. . . (Allegretti & Frederick, 1995).

Another way to define critical thinking is to determine what it is not. It is not higher order thinking, although higher order thinking is required for critical thinking (Ennis, 1993). It is not engaging in active learning, although active learning is certainly required for critical thinking. Critical thinking is not negative; it does not refer to criticizing something. Rather it relates to the word criteria and indicates that type of thought that answers to a high standard of reasonableness. While critical thinking involves making judgments, it does not mean being judgmental. Judgments made through critical thinking are grounded in well-informed, well-reasoned thought and result in the critical thinker taking actions based on sound reasoning (Nosich, 2005). Critical thinking is, then, a process one goes through to make judgments based on high standards of reasonableness.

Paul and Elder (2006) proposed a substantive definition of critical thinking that involves not only the requisite skills, but also standards against which to measure the skills and dispositions or traits that will be realized as learners develop into critical thinkers. The elements of thought include questions, point of view, inferences,
implications, assumptions, concepts, information, and purpose. The standards against which critical thinkers measure the quality of their thinking are clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness. As learners become adept at thinking through the elements and applying the standards of thought, they must be encouraged to develop the intellectual traits of humility, perseverance, autonomy, integrity, courageousness, empathy, fair-mindedness, and confidence in reasoning.

According to Goree et al. (2006) “Critical thinking involves logic, but it is more than logic. It includes stories, common sense, and perception as well. It includes the best imagination, analysis, synthesis, logic, comparison, knowledge, wisdom, deliberation, and resolution applied to specific problems. Critical thinking brings together our best skills and achievements to resolve problems”.

A primary objective in teaching students to think critically is for students to learn to use these skills beyond the classroom. One method to promote the transfer of these skills is to give students practical situations in which they apply the strategies and practice thinking critically (Allegretti & Frederick, 1995).

Critical thinking skills are common desired outcomes and can bridge environmental education with state and national standards; when taught explicitly in the context of environmental issues, these skills can become integrated into student behavior and help to create the environmental citizenry that environmental educators envision (Ernst & Monroe, 2006).

The goal of improving critical thinking is fundamental to American schooling, as increasingly complex societal challenges call for an improvement in the thinking skills used by decision-makers and citizens in their daily affairs (McTighe & Schollenberger, 1991).

The Commission on the Future of Higher Education (2006) found that employers consistently conveyed the message that college
graduates do not have the critical thinking skills necessary to be effective in the workplace. The Commission stressed the importance of a higher education system that prepares students with the skills needed to be productive in a fast-paced, changing economy. Between 1992 and 2003, college graduates’ ability to interpret texts such as newspaper articles fell from 40% to 31%. The ability to interpret documents such as prescription information fell from 37% to 25% (Secretary, 2006).

Elam (1989) stated that with the rapid increase of available knowledge, educators are realizing that the development of critical thinking skills is necessary to process this growing content base. Eighty percent of the teachers polled in the 1989 Annual Gallup Poll regarded the ability to think as the highest goal of education (as quoted by McTighe & Schollenberger, 1991). The evidence suggests that critical thinking does not develop just as a result of maturing. Students do not find learning to think critically easy. “. . . most college faculty agree that critical-thinking skills are notoriously difficult to teach and develop.” “There is wide agreement that college students learn more and better when they (a) are actively engaged and personally invested, (b) receive comprehensible and timely feedback, and (c) work cooperatively with peers and teachers.”

Ennis (1993) identified ten actions a learner usually must take in order to think critically:

1. Judge the credibility of sources.
2. Identify conclusions, reasons and assumptions.
3. Judge the quality of an argument, including the acceptability of its reasons, assumptions, and evidence.
4. Develop and defend a position on an issue.
5. Ask appropriate clarifying questions.
6. Plan experiments and judge experimental designs.
7. Define terms in a way appropriate for the context.
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8. Be open-minded.
9. Try to be well-informed.
10. Draw conclusions when warranted, but with caution.

Critical thinking can be improved by having students discuss the connections between prior and current learning, explicitly teach the skills, include guided and regular practice, provide feedback, model critical thinking, teach metacognitive thinking, use brief classroom assessment techniques, and help students learn to self assess (Angelo, 1995).

1.4.1 SKILLS AND DISPOSITIONS OF CRITICAL THINKING

In 1990, a group of 30 experts convened in a Delphi study and determined that critical thinking is a process divided into skills and dispositions (American Psychological Association, 1990). This definition was used in the creation and assessment of the undergraduate course. The six skills defined by the Delphi study include:

- Interpretation: The ability to understand information.
- Analysis: The ability to identify the main arguments presented.
- Evaluation: The ability to judge whether this argument is credible and valid based on the logic and evidence given.
- Inference: The ability to decide what to believe or do based on solid logic, and to understand the consequences of this decision.
- Explanation: The ability to communicate the process of reasoning to others.
- Self-Regulation: The ability to monitor one’s own thinking and correct flaws in logic.

Fluellen (1994) considered critical thinking to be the “ability to question one’s own framework of thought, to understand the arguments and rationale of others, and to reason dialectically in such
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a way as to determine when one’s own point of view is at its weakest and when an opposing point of view is at its strongest.” The definition calls for open mindedness and intellectual humility, two dispositions of critical thinking.

