CHAPTER I
INTRODUCTION

This chapter presents the details regarding importance of EE & its need for the study, objectives, research questions, Hypotheses, variables, operational definitions of key terms and delimitations of the study.

1.1 IMPORTANCE OF ENVIRONMENTAL EDUCATION:

By just looking back for sometime, into our history, we notice that conservation of the environment has always been a key element of Indian culture and tradition. Over the centuries people had a fascination and respect for their natural heritage. This has been expressed in the Ishopanishad: “All in this manifested world, consisting of moving and non-moving are covered by the lord. Use its resources with restraint. Do not grab the property of others – distant and yet to come”. Conservation has been an integral part of the Indian way of life and is amply borne out by history and tradition.

The well-known concept of ‘Janani-Janma Bhoomi’ from Ramayana also signifies the importance given to the protection of our environment. If these older / earlier generations had also thought of development at the cost of natural resources, probably we would not have been, even in an attemptable position to save our environment! Our noble traditions will continue to sustain us. For example, we have rich traditions such as religious tenets that support the preservation of biodiversity through institutions like ‘sacred groves’.

Our constitution is one of the first in the world to recognize the importance of protecting the environment. A much stronger emphasis has been placed on environmental protection following 1972 Stockholm Conference on Human Environment. Between this conference and the Rio Summit in 1992, India worked on developing a stable organisational structure that would enable better protection of the country’s environment. Legislation, policies and programmes which also evolved during the same
period were geared up to the task of protecting the environment. Significant amendments have been made in various acts from time to time to make them more effective. Also the presence of the Supreme Court, the highest court of appeal in the land and the provision for public interest litigation, empowers the citizen to fulfill his constitutional obligation to protect the environment. But any number of such laws and acts remain clean only on the paper without much effect, if people are not ready to make up their minds for attitudinal changes.

This becomes very significant if the global realities are once understood. These ecological problems mean that people in many parts of the world are suffering from the effects of 'ecosystem decline'. Examples of this include: water shortages in the Punjab, India; soil erosion in Tuva, Russia; fish kills off the coast of North Carolina, USA; landslides on the deforested slopes of Honduras; forest fires in Indonesia; spreading deserts in north Africa . . . the list is almost endless.

As a result, a recent international assessment of the state of the world's ecosystems concludes: “If we choose to continue our current patterns of use, we face almost certain declines in the ability of ecosystems to yield their broad spectrum of benefits -- from clean water to stable climate, fuel wood to food crops, timber to wildlife habitat.” World Resources 2000-01

Consideration of human needs presumes that we must actively seek ways to improve the quality of people’s lives. This implies dealing with values in our education, even in Science and Technology Education. Development must continue to be promoted in both industrialized and less developed countries but we must find a way of creating a balance between the utilization of natural resources and economic growth.

Public awareness of the environmental issues was raised world-wide by the United Nations Conference on Human Environment held in Stock Holm in 1972. An important outcome of this conference was the creation of a new agency called the United Nations Environment Programme (UNEP). In response to, or in support of, it’s Declaration; some governments created or gave increased support to environmental protection agencies to reverse the trends that were leading to ecological disaster.
Thus a time has come that the public get educated with regard to their environment related behaviour in order to save it for us. It is high time that people of all ages develop awareness related to the issues/problems of environment & act in such a way to contribute to solve them. The globe has realized this and also a very important fact that any favourable dispositions (needed for positive action) towards Environment is easy to bring in at much a younger age. In the process of educating the public, a discipline called Environmental Education has evolved to tackle the different age groups of students.

1.2 ENVIRONMENTAL EDUCATION-AN OVER VIEW:

1.2.1 ENVIRONMENTAL EDUCATION ABROAD:
The main characteristics of EE as outlined in UNESCO's Tbilisi Conference on EE are: Problem-solving approach, an interdisciplinary educational approach, the integration of education into the community and a life-long, forward-looking education. UNEP has supported environmental education work in several United Nations agencies such as UNESCO & FAO, as well as in the International Union for Conservation of Nature and Natural Resource (IUCN).

There is no specific mention of science and technology in UNESCO's outline, for EE but no other specific disciplines are mentioned either. It is therefore, the task of the exponents of science and technology education, such as those who participated in the Bangalore Conference, to invent new ways in which the concepts of ecology, which lie at the heart of EE, can be infused into education as a whole and into science and technology education in particular. Surely science should constitute the foundation on which proper ecological value-judgments are based, and technology should provide the practical means of solving the ecological problems posed by industrial and other societies. (The Environment and Science and Technology Education; edited by A.V. Baez; G.W.Knamiiller; J.C. Smyth.)

The concept of EE as understood today has evolved from its historical perspectives. It has about five phases. Kirk (1985) had tried to analyse how two separate movements, namely conservation and nature study movement and the outdoor education movement have acted as
the foundation for modern education. He has described four major chronological phases. Each phase has contributed to the evolution of the next phase. They are as follows:

**Awareness phase: (1860-1890)**
Various powerful writers awakened many to recognize that man was not a single and solitary figure above all the living and nonliving systems, but rather an integral part of the systems.

**Presentation phase: (1890-1910)**
In this phase several writers popularized a need for the conservation of the environment and the natural resources. National Conservations commissions, were established in some countries. Forests were conserved not merely for their products but also resources for recreation relaxation and for research study.

**Nature study phase (1910-1932)**
The greatest catalyst was the establishment of the American Nature Study Society (1908). In this phase efforts were made to develop an understanding and appreciation of beauty, majesty and mystery of the nature. Valuable materials were also prepared which served as a tool and guide for aspiring teachers and naturalists.

**Education phase (1937-1956)**
In this phase, people became aware of the importance of learning about the inter relationships of and interactions between living and non living things. Efforts were made to train teachers in the use of natural areas as an extension of their classrooms. Several conservation agencies were established which began to publish materials for the conservation of the forests, wildlife and soil.

Such a world wide concern regarding the conservation and improvement of the environment for the human kind promoted United Nations to convene a conference on the Human Environment in Stockholm (5th June) 1972.

**Stockholm Conference, 1972:**
This was the first U.N. Conference on Human Environment, which was a resultant of the 163 decision of the General Assembly that action at the national, regional and international level we needed to limit the impairment of the human environment and protect and improve man’s natural surroundings. It was attended by 13 nations, UN agencies and non governmental
organizations. This was an important event in the history of Environmental education because for the first time several countries from all over the world assembled together to work out a practical plan of action for the benefit of all mankind.

The conference made 109 recommendations which related to five important themes.

- Environmental aspects of natural resource management
- Planning and management of human settlements for environmental improvement
- Identification of major pollutants and their control
- Educational socio cultural and informational aspects of environmental issues and
- Environment and development

While formulating the action plan, the recommendations were categorized under three sections, environment assessment, environmental management and support management.

It was this conference that initiated the idea of observing the world environment day on June 5th every year to create awareness among people through organizing various activities concerning the environment.

The UNESCO-UNEP-International Environmental Education Programme (IEEP)

In response to one of the recommendations of the Stockholm conference, a special agency namely United Nations Environmental Programme was formed. Recommendation 96 contributed to the foundation of and provided the frame work for a cooperative effort in international Environmental Education. As a result the international programme in EE was launched by UNESCO-UNEP in 1975. It aimed at promoting the exchange of information and experiences, research and experimentation, training of personnel, development of the curricula and support materials and international cooperation in the workshop on EE at Belgrade in 1975.

Belgrade Charter:

IEEP in fact was responsible for the many developments in the field of EE because of its constant and consistent efforts. It sponsored a large number of discussions at the regional levels allowing for the exchange of views and information related to the policies and strategies needed to facilitate assessment & to conceptualize all aspects of EE made the
experts conduct a series of meetings which culminated in the international workshop held in Belgrade 1975.

Sixty five countries participated in this workshop. The deliberations of the workshop came out in the form of a document-popularly known as “The Belgrade Charter”. The Charter emphasized the need for EE and proposed a number of guiding principles for EE programmes to suit the universal and socio-economic goals.

The Charter also stressed that EE should:
- Be a continuous and life long process
- Be interdisciplinary and multidisciplinary in nature
- Consider the environment it is totality
- Emphasize active participation in preventing and solving environmental problems
- Examine major environmental issues from a world view point giving due importance to regional differences on Belgrade Charter.
- Promote the value of local, national and international cooperation in solving environmental problems.
- The efforts should be reviewed periodically to assess the progress and plant out further action.

Before the conference at Tbilisi, the IEEP had conducted number of workshops and meetings on EE at various parts of the world. Some of them included a workshop at; Brazzaville, Africa, 1976
Kuwait, arab Countries, 1976
Bangkok, Asia, 1976
Helsinki, Europe, 1976
Bogotá, Latin America, 1976
Saint Louis, North America, 1976
Tbilisi Conference, 1977

The Tbilisi Conference, Georgia in 1977 brought together representatives from government as well as non government agencies and organizations to discuss and recommend appropriate
measures for protecting environment at all levels. It endorsed the goals and objectives formulated in the Belgrade workshop. The objective of Environmental Education established by the conference were to develop the following qualities in individuals and in social organizations,

These objectives of EE, as given in the Tbilisi conference:

- Basic understanding of knowledge of the environment and its interrelationship with the people.
- Social values and attitudes which are in harmony with the environmental quality.
- Skills of solving environmental problems.
- Ability to evaluate environmental measures and educational programmes and
- A sense of responsibility and urgency towards the environment so as to ensure appropriate actions to solve environmental problems.