Seven dispositional elements were also identified by this panel of experts, and include (Facione, 1998):

- Inquisitiveness: Concern to become and remained well-informed.
- Truth-seeking: Willingness to face one’s own biases and reconsider views.
- Self-confidence: Trust in one’s ability to reason.
- Open-mindedness: Flexibility in considering alternative viewpoints.
- Systematicity: Systematic thinking that follows a linear process.
- Analyticity: The willingness to pick apart your own and others’ logic.
- Cognitive Maturity: Being persistent in seeking the truth.

Chaffee (2004) also alluded to dispositions of critical thinking in his model. He maintained that thinking critically means “carefully exploring the thinking process to clarify our understanding and make more intelligent decisions.” His model identified specific acts necessary to think actively, discuss ideas in an organized way, and to become a critical thinker: carefully exploring situations through questioning, thinking independently, considering different perspectives, supporting differing perspectives with reasoning and evidence.
1.5 SOCIAL SKILLS

Social skills have been characterised both in terms of ‘ability’ (Combs & Slaby, 1977) and in terms of ‘behaviour’. Rinn and Markle (1979) define social skills behaviourally as a repertoire of verbal and nonverbal behaviours by which children affect the responses of other individuals (e.g. peers, parents, siblings, and teachers) in the interpersonal context. This repertoire acts as a mechanism through which children influence their environment by obtaining, removing, or avoiding desirable and undesirable outcomes in the social sphere.

Gresham and Elliot (1993) defined them as “socially acceptable behaviours that enable a person to interact effectively with others and avoid socially unacceptable responses from others”. Gresham and Elliott's (1984) places the emphasis on the social validity of the behaviour. Thus: social skills are those behaviors which, within a given situation, predict important social outcomes such as (a) peer acceptance or popularity, (b) significant others’ judgments of behavior, or (c) other social behaviors known to correlate consistently with peer acceptance or significant others' judgments.

Social Skills are interpersonal behaviours that assist individuals in maximizing reinforcement in an interpersonal context and in minimizing social punishment and negative feedback (Deffenbacher, 2001).

Social skills form the basis for social competence. Gresham et al. (2001) defined social competence as “the degree to which students are able to establish and maintain satisfactory interpersonal relationships, gain peer acceptance, establish and maintain friendships, and terminate negative or pernicious interpersonal relationships.”

1.5.1 CATEGORIES OF SOCIAL SKILLS

Elliott and Busse (1991) propose that there are five main ‘clusters’ of social skills behaviour:

- Cooperation: helping other people, sharing and abiding by rules.
• Assertion: initiating behaviours, asking for things and responding to behaviour of others.
• Responsibility: communication with adults and demonstration of care.
• Empathy: showing concern over the feelings of others.
• Self control: ability to respond appropriately to conflict or ‘corrective feedback’ from an adult.

According to Hicks (2001) the term “social skills” is an all-encompassing one. It includes:
• Friendship-Making Skills, e.g., joining in a game, giving a compliment, and sharing.
• Skills for Dealing with Feelings, e.g., expressing your feelings, dealing with anger.
• Skill Alternatives to Aggression, e.g., using self-control, responding to teasing.
• Skills for Dealing with Stress, e.g., dealing with being left out, reacting to failure.
• Classroom Survival Skills, e.g., following instructions, asking for help.

Social skills can be placed into several categories (Caldarella & Merrell, 1997; Gresham et al., 2001):
• Peer relations skills (complimenting others, offering help, inviting peers to play).
• Self-management skills (controlling temper, following rules, compromising).
• Academic skills (completing work independently, listening to the teacher, not distracting).
• Compliance skills (following directions, following rules, using free time appropriately).
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- Assertion skills (initiating conversations, acknowledging complements, making requests).

According to National Association of School Psychologists (NASP, 2002) while there are hundreds of important social skills for students to learn, social skills can be organized into four areas.

1. Survival Skills:-
   - Listening
   - Following directions
   - Ignoring distractions
   - Using nice or brave talk
   - Rewarding yourself

2. Inter-personal Skills:-
   - Sharing
   - Asking for permission
   - Joining an activity
   - Waiting for your turn

3. Problem Solving Skills:-
   - Asking for help
   - Apologizing
   - Accepting consequences
   - Deciding what to do

4. Conflict Resolution Skills:-
   - Dealing with teasing
   - Losing accusations
   - Being left out
   - Peer pressure

According to Gregory & Champman (2002) basic social skills that students need include
• Using appropriate language
• Speaking politely and quietly
• Encouraging others
• Listening to others
• Asking for help

Some social skills that students need to function well in a group include
• Disagreeing in an agreeable way
• Accepting different opinions
• Following procedures
• Checking for accuracy and understanding
• Dealing with conflict

Some of social skills that promote acceptance by teachers (and other adults and peers) are as follows (Mclyntre, 2005)

1. Manners and positive interaction with others
   • Approaching others in socially acceptable ways
   • How to ask for permission rather than acting impulsively
   • How to make and keep friends
   • Sharing toys/ materials
   • Consider the feeling of others

2. Appropriate classroom behaviour
   • Work habits / academic survival skills
   • Listening
   • Attending to task
   • Following directions
   • Seeking attention properly
   • Accepting the consequences of one’s behaviour
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3. Better ways to handle frustration / anger
   • Distracting oneself to pleasurable task
   • Learning an internal dialog
   • To cool oneself down

4. Acceptable ways to resolve conflict with others
   • Using words instead of physical contact
   • Seeking the assistance of the teacher

1.5.2 IMPORTANCE OF SOCIAL SKILLS

Research suggests that the possession of good social skills is linked with academic success, and happiness in school, as well as a more emotionally stable adult life. Phillips (1980) commented ‘when social skills are learned - at whatever time in life they are a basis for present adequacy and prevention of future inadequacy’. There is much evidence to support the link between the lack of development of social skills with later psychological disorders (Cowen et al., 1973; Trower et al., 1978).

The traditional focus of schools has been on the academic curriculum and few explicit attempts have been made to teach personal and social skills, despite their implications for both classroom learning and social relationships. The tendency has been to assume that children will automatically acquire these skills as part of the developmental process or as a by-product of formal education. However, this is often not the case and many children experience problems with both peer and adult relationships, which not only have a negative effect on their ability to form friendships, but also on their ability to benefit from classroom teaching. There is, in fact, a substantial body of literature to support the view that poor social skills contribute to academic underachievement (Cartledge & Milburn, 1980; Michelson et al., 1983; Hughes & Sullivan, 1988).
The works of Vygotsky (1978), Feuerstein et al (1980), and Bruner (1996) point to the importance of interpersonal relationships as precursors to effective learning. Social skills are equally significant as cognitive skills as essential tools for thinking and learning. Most researchers agree that attaining social skills early in a child’s school career plays an important role in later academic and vocational success (Oden & Asher, 1977; La Greca & Santogrossi, 1980; Asher & Hymel, 1981; Gresham, 1982; Quay & Jarrett, 1989). In community life, appropriate social behaviours may be even more important than academic or job skills in determining whether one is perceived as a competent individual (Black & Langone, 1997).

Holmes and Fillary (2000) investigated the ability of adults with mild intellectual disabilities to appropriately engage in the “small talk” that is part of any workplace. They noted that workers with intellectual disabilities who demonstrate competence in social skills are generally perceived more positively than those who lack such skills, regardless of task-related skill level. The notion that competence in using social skills will lead to positive perceptions of persons with disabilities can be extended to other community settings such as postsecondary education, neighbourhoods, and places of worship.

Gresham et al. (2001) noted that deficits in social skills are key criteria in defining many high-incidence disabilities that hinder students’ academic progress, such as specific learning disabilities, attention deficit/hyperactivity disorder (ADHD), mental retardation, and emotional disturbance. Therefore, helping students learn social skills is a proactive approach to minimizing the impact of these types of disabilities on school success.

Hair et al. (2002) observe that adolescents, who have strong social skills, particularly in the areas of conflict resolution, emotional intimacy, and the use of pro-social behaviors, are more likely to be accepted by peers, develop friendships, maintain stronger
relationships with parents and peers, be viewed as effective problem solvers, cultivate greater interest in school, and perform better academically. Adequate social skills need to be acquired while students are still enrolled in school and further supported and refined in postsecondary, community, and work settings.

There is also felt to be an advantage to the teaching of social skills in school because of the link between the development of social behaviour and pupils' school achievements (Cartledge & Milburn, 1980). This link has also been highlighted by Frederickson (1991) who stated “Children who are rejected by their classmates in primary school are more likely to achieve poorly at secondary school, to truant, and to become involved in delinquency”. In addition another study indicated that many children who are given access to social skills training will demonstrate specific changes in behaviour in the school setting (Daniels, 1990).

Consistent and effective use of acquired social skills is more likely to occur in schools having a positive social atmosphere. Most adults can think of a situation in which they didn't feel valued and, as a result, did not respond appropriately or compassionately to others. Schools can ensure that all students know they are valued and respected members of a learning community by taking the following steps to create a positive school climate (Curtis, 2003).

- Learn and use students’ names and know something about each student. This can be difficult in secondary schools; using nametags or assigned seating at the beginning of each term can be helpful.
- Hold daily classroom meetings each morning to help build a sense of community and provide opportunities for conversation among students.
- Provide unstructured time (e.g., recess) when students can practice their social skills with peers and experience feedback.
• Encourage journal writing to improve self-awareness.

• Provide opportunities for students to participate noncompetitively (without tryouts or auditions) in extracurricular activities. Avoid unnecessary competition among students.

• Provide ways for students to provide feedback regarding their experience at school, and show them that their input is taken seriously.

• Make a point of connecting briefly and informally, over a period of several days, with individual students who are having difficulties. This establishes a relationship that will be helpful if the student’s situation requires a more formal discussion at another time.

School size also has an impact on student attitudes and behaviors. Research indicates that secondary students fare better socially and emotionally in schools with, at most, 800 students. Smaller schools foster greater participation in extracurricular activities, better attendance, lower dropout rates, and fewer behavior problems (vandalism, aggression, theft, substance abuse, and gang participation). Teachers in small schools are more likely than their counterparts in large schools to use teaching methods that support the development of social skills, such as cooperative learning and multiage grouping (Cotton, 1996).