To meet these objectives the conference also outlined a number of guiding principles:

- It emphasized once again what should be the nature of EE-as a forward looking and a continuous life long process, consider environment in its totality, and follow, problem solving, interdisciplinary and multidisciplinary approach.
- It emphasized the pre-service and the in-service training of teachers in EE, preparation of teaching material, dissemination of information through mass media.

Subsequent to this, in the Nairobi Conference, 103 nations met on the 10th anniversary of Stockholm conference (1982) to reaffirm their commitment to the Stockholm declaration and plan of action.

**Lang-Kawi Declaration on Environment:**

The Lang-Kawi Declaration on the environment was drawn up by the heads of government of the Common wealth countries in conjunction with the conference held in Kuala Lumpur, Malaysia 1989. They were deeply concerned with the deterioration of the environment and the threat it had posed on the well being of the present and the future generations. They resolved to act collectively and individually to protect the environment and to carry on programmes and activities that would help in sustainable development, including the
development of new and better techniques in integrating the environmental dimension in Economic Decision Making.

The Earth Summit Conference at Rio de Janeiro, 1992 and the Agenda 21

The concept of sustainable development was emphasized further at great length in the Earth Summit Conference held at Rio de Janeiro, 1992. It put forward a proposal based on the declaration and the recommendations of the Tbilisi conference. The conference emphasized that EE and Development Education should deal with the dynamics of both the physical/biological and social-economic environmental and human development. It should be integrated in all disciplines and should employ formal and non-formal methods and effective means of communication.

It should increase public awareness and sensitivity to environmental and developmental problems and involvement in solving them. It should foster a sense of environmental responsibility and greater motivation and commitment towards sustainable development.

Thus we see that the EE has emerged with international introspection and through the formal approval of the entire community as an essential tool to protect not only the present environment which is facing a number of serious threats but for the survival of the human life itself.

EE has become even more important, because almost every decision we make has an environmental component. Only through EE people can develop a sense of concern for what is happening on a local and global scale & be encouraged to take appropriate action. The dimensions and implications of EE not only cover the process of developing awareness but also should be followed by action. EE is a key solution toward solving Environmental problems. This was suggested as a natural outcome of the Agenda -21...

“There is still a considerable lack of awareness of the interrelated nature of all human activities and the environment, due to inaccurate or insufficient information. Developing countries in particular lack relevant technologies and expertise. There is a need to increase public sensitivity to environment and development problems and involvement in their solution and foster a sense of personal environmental responsibility and greater motivation and
commitment towards sustainable development. The objective is to promote broad public awareness and an essential part of global education effort to strengthen attitudes, values and actions which are compatible with sustainable development: (UNCED, 1992)

The importance of EE for achieving sustainable development cannot be overstated. The objective of EE is to enable citizens to become conscious of their environment. This consciousness must be allied to a sense of the value of the coexistence of all living beings, and to a sense of responsibility towards the natural environment. This means that simply being conscious of the whole natural process and the characteristics of the environment is not enough. Rather, it demands that conscious citizens be actively engaged in a life along process to conserve natural resources, spurred by a sense of responsibility towards the environment, and needs of future generations of human kind and other species.

EE in schools, in general, is the teacher-students' fundamental principle of the interaction between nature and society with the acquisition of some practical skills. To make school children aware of the "responsibility for the environment, means to make them realize the relationship between human beings and society, and the need for ecological behaviour that is consistent with the interests of society in which they live. It is essential that schools be oriented towards two social objectives. The first goal is to foster the sense of responsibility for the state of the environment that they must observe in all aspects of their personal and social behaviour. The second goal is to teach them practical skills in how to monitor the environment, protect, improve it & foster nature. This objective can hardly be achieved without the general involvement of students in the active movement for a better environment. Though these goals are separate, they may go hand in the environmental process. Thus, EE at the primary and secondary school levels ensures a stage by state formation of student's attitude towards the environment.

EE was one of the principal topics on the agenda of UN Conference of Human Environment held in Stockholm (widen) 1972. Recommendation 96 of the plan of Action adopted by the Conference required UNESCO & UNEP, together with interested international bodies to establish an international programme on environmental education. UNESCO & UNEP collaborated in planning & developing a world cooperative program. The preparatory process included in international workshop in Belgrade 1975, followed by regional Symposia
held during 1975-77 in Europe (HELSINKI), Africa (Braaville & Lagos), Arab States (Kuwait), Asia (Bangkok), Latin America (Bogotá), North America (Ottawa) & East America (Prague). The outcome of these world wide consultation provided materials for an intergovernmental conference held in Tbilisi in 1977 that launched the International Environmental Education Programme (IEEP). In 1987, Ten years after Tbilisi, a second International Conference (The Moscow Congress on EE & Training) produced the International Strategy for Action in the field of EE and Training in 1990s. It should be noted that training was added to education. Chapter 36 of agenda 21 adopted by the UN conference on Environment and development (Rio de Janeiro, 1992) outlined three principle programs for EE:

- Reorienting education toward sustainable development
- Increasing public awareness and
- Promoting training

In agenda 21, the concept of sustainable development seemed to subsume environmental concerns. The UN Commissions on Sustainable Development, that was set to monitor progress in implementing Agenda 21, reviewed in its fourth session (1996) ‘progress and constraints’ related to chapter 36 of Agenda 21. EE acquired a new form: education for sustainability. For a review of the ‘UN led endeavor’ in this field, Perceptions of EE reflect priorities related to various operational purposes. Here are examples:

1. EE is aimed developing a world population that is aware of, and concerned about, the environment and its associated problems and which has the knowledge, skills, attitudes, motivation and commitment top work individually and collectively towards solving current problems or prevention of new ones (UNESCO, 1975).

2. Lucas (1980) recognizes three approaches to EE
   a. Education in the environment
   b. Education about the environment
   c. Education for the environment

3. Related to EE is the concept worldview; “the expression environmental world view is typically used to describe beliefs, values and concepts that collectively make up the
individual’s perception of the environment and humankind’s relation to it’ (Dosomger and Tp, sem. 1995). Environment educations aims at
a. Instilling in learner a positive perception of environmental worldview,
b. Cultivating in the society through educational institutions, a broader environmental worldview.

The Earth Charter makes all efforts to caution the public with no uncertain terms when it makes clear that “We stand at a critical moment in Earth’s history, a time when humanity must choose its future. As the world becomes increasingly interdependent and fragile, the future at once holds great peril and great promise. To move forward we must recognize that in the midst of a magnificent diversity of cultures and life forms we are one human family and one Earth community with a common destiny. We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace. Towards this end, it is imperative that we, the people of Earth, declare our responsibility to one another, to the greater community of life, and to future generations.” (Source: Preamble, The Earth Charter)

The focus of the Earth Charter is sustainable human development, includes the care and protection of the Earth. The Earth Charter recognizes that environmental, economic, social, cultural, ethical, and spiritual problems are interconnected. The first four guiding principles of the Earth Charter are:

- To respect Earth and life in all its diversity;
- To care for the community of life with understanding, compassion and love;
- To build democratic societies that are just, sustainable, participatory and peaceful; and
- To secure Earth’s bounty and beauty for present and future generations.

These four principles illustrate that the concept of sustainable development in the Earth Charter embraces the view that the problems of poverty, environmental degradation, ethnic
and religious conflict, and social injustice are all interdependent, and that policies that address one problem can impact and improve other issues. It is everybody’s experience that certain qualities, habits and attitudes die very hard and cannot be changed easily but are possible to modify at a younger age. The above mentioned principles are easier to develop among the younger children than among adults. Young &teenage children spend their precious hours in schools with teachers. Therefore teachers of schools should invariably make efforts in this regard. This, demands for a holistic approach given to the education at all stages. Environmental Education is dynamic in nature because it provides a holistic approach to learning that integrates attitudes and values with knowledge, skills, experience & awareness in an interdisciplinary context that explores bio-physical, social, economic and political issues relevant to the sustainability of the earth. The importance of global sustainability is at the top of the international agenda (UNESCO 1997) and teacher education has been identified as a critical imperative to ensure that teachers provide effective environmental education programmes in schools. This is precisely because of the potential ability of a competent EE teacher to make the pupils at the secondary level to become pro-environment in their activities.

**WWSS on sustainable development:**

The United Nations World Summit on Sustainable Development (WSSD) was held in Johannesburg from 26 August to 4 September 2002, and was a major world event.

Agenda 21, an action plan and blueprint for sustainable development, was one of five documents adopted by more than 178 governments at the United Nations Conference on Environment and Development (UNCED), known as the Earth Summit, in Rio de Janeiro in 1992.

Apart from Agenda 21, the following documents were also adopted at the Earth Summit:

- The Rio Declaration on Environment and Development. Its 27 principles define the rights and responsibilities of nations as they pursue human development and well-being
- A statement of principles to guide the management, conservation and sustainable development of all types of forests
• The United Nations' Framework Convention on Climate Change
• The Convention on Biological Diversity

The text of Agenda 21 carries a strong moral obligation to ensure the full implementation of these agreements. Agenda 21 stands as a blueprint for action in every area in which human activity impacts on the environment and the implementation thereof is first and foremost the responsibility of governments.

Underlying the UNCED agreements, is the idea that humanity has reached a turning point. The international world can either continue with present policies which increase poverty, hunger, sickness and illiteracy and cause the continuing deterioration of ecosystems on which life on earth depends, or it can change course towards sustainable development. Agenda 21 and the Rio Declaration outline key policies for achieving sustainable development that meets the needs of the poor while recognising the limits of development to meet global needs. Needs are not interpreted solely in terms of economic interests, but also in terms of the interest of a fully functional, harmonious global system that incorporates people and ecosystems.

During the Nineteenth Special Session of the United Nations General Assembly (UNGASS), also popularly known as Earth Summit + 5 or RIO + 5, which was held in New York in June 1997, the implementation of Agenda 21 and other agreements reached at the UNCED were reviewed and appraised, while emphasis was also placed on actions to promote sustainable development worldwide.

The ten-year review summit of the UNCED, officially known as the World Summit on Sustainable Development and popularly referred to as Earth Summit 2002 or RIO + 10, will be held in Johannesburg, South Africa in August and September 2002. The aims of the World Summit on Sustainable Development are to:

• Focus on accomplishments and areas where further actions are needed to implement Agenda 21 and the other agreements reached at UNCED, and to address, within the
framework of Agenda 21, new challenges and opportunities that have emerged since UNCED

- Ensure a balance between economic development, social development and environmental protection as dependent and mutually reinforcing components of sustainable development.

There is general consensus among UN member states that the Agenda 21 principles agreed on at Rio in 1992 should not be renegotiated. The Earth Summit 2002 should review the successes and failures of countries in meeting their commitments made at Rio in a frank manner, and should furthermore reinvigorate the global commitment to sustainable development.

The Earth Summit 2002 should deepen the global commitment to sustainable development through a new "global compact", and bring a new spirit into the environmental debate.

There is also wide consensus that the primary focus of the Summit should be on "poverty, development and the environment". Poverty and underdevelopment are seen as the fundamental threats to environmental security and sustainable development. The solution for this is embedded in the Education of the adults in the making towards aiming at a sustainable development for a healthy future. UNESCO has already prepared a multimedia package on ‘teaching & learning for a sustainable future’.

1.2.2 EE IN INDIA:

Concern for nature and natural resources is not a new concept for Indians. Admiration for nature and the urge to conserve and protect it has been a part of our civilization. India’s wealth of literature, scriptures and folklore are replete with examples which show that our ancestors were environmentally conscious and advocated concepts of sustained usage of resources through many social customs, myths, taboos, traditions and religion. Thus in traditional society, EE was an integral part of the learning. However with the onset of industrial revolution resulting in alienation of societies from the natural
environment and with changing social relationships, this kind of education has ceased to be a part of the natural learning process.

Unrestricted and indiscriminate exploitation of environmental resources necessitated by population growth, poverty, illiteracy, filthy politics and lack of awareness and values among people in India has created ecological imbalance resulting in environmental problems, different types of pollutions and other kinds of ecological disorders. This environmental crisis may become more worsened in the coming days simply because of lack of concern for the common good and the absence of a sense of responsibility for sustaining a balanced eco-system. Therefore, what is required today is education for the people and reorientation of the people towards the desirable attitudes and values, specially those that will lead to a greater concern for preserving balance in the eco-system, besides teaching them how to save the environment from further degradation. After the emergence of the concept of EE as a new dimension in the educational (both formal and non-formal) system (Stockholm Conference 1972), India also recognized the significance of EE in the direction of environment protection, took initiative in this regard and marched ahead to put into practice.

Then, the National Policy on Education 1986 and 1992 emphasized the need for EE as an integral part of the curriculum at all stages of education. NPE 1986 states “there is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society, beginning with the child. Environmental consciousness should inform teaching in schools and in colleges. This aspect will be integrated in the entire educational process”. The policy visualizes a national curricular frame work, which has a common core and includes several elements having a direct bearing on the natural and social environment of the pupils. These core areas are expected to occupy a place of prominence not only in the instructional materials but also in the classroom and out our school activities. The Department of Education, Ministry of Human Resource Development (MHRD) took initiative for integration of EE into the formal educational system at all levels and visualized a national curriculum frame work, which contains a common core of EE, while the National Council for Educational Research and Training
(NCERT) takes care of this at the school level, the University Grants Commission (UGC) is responsible at the college/University level.

Further, the responsibility of developing policies and strategies for creation of awareness amongst all the people about environmental issues through on-formal methods has been entrusted to the Ministry of Environment and Forest (MOEF). Some of the programs of the MOEF, which aimed at creating public awareness, are: National Environment Awareness Campaign (NEAC)-1986, Centers of Excellence on EE (CEE Ahmedabad-1884 and CPREEC Chenno-1988), Paryavaran Vahini-1992 (stopped at present) and Eco-clubs 1993, recently (98-99) this Ministry initiated the Environmental Management Capacity Building (EMCB) project for implementation of EE in school system. India joined Global Learning and Observations to Benefit the Environment (GLOBE), an international Science and Education program during 2000. This program, which unites students, teachers and scientists all over the world, is aimed at school children. About 100 schools spread over different parts of the country have already joined this program.

1.3 ENVIRONMENTAL EDUCATION IN TEACHER EDUCATION-
SIGNIFICANCE:

Teacher Education in Karnataka has gained more Weightage in the sense the number of B.Ed., colleges have been increased district wise and the curriculum is refined to adopt innovative approaches / methods/ techniques as for the methodology topics. New researches have been undertaken in order to understand the dynamics of learning styles of students and aim at productive & competent citizens to the society. Much current research on innovative practice in Teacher Education, the fast approaching environmental degradation are emphasizing the concept of the Critical Reflective Practitioner (UNESCO). A Critical Reflective Practitioner is one who is not only skilled in the technical aspects of Pedagogy but is also able to reflect on the social and environmental implications of difference approaches to teaching and learning. This speaks not only about the Critical Reflective Thinker in an EE teacher but also about one who is Competent in the Art of Transaction as pre-requisite. This thesis explores the significance of empowering pre-service secondary teachers with the EE competencies in
order to fill the gap between School Education and Environmental protection (Environmental Education).

Although in most professions, theory and practices form the core of professional preparation, Teacher-Education programmes seem to lack objectives in which theory and practice are operationally integrated. Moreover ‘Environmental Education Teacher Programme’ has no special identity of its own and is merged with the general programme for Teacher Education. Hence the competencies specially required for Environmental Education teacher has been neglected over those required for general education.

The Universities have to re-vamp the curriculum with an emphasis on infusing environmental concepts in all the school subjects. They should plan to organise multi-disciplinary teaching with a view to enable the future citizens to become critical consumers of scientific knowledge and experts in resolution of value disputes, environmental issues / conflicts etc. However lack of attitudinal inclination in this regard among the teachers themselves is now posing the greatest threat to quality improvement and competitive excellence in the field of teaching Environmental Education.

The very nature of Environmental Education i.e., its multi- & inter-disciplinarily, its multiple audiences, its life-long role, its linkages between past, present and future – all these invite the exploration of a range of options to achieve the goals. Particular medium gives particular ways of taking students through experiences which otherwise would miss out on. Thus such a ‘bring home the world’, technique certainly emphasize the key role of the teacher as a facilitator.

Until recently the lack of a suitable Environmental Education policy, together with the lack of strategic national frameworks or directions for effective teaching and learning in Environmental Education have resulted in an ad-hoc teaching that is often superficial and is reduced to little more than giving information about the state of the environment. To quote an illustration, from Karnataka schools...the concept of ‘Ecosystem’ is taught more as a lesson from life science than anything to do with Environmental Education.
EE is often characterized by *gathering information about environmental issues and presenting hypothetical solutions*. Such teachers give a hypothetical approach to the teaching of EE. It's nothing strange in Indian context to notice schools where the teachers make the students ‘Explore’ pond as an ecosystem very well inside the class rooms!

The Pre-Service Teachers after their training do not automatically become competent EE teachers. This is because the general training in the teacher education programme does not aim at training the special competencies or the abilities needed to infuse EE. This will be clear further with little more analysis as to what special competencies are required that generally need not be there in a secondary teacher.

In Karnataka many universities provide environment related courses. However their focus is often on knowledge acquisition and awareness and more often it reflects ‘Environmental Studies’ or ‘Environmental Science’ programme rather than a comprehensive Environmental Education Approach.