To be effective and worthwhile, social-skills training must result in skills that (a) are socially relevant in the individual’s life (social validity), (b) are used in a variety of situations (generalization), and (c) are maintained over time (treatment adherence) (Hansen et al., 1998). Such skills will be most consistently employed in a setting that is supportive and respectful of each person’s individuality.

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1.6 RESPONSIBLE ENVIRONMENTAL BEHAVIOUR

One of the ultimate goals of environmental education is to form an environmentally literate citizenry who can actively participate in solving environmental problems (Hungerford and Peyton, 1976). Such actions are termed "responsible environmental behaviour" (REB) or "environmental action" (Hungerford and Peyton, 1976).

The term 'responsible environmental behaviour' refers to 'the variety of recognised approaches to environmental action available to individuals or groups for use in preventing or resolving environmental problems or issues' (Peyton, 1977; Marcinkowski, 1988). A change towards environmental responsible behaviour is generally considered a desired goal in environment education (Tbilisi Intergovernmental Conference on Environmental Education, 1978; Hungerford & Volk, 1990; Newhouse, 1990).

Environmental education occurs under many guises across a wide range of audiences. Attempting to evaluate the effectiveness of various environmental education programs has proved to be a difficult task due to the variety of programs and goals within each program (Wiltz, 2001). Whether the interaction takes place in a county agricultural extension office, university course, state park interpretive program, or grade school classroom, it is generally held that the ultimate end of environmental education is responsible environmental behavior (REB). This may involve reinforcement of existing behavior, but often involves changing current practices or introducing new ones.

1.6.1 FACTORS THAT CONTRIBUTE TO RESPONSIBLE ENVIRONMENTAL BEHAVIOR

Environmental education has matured as a field of practice and research, applied theory has moved from the notion that knowledge of environmental crises is sufficient for improved environmental behaviours to the current understanding that there are a variety of
factors that contribute to responsible environmental behaviour.

Hines et al. (1987) analyzed responsible environmental behaviour by identifying four elements in environmental education: (a) knowledge of environmental issues; (b) knowledge of specific action strategies to apply to these issues; (c) the ability to take action on environmental issues; and (d) the ownership of certain affective qualities and personality attributes. Hines et al. (1987) conducted a meta analysis of research on responsible environmental behavior, reviewing studies from a variety of fields and using statistical procedures to determine the strength of the relationship between responsible environmental behavior and associated variables. Positive correlations were found for verbal commitment, locus of control, attitude, personal responsibility, knowledge, educational level, income, and economic orientation.

Using Hines’ findings Sia et al. (1985/1986) studied the predictors of environmental behavior in two populations of adults, one environmentally active and the other environmentally inactive. Sia’s prediction model was based on eight variables, six of which were determined to be significant using regression analysis procedures and which accounted for 52 percent of the variance. The finding indicated that skill in using action strategies, environmental sensitivity, and knowledge of environmental action strategies accounted for the majority of the variance. Sia’s finding were replicated by Sivek & Hungerford, (1989) and extended by Lierman (1995); Marcinkowski (2000).

Sivek and Hungerford (1989) also raised the question while investigating responsible environmental behavior in three conservation groups in Wisconsin. They attempted to assess eight selected variables affecting the prediction of responsible environmental behavior, level of environmental sensitivity, perceived individual locus of control, perceived group locus of control, perceived knowledge of environmental action strategies, perceived skill in using
environmental action strategies, beliefs about/attitudes toward pollution, beliefs about/attitudes toward technology, and psychological sex-role classification. They found that perceived skill in environmental action strategies was an extremely strong predictor of responsible environmental behavior. Locus of control, both individual and group, were also significant components. The third significant factor was regarding environmental sensitivity.

Newhouse (1990) it is very difficult to change behavior without changing attitude. A common issue is the discrepancy between attitude and behaviour. Newhouse counters that there is greater consistency if the two dimensions are measured correctly, a point of view shared by Shrigley (1983). She points out that most research has focused upon the impact of specific programs designed to change attitudes versus investigating how attitudes are formed. All educators must take into account the level of knowledge, attitude and moral development of the learner. In addition to knowledge and action strategies, environmental educators must provide learners with the opportunities to acquire the skills to make decisions for themselves, implying that environmental educators will need to adopt similar techniques and strategies as moral educators.

Hwang et al. (2000) surveyed trail users at an arboretum in Korea. They considered knowledge as a prerequisite component to other responsible environmental behavior related variables and intention to act was considered as a substitute to behavior. The primary focus of their study was the relationship between locus of control, attitude, general knowledge, personal responsibility, and intention to act. Their conclusions indicated that locus of control had the largest effect upon intention, in addition to a strong effect on attitude. Personal responsibility and general knowledge had a weak or nonexistent effect upon intent, leading Hwang et al. to the conclusion that in order to influence responsible environmental behavior, environmental educators should focus upon material and programs.
that stimulate internal locus of control and provide opportunities to apply action skills. When discussing their results, the authors acknowledged that intention to act is different from actual behavior.