It is one of the very important functions of any Teacher Education program to train the pre-service teachers and to equip them with the basic Content and Pedagogical Competencies to transact EE through Infusion Approach. The highest objective of EE being participation becomes impossible to be achieved by the secondary teachers if they are not equipped with the needed competence during their pre-service training. It is also very obvious that the general functions of Teacher Education confines only to the development of basic Content and Pedagogical Competencies that do not help achieve much of the EE objectives & goals successfully.

The task of EE teacher is not very similar to any ordinary teacher. In Karnataka secondary school curriculum, there exists no subject titled ‘Environmental Education’. However there is a strong presumption that environmental aspects exists in all school subjects (EE is both multi- and inter-disciplinary). No doubt every subject has a unit in it that speaks about some aspects of environment. This in itself does not serve a
comprehensive purpose. It is almost taught as any other school subject. Students at the
most can very well write a beautiful essay on some environment related topics. In the
sense, even though attitudinal modification need be there in all teachings, EE teaching
demands for bringing attitudinal modification in such a way that it gets manifested itself
in some constructive action by the students towards the protection of environment. This
means that any EE teacher should dominantly aim at affective and psychomotor domain
and not confine to only cognitive domain. The EE should be infused to give a holistic
perspective of environment to students for this the EE teacher should perform
competently to achieve specifically this objective. These pre-suggest that there is the
need for a competency-based training programe at the teacher education level for the
pre-service teachers.

Competency based training is no doubt an effective means of acceleration change
(changing desirably) in the field of Environmental Education. Any Competency for
Environmental Education teacher requires performance of skills along with the
knowledge and higher level conceptualizations i.e., it demands the possession of
required Knowledge, Skill and Ability to Perform a task adequately. It is an irony that in
many situations the teacher with relevant Knowledge lacks the relevant skill and people
with relevant skill lack the knowledge! Relevant knowledge about environment related
aspects of course, is a pre-requisite for any, ‘attitude to develop’ and ‘skill to perform’.
Environmental education teachers’ pre-service training should prepare them to foster an
‘atmosphere’ and ‘student interactions’ that are conducive to learning. The teacher
should have the capacity to organise both formal and informal activities. The teacher-
education programme hence should aim at producing teachers who are creative,
divergent-thinking; have decision-making skill; are empathic and environmentally
sensitive. Only such teachers mould their students into responsible environmentally
literate citizens. No doubt the task is challenging but it is time for the teacher-training
institutions to take up this challenging task and go by it successfully.

It is time to recognize that teacher training institutions cannot remain only to cater to the
interests of the teaching profession. They should have social responsibility to perform as
a part of the higher education establishment of the nation. They need to become agents
to deliberately bring in changes in the society by moulding student-trainees through
democratic processes/acceptable values as the operational strategy. Such pre-service
teachers when they go to different schools can make the schools play a pro-active, pro-
people; pro-environment role that results in environmental reforms and sustainable
development.

The colleges of Education should design the Environmental Education programme
carefully so that there is no scope for mismatch between competencies developed and
competencies expected to execute a task with efficiency. In this respect, human resource
is now considered the most valuable asset in the act of environmental protection.

An Environmental Education teacher should teach the students to diagnose problems
related to environment. Diagnosis of problems involves detecting discrepancy between
the (a) way things are (Demands the use of perceptual skills) and (b) way they should be
(Demands the use of professional values). The Teacher Education Programme does not
have this goal at present.

The teacher-training institutes need to consider that any training device or technique for
training EE competency must have THREE elements:

(a) A standard task (skill oriented) to be performed by each person to get
training. The performance of this task should involve the demonstration of the
competency.

(b) A procedure (reliable tool) for obtaining documentary record of the
performance during the training session which is accurate and is possible to score
objectively.

(c) An objective procedure (Weightage provided for different aspects of the task) for
quantifying or scoring the record. However it is equally important that the procedure
designed be practicable.

The traditional training of pre-service teachers that is provided in Teacher Education
programme may not help them achieve the EE objectives. Obviously, the competencies
required of a secondary teacher and an EE secondary teacher cannot be the same.
Indeed it is a necessity for the EE teacher to possess the general competencies but that will certainly not be sufficient. An EE teacher must possess some extra competencies along with the traditional competencies.

- An EE teacher has to first identify the infusion spot to infuse environmental dimension in whatever subject he/she is teaching. Generally this demand is not there from a secondary teacher.
- An EE teacher as an additional responsibility should find ways & means to teach environment related aspects during the transaction of the general subjects without jeopardizing the latter’s smooth continuity. This integrated approach to EE is very important to give holistic perspective to it. Thus an EE teacher should go beyond just covering portions for exams & make efforts to develop environmental sensitivity among pupils in order to develop feeling positive towards the protection of environment. This may be referred to as the ‘outcomes of instruction’. In the present context a secondary teacher is exempted of this.

-An EE teacher is expected to be environmentally literate and be aware of environmental concepts/phenomena/problems/issues of local and global, whereas an ordinary secondary teacher is expected only to have mastery of the subject he/she teaches.

The training institutes generally feel the ‘task’ as a complicated and have the plea of ‘time constraint’. But these institutions should realise the urgent need of environmentally literate citizens and how in turn this depends only on the competent teachers. Otherwise the teachers freshly out of training institutions may end up in developing intellectual parasites to the society! How dangerous this could be for the present as well as the future generations! Training institutes should not only aim at providing ‘survival skills’ to the pre-service which at the most help them ‘get along well’ with the regular ‘class-periods’ without much trouble to themselves. Training should aim at preparing teacher who is both environmentally competent and committed. This is very true since the pupils cannot be held accountable for failure to learn desirable behaviours towards environment,
because the assumption underlying a training programme is that any failure is a result of the inadequacy of learning conditions.

To put in a nut shell, Teacher Education must give priority to EE. EE in Teacher Education must take a lead role towards achieving these goals. The role of EE is to provide opportunities for a critical review of current patterns of behaviour to ensure a sustainable future. To achieve this, processes of teaching-learning that are participatory have been identified from literature in EE that link directly to Experiential Education. These include: critical reflection on current behaviours and lifestyle choices; the importance of grounding students’ experiences within the total environment to develop better understanding; the need to empower and motivate individuals to participate in social action; the need to engage in student-centered problem solving and decision-making. The teacher is expected to play the role of developing opportunities for individuals to engage in learning that models these strategies. This means that the Teacher Education programme should in no way remain complacent, instead make efforts to train pre-service teachers in such a way that they can effectively involve themselves in the participatory teaching-learning activities. Such expectations from school teachers are also expressed in many reports & studies. The Brundtland Report (1987) argued ‘that the world’s teachers have the crucial role to play in helping bring about the extensive social changes needed for sustainable development.

1.4 ENVIRONMENTAL EDUCATION IN SCHOOLS:

To decide the quality Teacher Education programme for Environmental Education, it is very important that there is a similar demanding goal at the secondary education. Otherwise it cannot gain momentum. Environmental literacy should be one of the goals of school education. This makes it obvious that the indirect responsibility of this is to be taken by teacher education programme in terms of enhancing the environmental competence of secondary teachers to teach EE in secondary schools.

With all the efforts from the govt. to universalize the school education, it is not very long time that this becomes a reality with increased number of enrolment in the secondary
schools. The fruit of this effort must be in terms of productive and contributing citizens to the society. This also means that such citizens bear the responsibility of decisions taken & actions performed by them 'for' environment. For this, they should be equipped with the relevant knowledge related to environment and its problems with desirable attitude. So equipped pupils can grow into productive citizens and participate in environment protection activities. Tbilisi Conference lists ‘participation’ as the highest objective of any EE. Only a teacher who is environmentally literate and is competent enough to use different techniques to develop environmental sensitivity can help achieve this objective. To train the in-service teachers in this regard would be a step ahead but it remains only as a ‘patch work’. Instead, the pre-service teachers getting suitable training during their practice-teaching may tend to be a better solution for this.

A secondary teacher to perform the role of an EE successfully is not automatic but he / she should be ‘made that way’ during pre-service training. Thus it is clear that Teacher training Institutions play a significant role. These demands for the whole setup, to undergo a revolutionary change with the program they design.

School teachers have to invariably bear the need for training such competent teachers. This also demands the teacher training institutions to provide ‘competency-based training’ for Environmental Education teachers. Even though the task does not sound easy, it is certainly not an impossible task. It is worth making an honest effort since teachers can at a time have multiple audiences and can afford to bring in attitudinal modifications in exponential rate!

However the ability of schools in India to promote, model, give guidance and take action on experience and knowledge regarding environmental issues is limited due to the constraints of timetables, exams, curriculum pressure, a strong focus on knowledge learning and in many cases, the lack of understanding and basic competence in teaching and learning strategies for effective Environmental Education. Thus, “action ‘for’ the environment is a contentious and difficult concept to implement given the current
structure of Indian schooling. EE in School Education has become the international focus point, but almost with little effect.