While there is some discussion of how exactly these factors break down, there is agreement that they can be classified as cognitive and/or affective. Locus of control (internal and external, group and individual), knowledge of environmental issues, knowledge of and skills in environmental action strategies and knowledge of ecological concepts, personal responsibility, beliefs and values related to environmental issues, environmental sensitivity, and attitude have all been identified as factors related to responsible environmental behaviour (Ramsey & Hungerford, 1989; Sivek & Hungerford, 1989; Newhouse, 1990; Ramsey, 1993; Hwang et al., 2000). Most research has focused upon the cognitive factors, such as locus of control, knowledge of ecological concepts and issues, and environmental action strategies (Newhouse, 1990) although it is commonly held that affective factors, especially attitude, are among the most important factors influencing behaviour (Sivek & Hungerford 1989; Hwang et al., 2000).

According to Ramsey & Hungerford (2002) the research indicates that responsible environmental behavior is associated with the following variables:

- Environmental sensitivity (i.e. feeling of comfort in and empathy toward natural areas),
- Knowledge of ecological concepts,
- Knowledge of environmental problems and issues,
- Skill in identifying, analyzing and evaluating environmental problems and solutions,
- Belief and values (i.e. beliefs are what individuals hold to be true. and values are what they hold to be important regarding problems/issues and alternative solution/action strategies),
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- Knowledge of environmental action strategies (i.e., consumerism, political action, persuasion, legal action, and physical action). Skill in using environmental action strategies, and
- Internal locus of control (i.e., the belief that by working alone or with other an individual can influence or bring about the desired outcomes).

1.6.2 DIMENSIONS OF RESPONSIBLE ENVIRONMENTAL BEHAVIOR

1.6.2.1 Knowledge of Ecological Concepts

The word ecology was coined in 1870 by the German zoologist Ernst Haeckel from the Greek words oikos (house) and logos (logic or knowledge) to describe the scientific study of the relationships among organisms and their environment (Cunningham, 2003c).

Ecological concepts are the concepts of ecology which are concerned with the relations between organisms and their environment, ecosystems, populations of interacting organisms and their habitats.

1.6.2.2 Knowledge of Environmental issues and Problems

Environmental issue is a point or matter of discussion, debate, or dispute of an organization's environmental aspects. The definition of an environmental issue is rather broad, including both problems, factors, consequences and causes.

An environmental problem is a description of a known process within the environment or a state of the environment which has adverse effects on the sustainability of the environment including society. They include resource consumption and environmental impacts.
1.6.2.3 Locus of Control

Locus of control can be defined in several ways. In its broadest sense, it refers to an individual's sense that he or she can manifest some degree of control over desired outcomes of a specific activity. The literature on social learning theory, expectancy theory, and efficacy perception have all contributed to the development of and definition of this psychological construct (Rotter, 1966; Rotter et al., 1972; Phares, 1976; Lefcourt, 1981, 1982; Rotter, 1982; Hines, et al., 1987).

Over time, the results of research on locus of control have been used to modify and refine this definition. In earlier research, the emphasis was on distinguishing between an internal locus and external locus of control. Here, internal referred to the belief that they themselves exerted control, while external referred to the belief that outcomes were controlled by external forces (e.g., Rotter, 1966; Levenson, 1974).

Locus of control may be defined as "an individual's perception of whether he or she has the ability to bring about change in a particular situation through his or her own behaviour" (Peyton and Miller, 1980).

According to Phares (2001), “locus of control refers to set of beliefs about the relationship between the behaviour and the subsequent occurrence of rewards and punishments. The more precise for these beliefs about locus of control is internal vs external control of reinforcement (I-E) whenever reinforcements (either positive or negative) are perceived by the individuals as being the result of his or her own behaviour, efforts, or relatively permanent characteristics we have an example of internal beliefs. External beliefs involve perceptions that reinforcements occur as the result of luck, chance, fate or the interventions of powerful others or else are simply unpredictable because of the complexity of events. Beliefs about locus of control or I-E are not either/or but may fall anywhere along a dimension marked by external beliefs at the one extreme and internal ones at the other".
1.6.2.4 Environmental Attitude

According to Holahan (1982) one way of defining environmental attitude is by saying that Environmental Attitudes refer to people's favourable or unfavourable feelings towards some features of the physical environment.

In a scientific sense it is not clear that attitudes exist. One cannot weigh them, say what color they are, how fast they are, or describe their bio-chemical nature. An attitude is a hypothetical construct about a mental state which is inferred from verbal reports and behavioral observation. As a concept, attitude takes its reality from our own introspection. We believe in attitudes and find them useful for understanding the behavior of others. We know them to be powerful because changes in social structure, such as a law which requires an environmental impact statement, or stabilities, such as the continued reliance on the single person auto mobile, often seem to be influenced by public attitudes. Attitudes, defined by social psychology as “favorable or unfavorable evaluations of and reactions to objects, people, situations, or any other aspects of the world,” enable us to predict and change people’s behavior (Atkinson et al., 1996).

Schultz (2000) believe that people’s attitude towards the environment and the type of concern that develop towards the environment, are associated with the degree to which they view themselves as interconnected with nature.

1.6.2.5 Beliefs and Values Related to the Environment

In everyday language, the term “belief” is often used loosely and synonymously with terms such as attitude, disposition, opinion, perception, philosophy, and value. Because these various concepts are not directly observable and have to be inferred, and because of their
overlapping nature, it is not easy to produce a precise definition of beliefs. (Leder & Forgasz, 2002). Different researchers associate belief with motivation and conception. Kloosterman (2002) sees the direct connection between belief and effort. Student's belief is something the student knows or feels that affects effort. Moreover, Kloosterman (2002) argues that student's choices are on one hand based on beliefs and on the other hand on personal goals. Thus, there is a close connection between beliefs and choices. But sometimes the personal goals and the beliefs are at variance. There have been two different notions about beliefs and conceptions in literature. In one case the beliefs are understood as a subclass of conceptions (Hart, 1989; Thompson, 1992) and on the other hand the conceptions are a subset of beliefs (Pehkonen, 1994). One can explain the concept of “conceptions” as an originations, comprehensions, ideas, rules, images etc. The easiest to understand and thus the widest, is the definition given by Rokeach (1972). He says: ‘a belief is any simple proposition, conscious or unconscious, inferred from what a person says or does, capable of being preceded by the phrase 'I believe that...’”

Beliefs are the assumptions we make about ourselves, about others in the world and about how we expect things to be. Beliefs are about how we think things really are, what we think is really true and what therefore expect as likely consequences that will follow from our behaviour.

A value is a belief, a mission, or a philosophy that is meaningful. Whether we are consciously aware of them or not, every individual has a core set of personal values. Values can range from the commonplace, such as the belief in hard work and punctuality, to the more psychological, such as self-reliance, concern for others, and harmony of purpose. According to Hall (1994) values are about how we have learnt to think things ought to be or people ought to behave, especially in terms of qualities such as honesty, integrity and openness. Values are the ideals that give significance to our live, that
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are reflected through the priorities we choose, and that we act on consistently and repeatedly.

Ramsey & Hungerford (2002) explains beliefs and values related to the environment that beliefs are what individuals hold to be true. And values are what they hold to be important regarding problems/issues and alternative solution/action strategies.

1.6.2.6 Environmental Sensitivity

Environmental sensitivity has been defined as an empathic perspective toward the environment (Hungerford & Volk, 1990). This perspective involves the belief that it is essential for humans to live in ecological harmony with the environment (Ramsey & Hungerford, 1989). Environmental sensitivity is difficult to foster in traditional school settings. Instead, it is commonly looked at as a "function of an individual's contact with the outdoors in relatively pristine environments either alone or with close personal friends or relatives" (Hungerford & Volk, 1990). Individuals who show the greatest level of environmental sensitivity typically report greater and longer involvement in outdoor activities such as hunting and fishing, often beginning at a young age.

Environmental sensitivity refers to an empathetic view of environment and of its problems and issues. It is a view that respects ecological stability and promotes the idea that human must live in harmony with natural environment. Research indicates the environmental sensitivity is more prevalent among those who behave in environmentally responsible ways than among those do not (Sia et al., 1986; Marcinkowsk, 1989; Hungerford & Volk, 1990).

Environmental sensitivity is ‘an empathetic or understanding view of the environment’, and is characterized by the individual who ‘refuses to litter highways and natural areas ... conserves natural resources ... works to preserve ecologically important natural areas ...
strives for a stable and appropriate human population level... respects hunting and fishing laws ... insists on rational zoning requirements ... etc.’ (Hungerford et al., 1992).

1.6.2.7 Personal Responsibility

Personal Responsibility can be defined as an act where by an individual takes accountability, for a work and the obligation to repair any damage caused by that work.

In environmental context, he undertakes the responsibility to do certain things, not to do certain things and do things in a certain way which will effect the environment and if anything goes wrong he holds himself responsible and resolves not to occur again for example turn off lights that are not being used, buy recyclable products, turn off the tap after drinking water from it, clean litter after picnic, keep his home and institution clean.

1.6.2.8 Environmental Action Strategies

Environmental action strategies involve citizen action skill and often require higher level thinking skills and behaviors and they call for careful planning and thorough attention to procedures and policies of action. A significant amount of time and a high degree of commitment will be required of people who are serious about following their intentions (Ramsey & Hungerford, 1989).

Once people have made decision regarding the most appropriate solution to environmental issue, they need to consider here to work towards these solutions. Just like the skills needed to investigate and evaluate issue action strategies are better learned and retained when opportunities are provided for practice and application. Ideally this application occurs after an in-depth investigation and evaluation of an issue, and its alternative solutions. It is important for students to understand how they can help to solve environmental issues. Because
issues change over time and because appropriate solution also changes, it is critical that students learn to make good decisions about solving environmental issues. Responsible decision making is refined as students formulate action plans and evaluate the environmental and socio cultural implication of those plans [Klinger, 1980; Ramsey et al., 1981; Simpson, 1989; Ramsey & Hungerford, 1989).

1.6.2.9 Intention to Act

Intention to act is the willingness to act in a certain way or to do a certain thing in a specified manner. It is the willingness to take suitable actions to stop man’s abuse towards environment and solving environmental problems like hunting of tiger, pollution, deforestation, global warming by green house effect etc.