It is true that School subjects enlist some environment related topics as contents with a view to develop environmental awareness. But this is just a lip-sympathy towards the protection of environment, as these topics are not taught with any vigor to convey environmental message. The teaching of these topics does not convey any special message related to the protection of environment. Environmental sensitivity, an important quality to be inculcated among pupils can very seldom be taught when EE is introduced as separate unit in the school subjects. It becomes mandatory for these EE teachers to transact EE in the already existing curriculum. Teachers opine (an open discussion with the investigator) that they need to be competent in a way to bring development among pupils in all 3 domains. This becomes very important since the manifestation of these developments, alone can promote participation of individual in the protection of environment & sustain it. In this study EE teacher is considered as one who teaches about environment, its problems & solutions (by) infusing environmental aspects during the transaction of different school subjects.

“Environmental Education” has been a curricular buzzword since the 1960s. In his last national curricular study of environmental education Childress, 1978(Essential Readings in Environmental Education) suggests that most of that energy has been dissipated in discussion. Environmental Education, if it exists at all, is loosely organized and has little sense of direction. The Childress study of 301 Environmental Education programs found that less than 40% of those surveyed considered lower level of objectives in the hierarchy objectives.

1.5 ENVIRONMENTAL EDUCATION & INFUSION APPROACH
Infusion is defined as “the process of integrating a new dimension or perspective into the contents of the existing courses in order to highlight its significance without jeopardizing the innate nature of the course/s”(CEE-Training Manual in EE for DIETS-an exemplar
A similar but a more feasible approach is highlighted by UNESCO in its multimedia package for ‘Educating for sustainable future’.

While most definitions for EE outline positive attitudes for the environment and highlight the need for knowledge, understanding, skills and some form of action or participation. Some introduce the idea of across curricular or multidisciplinary approaches to learning. This is a critical issue if action and participation are central to Environmental Education. Essential skills associated with knowledge derived from isolated blocks of study becomes highly compartmentalized and limit the ability of individuals or groups to act in ways that takes into consideration all the elements needed to maintain and improve the quality of the environment. This is what has happened till recent years under the blanket of introducing EE successfully. The outcomes however were disappointing. Hence, a more holistic approach to environmental education has emerged. Now there is a need to extend and expand the focus of Environmental Education to the surrounding issues of social, economic and political influences rather than to just revolve around maintaining the biophysical environment. Hence, Environmental Education has expanded to include an interdisciplinary approach to addressing the interactions between environment, society and economics. Consequently, Environmental Education in the 1990s has transformed itself and emerged to reflect a more holistic concept.

As mentioned earlier, Environmental Education should not form a separate part of the curriculum but should be ‘integrated/infused’ with all other general subjects. In such an infusion approach, environmental dimensions are integrated into the existing curriculum system with minimal demands. Such an infusion requires not so much new content to be introduced into the teaching of a subject, but rather that a holistic perspective to be given to what is being taught and that is taught so as to ultimately make the students environmentally literate & environmentally sensitive in order to monitor his behaviour desirably. It is also assumed that teachers of all disciplines can get involved in the process. A variety of teaching methodologies may need to be used for effectively brining in the environmental dimensions such as to awake interest, arouse curiosity,
provide information and enable systematic processing of the information, help formulate codes of ethics and behaviour leading positive attitude and action towards conserving environment. The teacher should be competent enough to give out ‘environmental’ perspective in the teaching of the subjects which are not traditionally thought to be so. This suggests for the enrichment of the classroom experiences.

One of the things to come out of this training is the knowledge that Environmental Content and Skills can often be integrated into existing courses without interfering with the content and skills in it as desired by involved faculty members. Infusion is a relatively simple process to understand but a rather complex process to accomplish. (Childress 1978). Simply stated, *infusion refers to the integration of content (environmental dimension) and skills (strategies/techniques) into existing courses in a manner as to focus on that content (and/or skills) without jeopardizing the integrity of the courses themselves.*

A key component in the infusion process rests with the faculty of the school attempting to incorporate an infused Environmental Education program. Any comprehensive infusion strategy demands a great deal of cooperation from staff members who are going to be responsible for the infused program. The faculty must be sympathetic toward the infusion and the members of that faculty must be willing to work cooperatively to build a plan for infusion and see that the plan is carried out. A major ingredient of that “plan” must be to respect the integrity of the scope and sequence in a manner that guarantees that instruction will proceed logically across content areas. Sometimes this can be accomplished by teachers working independently of others but often it necessitates “team teaching,” with instructors from two or more content areas working cooperatively to deliver well-thought-out instruction. (Childress, 1978 Essential Readings in Environmental Education, 2nd Edition)

*It is already mentioned the different versions of the definition of ‘infusion approach’ to EE. The study has redefined the concept ‘infusion’ as it is used in the present study to have a better understanding of the study made. Infusion is defined as “the process of*
integrating *Environmental dimension or perspective* into the contents of the existing courses in order to highlight its significance without jeopardizing the innate nature of the course/s”.

The training manual by CEE throws some more light into ‘infusion’ approach. The basic purpose of including Environmental Education at the school level is to enable the future citizens to understand the complexities in nature understand the interdependence of living organisms on environment, in particular, human beings and develop appropriate attitudes, appreciation and values towards it. One way to bring about this needed thrust in the school curriculum is by infusing it into the teaching of other subjects. This is done by adding a new focus to a discipline. This new focus calls for a deliberate selection and inclusion of content which will add to the students’ awareness and understanding of the environment and environmental issues. According to the manual, Environmental Educators generally recommend two different ways to handle environmental education in the classroom.

Infusion: incorporating environmental concepts, activities and examples into existing curricular goals.

Insertion: adding an environmental unit or course to the class or curriculum, usually something else is removed.

According to the materials brought out by the National Consortium for Environmental Education and Training, U.S.A, infusion could be anything from using running games to explaining population dynamics to altering an entire curriculum to reflect an environmental theme.

In India some NGO’s like CEE (Ahmedabad and Bangalore and CPR Environmental Education Centers have been working for EE in Teacher Education. CEE being a National Institute of excellence for EE supported by the Ministry of Environment and Forests, Government of India and affiliated to the Nehru Foundation for Development, has its main objectives to create Environmental Awareness among the public. CEE has developed innovative programmes and materials and has field tested them for their validity. The training modules prepared by it for both in-service & pre-service teachers
are worthy to note here. In all these modules the aim is to provide models for transaction of EE that could be easily replicable to suit local conditions. They strongly suggest the infusion approach to EE. This has become the main source of direction for the designing of the POA to CBT in the present study.

1.6 COMPETENCIES NEEDED FOR EE TEACHER:
Competency is a term used extensively and hence is needless to say that it is defined by different people in different ways. “several researchers have attempted to define this term. Houstan (1987) ‘Competencies are the requirements of a competency-based teacher education, which includes the knowledge, skills and values the student must demonstrate for successful completion of the programme’. Similar views were expressed with respect to the meaning of a competency by McNamara (1992) and APEID, UNESCO.

Even though the highlight is on the competencies of an EE teacher, the general notion of the term competency and its training as it prevails in the general education system is of great significance to the present study.

According to DPEP, Tamil Nadu (1996) teacher competency refers to ‘the right way of conveying units of knowledge, application and skills to students’. The right way here, includes knowledge of content, processes, methods and means of conveying content in an interesting way, involving the activities of students. Hall and Jones (1976) had viewed competencies as less abstract than goals and objectives as more specific than a competency. Teacher competencies have their super ordinate and subordinate relationships as shown below:

Role/Function → Task → Subtask → Competency → Sub competency →
Skill → Sub skill → Unit behaviour

Report of DPEP on the activity of NCERT identifies that the meanings attributed to competency in literatures pertaining to teacher education, reveals certain common characteristics that are applicable to a competency. The present study finds it relevant to enlist those here for a broader understanding of the term ‘competency’. They are as follows:
1. A competency consists of one or more skills, whose mastery would influence the attainment of the competency.

2. A competency has its linkages with all the three domains under which performance can be assessed. It spans the domains of knowledge, skill and attitude. Even though the skilled performance of a teacher is closely associated with his competence, such a performance would have knowledge and experience based and a favourable attitude.

3. Competencies, since have a performance dimension to them, are observable and demonstrable.

4. Because the competencies are observable, they are also measurable. It is possible to assess a competency from the performance of a teacher. It is not necessary that all competencies of a teacher have the same extent of knowledge, skill and attitude. There may be competencies which have a layer part of it pertaining to knowledge than to skill and attitude. Some have referred to such competencies as cognitive competencies whereas, there may be competencies which skill/performance loaded. In this work, competencies which have a predominant part of skills have been considered. A reason being that such competencies are not devoid of knowledge and attitudinal dimensions and that they are more closely linked to the performance assessment of a teacher or to his job analysis.

A set of competencies are needed for an EE teacher in order to provide enriched experiences. Experiential learning should be the goal of the whole EE in schools. The idea of experiential learning as a cycle was suggested by prominent educationalists such as Jean Piaget, John Dewey and David Kolb. This suggests for experiences that is to be provided which enables students to have the actual participation of more of their sense organs in order to understand the real environment. Such an experience no doubt makes them gain a deeper understanding of our environment and may even help modify attitude & behaviour towards environment & apply the learnt knowledge in different situations.