1.6.3.1 Hines et al. Model

Hines et al. (1987) oft-described model of responsible environmental behavior derived from a meta analyses of 128 behavior studies written between 1971 and 1986, depicts a different basis for the intention to act. Hines model states that personality factors (made up of attitudes towards the environment, locus of control and sense of personality responsibility) combine with knowledge of action strategies, action skills and knowledge of issue to create an intention to act. Essentially for a person to act upon an issue they must know the issue exists and understand what they can do about it. The person must also have the desire to act; a component that Hines et al. believe is influenced by the previously intentioned personality factors.
Hines et al. (1987) point out that while intention to act leads to a greater likelihood to action than no intention to act, it is not the sole factor leading one towards responsible environmental behavior even with the intention to act, situational factors come into play facilitating or obstructing the intended behavior.

1.6.3.2 Hungerford and Volk Model

Hungerford and Volk pose a variation on the Hines et al. model (1987) in their 1990 conference paper “Changing Learner Education” through Environmental Education, Hungerford and Volk cite the Hines model as important, but incorporates nine studies taking place simultaneously with the Hines meta analysis to create a somewhat more expansive model that describe the factors playing into citizenship behavior or environmental responsible behavior on multiple levels. Thus the authors’ previous attempt to focus the environmental education field on a model of behavior change that leads to generalizable behaviors, rather than change in behavior that focus on single issues. They describe three categories of variables that
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influence behavior. Those three variables behave in linear yet, complex fashion leading to behavior change. These categories are entry level, ownership, and empowerment variables.

![Figure 1.9 Behaviour flow chart: Hungerford and Volk Model](image)


In each of the categories, variables are divided into major and minor variables as shown in the table 1.1.

<table>
<thead>
<tr>
<th>Entry Level Variables</th>
<th>Ownership Variables</th>
<th>Empowerment Variables</th>
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<tbody>
<tr>
<td>Major Variables:</td>
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<td>Environmental</td>
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Table 1.1 Major And Minor Variables Involved In Environmental Citizenship Behaviour

Entry-level Variables

Entry level variables are prerequisite variables or at least variables that will strengthen the decision-making. The strongest variable in this category is environmental sensitivity that is defined as “an empathetic perspective toward the environment.” Androgyny, knowledge of ecology and attitude toward pollution/technology/economics are not as strong as predictors of environmental sensitivity.

Ownership Variables

Ownership variables are environmental issues that are important at a personal level. The variables appear to be critical to responsible environmental behavior. The two major variables in this category are in-depth knowledge of the issues and personal investment.

Empowerment Variables

Empowerment variables strengthen the sense that we can change and are able to solve environmental problems to make a better world. Knowledge and skill in using environmental action strategies is the best predictor of pro-environmental behavior because it brings self-confidence to help resolve environmental problems. Locus of control refers to believing in being reinforced for a certain behavior. A person with internal locus control believes that he/she will be reinforced for doing something. Intention to act is related to empowerment variables. If a person’s intent is to take action, the chances of that action occurring are increased.

An example of the complexities of the interaction between variables described by Hungerford and Volk (1990) appears in the well known Border and Schettino (1979), “Determinants of Environmentally Responsible Behavior” study, which found that affect and knowledge are additive rather than interaction in influencing environment action. The authors of this quantitative study (included in the 1990 Hungerford and Volk meta analysis) administered a test to
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sample of 500 college students with questions regarding affect, knowledge, actual commitment and verbal commitment. They found that students with high levels of either knowledge or positive effect describe similar levels of current commitment to solving educational problems, with high affect students calling themselves slightly more committed. Students with high levels of both did not show disproportionately high levels of current commitment, leading the authors to label the contribution of the factors to commitment as additive. However this study also showed that while both affect and knowledge are important for influencing current action it is primarily affect or emotions towards the environment which appears to influence action regarding future commitment to environment.

**1.7 INTELLIGENCE**

Intelligence is a capacity of an individual to understand the environment and the resourcefulness to cope with its challenges of environment.

According to Spearman (1927), intelligence is, by and large, a general intellectual capacity. He postulates the existence of a general factor (or g factor) and a specific factor (or s factor) underlying intelligence. Thurston and Thurston (1943) defined intelligence on the basis of the combination of groups of traits or factors and their theory is popularly known as the group factor theory or multiple factor theory. They are of the opinion that intelligence is not an expression of the general factor; rather it is an expression of combination of group of traits or factors.

Stoddard (1943) has defined intelligence as “the ability to understand activities that are characterized by (i) difficulty (ii) complexity (iii) abstractness (iv) economy (v) adaptiveness to goal (vi) social value and (vii) the emergence of originals and to maintain such activities under conditions that demand a concentration of energy and
resistance to emotional forces.” According to Wechsler (1944), intelligence is “the aggregate or global capacity of the individual of act purposefully, to think rationally, and to deal effectively with his environment.”