To empower the pre-service teachers with the basic teaching competencies is the inevitable function of any teacher education programme. According to Prof. R.H.Dave, (NCTE document) Pre-service teacher education is a process of transformation of the untrained entrants possessing requisite back-ground education into competent and
committed professional educators. The document stresses on 3 important and interrelated components of professional education of teachers viz, competency, commitment and performance.

One more related aspect is the existence of such a competence at different levels. “An even broader approach to competence is variously termed integrated, holistic, or relational. An integrated view sees competence as a complex combination of knowledge, attitudes, skills, and values displayed in the context of task performance (Gonczi 1997; Hager 1995). Barry Law feels that this approach recognizes the different levels of competence-entry/novice, experienced, specialist-rather than a once for all attainment. Interpreted broadly, competence is not trained behavior but thoughtful capabilities and a developmental process.

The present study identifies this outlook as very much feasible for the present study. This is so since the designed competency-based training programme for the present study gives a platform for the training of a stream of ‘thoughtful capabilities’ that can be exhibited at different levels. To achieve mastery of any of these is only developmental process. Thus the study aims at helping the pre-service teachers to attain the competencies identified at the novice level to transact EE & become a specialist in the later stages.

To decide the training aspects of the pre-service EE teachers, the Teacher Education programme should consider those factors which help enhance the effectiveness of a teacher. These may be the ‘possessions’ of a teacher to use in their classrooms for the transaction of EE. These possessions invariably become the EE ‘teacher competence’ that include a teacher’s possession of the related basic environmental knowledge i.e., environmental concepts/ principles/ Issues/problems etc. along with the required pedagogical skills & suitable dispositions.

Although the concepts ‘teacher effectiveness’ & ‘teacher-performance’ are not synonymous with the concept ‘teacher competence’, the two are a function of the later one. Therefore the teacher education program should aim at competency-based training.
in order to enhance the ‘teacher effectiveness’ & ‘teacher-performance’. Competency serves, as a basis for selecting and arranging appropriate teaching learning activities with a view of meeting learning needs of learners. This calls for the child-centered and activity oriented competency-based teaching. It originated in US in 1918. This is programme for students. The present study has a different goal. The pre-service teachers should gain the ability to convert successfully the ‘subject knowledge’ related to Environment & its’ problems into ‘teaching activity’. This is in fact the need of the hour. If the pre-service teachers are not empowered with the ability to use quality inputs (inputs that are strong to enhance the quality of communication), the Environment related communication suffers. The goal to achieve this is to prepare training package to the teachers in the competencies required for effective transaction of EE. Such a programme should invariably be in terms of Competency-based training. Thus ‘Competency-Based Training’ has gained momentum at present.

1.7 NEED FOR THE PRESENT STUDY:

The society needs responsible citizens who care for environment, preserve it for future generation and show compassion towards fellow creatures. The older generations painfully witness the educated young daringly misbehave with the nature. Abuse of environment by the people is not because they lack related knowledge. But they lack the related positive feelings or the social values attached to it. A teacher who is competent can shake up the illusioned young minds and let them know that within this finite system of earth, the air, the water, the soil, the landscape and the biological organisms exist in very delicately balanced MUTUAL relationships. As the balance is disturbed by technological innovations, nature responds by adjusting itself to a new equilibrium compatible with new situations /conditions. This new adjustments usually manifest itself in the form of changed environmental and ecological conditions that may be often highly detrimental to the community at large. The more we intervene with the nature, the more such adjustments it makes! A competent teacher indeed can develop awareness about these and illustrate, ‘any alterations of climatic patterns by global warming, acid rain, salinization of soils in arid lands, ground water contamination, disappearance of wet land, destruction of
wild life habitats’ as the examples of nature’s SUCH adjustments to human interventions. Competent teacher can make students feel sorry for the undesirable act of human beings and help them incline their attitude towards aiming at benefiting the public trust properties. But what actually transpires in the classrooms is actually far from these expectations.

Our need for environmental protection is no issue at all. It needs no debate. It is never secondary in its priority. So all educational institutions, starting from elementary schools should aim at developing concern towards environment & its protection. This is very clear when New Education Policy 1986 states that “There is a paramount need to create a consciousness of the environment. It must permeate all ages and all sections of society beginning with the child. Environmental consciousness should inform teaching in schools and colleges. This aspect will be integrated in the entire educational process”.

But strangely we notice the younger generation misbehaving with the nature and its creatures. This reflects typically the kind of experiences they lack in schools and colleges. Indirectly this also tells the tale of such noncommittal and incompetent teachers who are otherwise expected to become the facilitators of apt learning experiences! Thus we are in urgent need of competent teachers who develop concern towards environment.

After the declaration of ‘Education for all’ by NPE, the academicians, curriculum framers have woken up and realized the need for introducing environmental concepts ‘at all levels’ irrespective of the subjects. Therefore it becomes part and parcel of the programme in schools and colleges to provide such an education which results in the enhancement of students’ productive nature viz., to think productively, to learn worthy values, to lead eco-friendly life-styles etc. This indeed suggests the institutions to look out for competent teachers who can successfully develop these qualities. That’s the main reason why many universities are volunteering to make Environmental Education course, mandatory in teacher-education programme.

Opportunities for learning exist everywhere. Educational institutions are formal places, where deliberately learning atmosphere is created. The teacher is the key to the whole system. It is only through the initiative and innovativeness of the teacher, that any programme can be carried out successfully. There are many teacher support materials, handbooks on environmental education related aspects, with a number of different types
of activities. The role of a teacher in performing these activities is not that of merely transferring information but rather, one of being a facilitator, a leader and a resource person in a learning process that is participatory. This type of role for an environmental education teacher has a very high significance. Each activity when presented to students with due stress (Weightage) given to it can provide students, an experience of a small part of the environment. And these small pieces of experiences build into a larger mosaic of understanding. The teacher should be competent enough not only in making the successful use of available readymade activities but also to design a number of such activities based on their local environment and available opportunities. Such activities encourage the students to observe and explore their environment, to understand relationships in nature between humans and nature and to learn better how humans are an integral part of the intricate web of life. A competent teacher will make this a joyful learning for students by providing activities based on real experiences and to help them to explore their environment with utmost sincerity by preparing their mindset for ‘Prevention is better than cure’.

Young minds are important asset to society whose energies, if harnessed properly can help in lifting us from the rut that we find ourselves in. They have the energy, will and the potential to do anything to save the environment they live in. They only lack proper direction and opportunities. Since they are the future citizens, desirable attitude to safeguard the environment should be built now in them. Therefore to invest in youth is to ensure our future. According to Medard, Gabel, Director of World Game Institute “...The future belongs to the youth of the world. They own the future. They may not own the property, or the military, or the multinational corporations. They can't even vote yet. But they do own one thing, and that is the future . . . The youth of the world, at their age, still has three quarters to 80% of their life in front of them. So the future is owned by them. This is why it's so important that the young people on the planet start caring about both the environment and all the other problems we face, because they're the ones who are going to have to deal with it.”
However in India, EE has not yet found an established niche in the Indian schooling process. Most school-based educators have not adopted a frame of reference for either EE curriculum or instruction, although they are widely used in non-formal contexts (e.g., in zoos, museums, and parks.)

Except a few developed countries others are showing lip sympathy. In India it is in no way better than many other countries. Until recent years EE was much used in non formal contexts. Now the schools are making an eye wash. Only recently UGC (University Grants Commission), & NCTE have made it mandatory to study environmental studies as a course in 1st grade colleges (after +2 level). It is indeed a pity that the objectives suggested by Tbilisi Declaration have not still completely become the basis in any of levels of education in India. Karnataka retains almost the same scenario.

A number of centers of excellence, paryavaran vahini, eco-clubs, Non Govt. organizations, apart from the National Environment Awareness Campaigns (NEAC) every year (since 1986), ENVIS, NMNH (Decentralized information systems) are no doubt making efforts to bring awareness among the people and to encourage them to participate in the act of conserving environment. Yet fiscal incentives to generate public support for this purpose have not taken us too far to promise anything. India is also the signatory to a number of international treaties and conventions promoting sustainable development and conservation of natural resources. All of these are highly effective when they are spoken about but when comes to operational stage, yet to act seriously. They are failing in modifying the *already structured attitudes* of the people towards abuse of environment. Attitudes, like habits ‘die hard’. Desirable attitude can be easily developed at younger ages. Any effective programme on EE cannot overlook this aspect. This forces the concerned to analyse the multiple perspectives of the definitions of EE with a view to get a better hold of the approaches to EE.

While most definitions of EE outline positive attitudes for the environment and highlight the need for knowledge, understanding, skills and some form of action or participation. Some introduce the idea of across curricular or multidisciplinary approaches to learning. This is a critical issue if action and participation are central to environmental education. Essential skills associated with knowledge derived from isolated blocks of study becomes highly
compartmentalized and limit the ability of individuals or groups to act in ways that takes into consideration all the elements needed to maintain and improve the quality of the environment. This is what has happened till recent years under the blanket of introducing EE successfully. The outcomes however were disappointing. Hence, a more holistic approach to environmental education has emerged. Now there is a need to extend and expand the focus of environmental education to the surrounding issues of social, economic and political influences rather than to just revolve around maintaining the biophysical environment. Hence, environmental education has expanded to include an interdisciplinary approach to addressing the interactions between environment, society and economics. Consequently, environmental education in the 1990s has transformed itself and emerged to reflect a more holistic concept.

There are certain issues that have been identified that pose obstacles in the transaction of EE. The schools teachers and the teacher educators from most schools and colleges of education, commonly feel that the EE can be successfully transacted only through certain natural science and geographical topics. This encouraged them to adopt safe modes of teaching are practicing. This becomes the second issue. According to Barry Law, who quotes Williams (1988) that the dominance of a natural science based approach in schooling and teacher education has led to environmental education becoming a sub-set of existing disciplines. “According to Fien and Tilbury (1996,p.40) Environmental Education becomes embedded in “selective curriculum” where “certain safe methods and knowledge are taught” and thus avoids linking political, economic, social/cultural perspectives to bio-physical issues.” (Barry Law-2003) These perspectives are a must as EE requires a holistic approach for its transaction. Most teaching in educational institutions aimed at transmitted the factual knowledge related to Environment. Thus another key issue is the continual dominance of knowledge acquisition at the expense of learning through action. “According to Stevenson (1987,pp.73-74), the historical purpose of schooling was not to produce ‘critical thinkers, social inquirers, problems solvers or active participants who would
engage in social decision-making. Instead, it was the “transmission of cultural knowledge, skills and values”. Barry Law identifies that this presents a dilemma for the teacher educators who view learning as a transformation process.

There are several reasons why especially competent teachers are required for teaching Environmental Education. This may require an analysis of the nature of the discipline and its objectives:

- The very objectives set forth for environmental education going from awareness to action (Tbilisi) – pose a challenge. The conventional classroom methods of teaching are not found effective in meeting different objectives to any great extent, which is why teachers have to explore fresh ways of teaching in order to become successful Environmental Education teachers.

- Environment is all-encompassing multi-disciplinary and dynamic. It has scientific, social, economic, political and technological dimensions to it. An EE teacher has to bring in all these aspects to capture the true spirit of Environmental Education.

- Environmental Education is meaningful, if it takes place in realistic and is generally oriented towards understanding and solving real-life problems. Practical activities and first hand experiences are essential for creating this understanding.

- But most schools are not geared towards this. This is because most teachers are not equipped with the required abilities. This is precisely because generally it is not expected out of the schools teachers. The teacher training institutes also have remained complacent in this regard.

Whether the curriculum actually achieves this goal or not will be affected by many issues. While these often extend beyond the responsibilities of a single school or teacher, there are many things that schools and teachers can do, including the following few activities:

➢ Teachers can so choose the learning experiences to infuse that by participating in them the students develop positive feelings related to environment. (eg: enriched
learning experiences can be provided through role-playing, story–telling on relevant topics in different subjects.)

Teachers can pose problems from daily life (environment related) & use some idea pooling techniques such as Brain-storming sessions. This helps them focus their attention on the local environmental problems & try to hell

Teachers can assign some action projects (this helps modify their attitudes as well as values)

Teachers can construct some tools to know pupils’ awareness/attitudes/action behaviour regarding some environmental theme/situation. The results of this can be further utilized to provide suitable learning experiences.

Teachers may learn to prepare additional resource materials related to environment & make use of them &/or exhibit them during the teaching of different subjects at the apt infusion spots. (these indirectly may serve the purposes of environmental data collection)

Teachers can use techniques such as organizing co-curricular activities such as dance, drama, music, debate, essay etc. in a way that they convey some environment related values/message.

Teachers can train them to make environmental pro-decisions for all the activities that are to be performed by them.

Teachers can deliberately plan for ‘out of class room’ teaching and provide pupils with tremendous amount of enriched experiences that results in meaningful learning by them.

For meaningful learning to take place within this framework, the interaction has to be optimised. An environment education teacher should be competent enough to;

- Help students become aware of the importance of our natural resources and the ecological processes that maintain them.
- Demonstrate and help students to understand the different influencing factors that threaten the well being of our environment and how people can contribute to its improved management.
- Enable students to do what they can, to conserve our natural resources through desirably making changes in their life styles.

The research studies done by Michale J Dunkin (1997), Medley and Shamm (1994) etc indicate that studies though are on teacher competence it confines to the assessment aspects related to teacher competence. Some studies on ‘Competency-based teaching’ have been done. Mr. P. Natarajan-Lecture & N. Natesan-Reader & Head, Department of Studies have conducted a study on ‘Effect of Competency-based teaching of Environmental science through video on students’ attainment at primary level.’ Here the target group benefiting out of this are the school students through the Competency-based teaching. Thus the studies related to EE competencies are found to be very scanty.

The report on DPEP identifying the need to have competent teachers in the general education declares that “To improve the quality & efficiency of school education, we need teachers who can perform well in the classroom, in school and out-of-school activities. ...A teacher is after all, a professional practitioner and therefore should possess the competencies required for exemplary performance in these areas to carry out the professional tasks with efficiency and insight”.

Lastly, we should not forget, Mahatma Gandhi’s statement ‘Nature can provide for every man’s need but not for greed’. Competent-teachers play a dominant role in conveying this message to the mankind. If the teachers downplay their responsibilities now, it will be disastrous. Because, ‘forgoing responsibility’ is to force the inevitability and to forgo chance. We are all ultimately greater than the sum of our parts. There is no force greater than ‘human will’. So we must make RIGHT CHOICES by playing our responsibilities. WE ARE, WHAT WE CHOOSE. And if we so choose, we can thrust healthy environment upon mankind. Competent teachers surely make the students realize, how, ‘for the loss of a horse shoe nail, a kingdom was lost’ and assures the young minds that each one ‘is’ such a nail the favour of which certainly sustain us.
The task therefore is to train competent teachers who can transact environmental education successfully. This is not that easy since such a teacher should possess a set of extra competencies that NEED NOT / MAY NOT be present in a teacher teaching regular school subjects. This is because, Environmental Education demands special expertise to be effective in class rooms.

This detailed discussion probably forces us to conclude that competency – based training to transact Environmental Education should be a part of the course in teacher-training institutions. Such trained competent Environmental Education teachers alone can inculcate desirable values and attitudinal modifications among the future generation which can make conservation of environment – an ongoing cultural process.

Thus the central purpose of the study is to explore the effectiveness of the CBT Programme on pre-service secondary teachers to transact EE.

1.8 OPERATIONAL DEFINITIONS OF THE KEY TERMS

**Pre-service Teachers**: Teacher trainees who are undergoing B.Ed. training during the period of research.

**EE teacher**: is one who teaches about environment, its problems & solutions (by) infusing environmental aspects during the transaction of different school subjects.

In the present study EE teachers refer to pre-service teachers who transact EE at the secondary level during their practice teaching session.

**Environmental Education (EE)**: Environmental Education is an attempt to reorient education so that environmental competence is resorted as one of us basic aims, along with personal and social competence. It is not just a subject of education but an expansion of its whole philosophy, recognizing our environmental as continuous with ourselves and in eed of the same ease and understanding as we give to oiur personal and social well being” (Smyth 1995)
According to UNESCO-UNEP: Environmental education is regarded as a permanent process in which individuals and the community gain awareness of their environment and acquire the knowledge, values, skills, experience and also the determination which will enable them to act-individually and collectively-to solve present and future environmental problems.

In the present study,

a) At the secondary level: EE refers to the development of knowledge of environment, awareness of environmental problems & measures and right attitude towards the protection of environment through the secondary curriculum.

b) At the B.Ed. level: EE refers to the education leading to the development of content and pedagogical competencies required to transact environmental components at the secondary level.

**Attitude:**

An attitude is a dispositional readiness to respond to certain situations, persons, or objects in a consistent manner which has been learned and has become one’s typical mode of response. The degree or strength of a person’s attitude may vary from extremely positive through a gradation to extremely negative.

**Attitude towards EE:**

In this study it refers to the favourable dispositional readiness of pre-service teachers, to respond to a) Introducing EE at both B.Ed. level and Secondary level. b) Teaching EE at secondary level.

**Infusion:** is defined as “the process of integrating *Environmental dimension or perspective* into the contents of the existing courses in order to highlight its significance without jeopardizing the innate nature of the course/s”.

**Infusion approach:** An approach in the teaching of EE with a new focus to the subjects taught. This approach calls for a deliberate selection and inclusion of
content, which will add to the students’ awareness and understanding of the environment.

**Infusion spots/Plug points:** These are the words/phrases, statements; sentences in the topics taught (secondary curriculum) where provision can be made for infusing environmental dimension without harming the continuity of the topics.

**Competency:** Report of DPEP on the activity of NCERT identifies that the meanings attributed to competency in literatures pertaining to teacher education, reveals certain common characteristics that are applicable to a competency. They are as follows:

1. A competency consists of one or more skills, whose mastery would influence the attainment of the competency.
2. A competency has its linkages with all the three domains under which performance can be assessed. It spans the domains of knowledge, skill and attitude. Even though the skilled performance of a teacher is closely associated with his competence, such a performance would have knowledge and experience based and a favourable attitude.
3. Competencies, since have a performance dimension to them, are observable and demonstrable.