Piaget (1950, 1952) defined intelligence on the basis of assimilation and accommodation, which together determine a person’s ability to learn. Assimilation denotes charges occurring in what has entered into the mind from the external world in such a way that they fit into a frame of reference and accommodation denotes charges occurring in the internal structure of a person as a function of new experiences. Guilford (1967) on the basis of factor-analytic research proposed a three dimensional box like model which he calls the structure of intellect model or SI model. The model has tried to simplify the picture of intellectual trait relationships by organizing the traits along three dimensions viz, contents, operation, and products. Each of these aspects of intelligence was analyzed and separated into subcategories: five for operations, six for products, and five for contents, making a cube of 5x6x5 = 150 cells.

Jensen (1968) has defined intelligence on the basis of a combination of two level processes. At one level is found associative intelligence and at another abstract intelligence. Associative intelligence includes those kinds of tests that depend upon memory as well as upon simple verbal association; such intelligence may include factors like verbal associations, memory for temporal sequence, spatial position, and stimulus response learning. Abstract intelligence on the other hand includes factors like concept leaning, thinking, problem-solving skills, multiple discrimination, and principal learning etc (Freeman, 1962; Gagne, 1965).

Das (1971) views intelligence as the ability to plan and structure behavior effectively for goal attainment. An effective use of information or of reasoning and memory abilities rather than abilities per se, would thus indicate intelligence. Luria (1980) conceptualizes


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intelligence as a particularly complex form of mental activity taking place only when the problem demands preliminary analysis and syntheses of the situation, and auxiliary operations by means of which it can be solved. Sternberg (1985) defines intelligence, broadly as mental self management and stresses the “real – world” in addition to the academic, aspects of the concept. He believes that intelligent behavior consists of purposively adopting to, selecting, and shaping one’s environment and that both culture and personality play significant roles in such behavior. Gerrow et al. (1989) view intelligence as a capacity to understand the world and the resourcefulness to cope with its challenges.

Intelligence, as measured by Intelligent Quotient and other aptitude tests, is widely used in educational, business, and military settings due to its efficacy in predicting behavior (Geary, 2004). Intelligence is significantly correlated with successful training and performance outcomes, and $g$ is the single best predictor of successful job performance (Ree & Earles, 1992).

Sinha (1967) found that intelligence and academic achievement were significantly related. Joshi (1970) found that higher intelligence is positively associated with higher scores on the algebraic concepts. Sansanwal (1978) found out that the mean achievement scores of students belonging to high intelligence group was significantly higher than that of average and low intelligence group students and also that the mean achievement of average intelligence students was significantly higher than low intelligence group. Sauer and Gattringer (1987) in a study on 651 fourth graders confirmed the hypothesis that intelligence would be the most important predictor for school achievement.

Dutt (1988) studied the effect of problem solving, strategies on problem solving ability in science of high school students in relation to anxiety, cognitive style, and intelligence. He found that intelligence
effect significantly in problem solving ability. Schicke and Fagan (1994) examined the contributions of self concept and intelligence to the prediction of academic achievement among a total of 121 fourth, sixth, and eight graders. Results from regression analysis revealed that intelligence accounted for the maximum variance in achievement. OakLand et al. (1995) examined conceptual and test related intelligence among 214 Brazilian students. Results showed that intelligence correlated significantly with achievement, grade repetition, and school absences.

According to Carroll (2000; 2003) Just because you are intelligent or have great knowledge does not mean you can think critically. A profound genius may have the most irrational of beliefs or the most unreasonable of opinions. Critical thinking is about how we use our intelligence and knowledge to reach objective and rationale viewpoints. Opinions and beliefs based on critical thinking stand on firmer ground compared to those formulated through less rational processes. Additionally, critical thinkers are usually better equipped to make decisions and solve problems compared to those who lack this ability.

Some beliefs can hinder critical thinking. If you believe you will fail at trying to solve a problem, you probably won’t try. If you don’t try, you won’t avail yourself of the opportunity to learn and develop your talents, including your critical thinking talents. Surprisingly, much research has found that believing that intelligence is something you are born with, and is fixed for life by your genes, hinders people in several ways that might affect their ability to think critically. “One of the dumbest things people do with the fixed view of intelligence is to sacrifice important learning opportunities when those opportunities contain a risk of revealing ignorance or making errors” (Dweck, 2002).

When we're thinking critically, we're using our knowledge and intelligence effectively to arrive at the most reasonable and justifiable position possible. When we're thinking uncritically--no matter how
intelligent or knowledgeable we are—we’ll make unreasonable decisions and arrive at unreasonable beliefs or take unjustifiable actions, unless we are lucky and end up making the right choice for the wrong reasons! (Carroll, 2004).

It does not automatically follow that being intelligent means the student can think critically or reason about information in a useful, effective and efficient manner. Many very intelligent people hold very odd and somewhat irrational beliefs about the world. Being smart and intelligent is simply not enough. Critical thinking is a process. It is a journey that helps us to arrive at the most useful, helpful, and most likely destinations when evaluating claims for scientific truth. Critical thinking is thinking clearly, thinking fairly, thinking rationally, thinking objectively, and thinking independently. It is a process that leads hopefully to an impartial investigation of the data and facts unswayed by irrelevant emotions. The aim is to arrive at well reasoned, considered, and justifiable conclusions. (Braithwaite, 2006)