   Because the competencies are observable, they are also measurable. It is possible to assess a competency from the performance of a teacher. There may be competencies which have a layer part of it pertaining to knowledge than to skill and attitude. Some have referred to such competencies as cognitive competencies whereas, there may be competencies which skill/performance loaded.

   In the present study Competency refers to the state of having and demonstrating, skills, abilities or aptitudes in the satisfactory execution of a learning task (Competency). It consists of one or more components. Here components are the tasks to be performed under the individual competency in order to attain it. Satisfactory execution of a Competency refers to the demonstration of all components of a Competency.
In this study, Competencies (to transact EE) that have a predominant part of skills have been considered along with the ones that are dominated by the knowledge. A reason being, such competencies are not devoid of knowledge and attitudinal dimensions and that they are more closely linked to the performance assessment of a teacher or to his job analysis.

Competencies are meaningfully categorized based on the purpose and common criteria as follows:

**Content Competency:** Refers to the following competencies viz.

**Environmental knowledge (EK):** Knowledge of basic environmental concepts/phenomena, its problems and its protection among pre-service teachers, in order to infuse EE successfully at secondary level & it is represented by the total scores obtained on Environmental Knowledge Test (EKT) used in the present study.

**Environmental Awareness (EA):** In this study it is defined as “the state in which an individual is environmentally conscious regarding a number of environmental or ecological concepts and environmental problems” and it is represented by the total scores obtained on Environmental Awareness test (EAT) used in the study.

**Environmental Action Behaviour (EAB):** It is defined as mental and physical disposes of a Pre-service teacher towards solving the existing environmental problems and regarding future once through action. In other words it is the transformation value and Environmental Attitude into considerable actions towards securing environmental problems. It is represented by the total some obtained on Environmental Action Behaviour test (EABT) used in the study. In the Present study, Environmental Action Behaviour refers behaviours of Pre-service teachers to those ‘day to day’ actions, which by their frequency have the potential to affect environment, either adversely or beneficially.
**Pedagogical Competency:** In this study pedagogical competency is defined in terms of class room performance of teachers, which has direct bearing on content component (not assessed separately) & affective components (assessed separately).

In the present study Pedagogical Competencies refer to the following:

**Indoor competencies:** refers to the classroom competencies of an EE teacher which are to be performed only inside the classrooms in order to transact EE at the secondary level.

**Outdoor competencies:** refers to the class room competencies of an EE teacher, which are performed out side the classrooms preferably in the natural setting. The study considers two competencies under this category viz. Nature walk and Nature game.

**Preparation of Additional resource materials:** in the present study four additional resource materials have been identified. They are:

- **Environmental album:** Arrangement of visuals from varied sources on varied environmental themes in the form of a photo album.

- **Environmental Scarp book:** Arrangement of paper clippings from varied sources on varied environmental themes on a used/unused book.

- **Learning aids:** preparation of learning aids that acts as a supplement in the transaction of EE, using waste/available at low cost ‘Thermo Coles’ on environmental themes.

- **Environmental Posters:** refers to the collage of visuals from varied sources related to an environmental theme on a single drawing sheet. It includes a relevant caption to catch the viewers.
**Action project:** it is a project, which involves some action (head, heart and muscle). In this context it refers to the execution of a project by pre-service teachers involving secondary students.

**Making environmental pro-decision:** refers to those potential abilities of pre-service teachers which help them mend their action behaviour pro-environment.

**Constructing Evaluation tools:** refers to the ability of the pre-service teachers to construct the tools such as rating scales, check lists & questionnaires (open type) in order to assess their students EK, EA & EAB.

**Competency-based training programme:** A package prepared to train and evaluate competencies to transact the curriculum in respect of specific disciplines. In this study, it refers to a package prepared to train (pre-service teachers) to transact the EE at the secondary level and evaluate attainment of those competencies.

**Competency Attainment:** “accomplishment or proficiency of performance in a given skill or body of knowledge.” (Good-1997)

In this study attainment refers to the achievement of specified competencies on which satisfactory execution is demonstrated by each pre-service teacher during the transaction at the secondary level. Satisfactory execution refers to the execution of all the desirable components of identified competencies.

**Competency-based training programme:** a package consisting of the modules and procedures to train, assess the pre-service teachers in the competencies identified as necessary for pre-service teachers for the transaction of EE.

**Subject background of pre-service teachers:** refers to Science and Arts & language Content Cum Methodology subjects opted by Pre-service teachers at B.
Ed. level. on this basis the pre-service teachers are categorized as those with Science method and those with Arts & language methods respectively.

**Treatment groups:** refers to three experimental groups which receive alternative modes of CBT in terms of Casual Approach (CA), Written Approach (WA) & Practical Orientation Approach (POA) to CBT

1.9 STATEMENT OF THE PROBLEM:

**EFFECT OF COMPETENCY-BASED TRAINING PROGRAMME IN ENVIRONMENTAL EDUCATION ON THE COMPETENCE OF PRE-SERVICE SECONDARY TEACHERS.**

1.9.1 OBJECTIVES OF THE STUDY

The present study mainly aims at identification of the competencies required for pre-service teachers to transact the Environmental Education using infusion approach at the secondary level and development of those competencies among pre-service secondary teachers. It is also purported to provide alternative modes of CBT programme to pre-service teacher to develop the identified competencies and to study their relative effectiveness. The objectives of the study are specified as given below:

1. To identify the competencies required for the pre-service teachers to transact the Environmental Education through infusion approach at secondary level.
2. To design a competency-based training programme with alternative modes to foster the identified competencies viz. Content Competencies & Pedagogical Competencies.
3. To develop tools to assess the attainment of identified competencies among pre-service teachers.
4. To study the relative effectiveness of the alternative modes of Competency-Based Training programme (CBT) viz. Casual Approach (CA), Written Approach (WA) & Practical Orientation Approach (POA), on the competencies attainment of pre-service teachers.
5. To study the relationship between the Attitude towards EE and Competency Attainment of the pre-service teachers of Treatment Groups.
6. To study the difference in Competency Attainment between *Science Methodology* and *Arts & Language Methodology* pre-service teachers of Treatment Groups.
1.9.2 HYPOTHESES TO BE TESTED:

I. There is significant gain in the Competency Attainment of pre-service teachers of the different Treatment Groups (experimental groups) in the following categories of competencies after the intervention in terms of Alternative Modes of CBT:

1. **Content Competencies:** the three areas of content competencies viz.
   a. Environmental knowledge
   b. Environmental Awareness
   c. Environmental Action Behaviour

2. **Pedagogical Competencies** such as:
   a. Indoor competencies
   b. Outdoor Competencies
   c. Preparing Additional Resource Materials
   d. Making Environmental Pro-Decisions
   e. Executing Action Projects
   f. Constructing Evaluation Tools

II. There is no significant differential gain in the Competency Attainment of pre-service teachers between the Treatment Groups (experimental groups) and the Control Group in the following categories after the intervention in terms of Alternative Modes of CBT:

1. **Content Competencies:** the three areas of content competencies viz.
   a. Environmental knowledge
   b. Environmental Awareness
   c. Environmental Action Behaviour

2. **Pedagogical Competencies** such as:
   a. Indoor competencies
   b. Outdoor Competencies
   c. Preparing Additional Resource Materials
   d. Making Environmental Pro-Decisions
   e. Executing Action Projects
   f. Constructing Evaluation Tools
III. There is no significant relationship between the Attitude Towards Environmental Education (AEE) and Competency Attainment of pre-service teachers of Treatment Groups.

IV. There is no significant difference between the Pre-service teachers with *Science method* and *Art & language method* of Treatment Groups in their competency attainment.

1.9.3 RESEARCH QUESTIONS:
1. What are the Competencies & their components that are required to transact EE through infusion approach as secondary level?
2. To what extent the alternative modes of CBT are effective in developing the identified competencies among pre-service teachers at secondary level?
3. What components of different competencies required for EE teachers are displayed by Pre-service teachers after undergoing different modes of CBT?
4. What is the feasibility of implementing different modes of CBT programme to train EE teachers?

1.9.4 VARIABLES CONSIDERED FOR THE STUDY:
The following are the different variables considered for the present study:

- **Dependent Variable:** Content (EA, EK & EAB) and Pedagogical (Indoor, Outdoor, Making Environmental Pro-decisions, Executing Action projects, Preparing Additional resource materials, Preparing Evaluation tools) Competencies
- **Independent Variable:** Treatment
- **Background Variables:** Attitude towards EE & Subject Background

1.9.5 DELIMITATIONS OF THE STUDY:
- The competencies selected are delimited to only those which are felt ‘essential and require training’ by the secondary teachers.
- The study could make provision only for post-test in case of ‘Executing Action Project’ competence.
- The study is restricted to observation of lessons only in Peer Group Setting for pre-tests of Indoor Competencies & Outdoor Competencies.