CHAPTER – II

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

The purpose of this chapter is to review and synthesize literature relevant to the study of experiential learning approaches in environmental education for teacher education. Literatures from various sources were reviewed to study the trend in this area. The reviewed literature and researches are categorized into i) studies on Environmental Education at the school level, ii) Studies related to Environmental Education, iii) Studies related to Environmental Education and Teacher Education, iv) Developmental Studies on Environmental Education and v) Studies related to Environmental Knowledge and Environmental Responsible behaviour.

2.2 STUDIES RELATED TO EE AT SCHOOL LEVEL

Most of the researches were done on the environmental awareness and attitude of school children as well as the school teachers. Some of the studies were focusing on the improvement of environmental awareness and attitude of the school children and teachers. Rajput, J.S., Saxena, A.B. and Jadhav, V.G. (1980) conducted a research study on environmental approach of teaching at primary level to study the existing awareness towards the scientific and social environment in children and to identify the available community resources which can be gainfully utilized for teaching. The findings of the study were that only one of the four groups was significantly different on environmental awareness at pre-test
stage whereas at the post-test stage, the experimental groups were significantly better than the control groups.

Deopuria, R.P. (1984) conducted a comparative study of teaching science through environmental approach and traditional approach in schools of Madhya Pradesh, also compared the environmental awareness and attitudes of students when taught by the above mentioned methods. The study employed a two-group design having the environmental approach for the experimental group and the traditional approach for the Control Group. The study revealed that the students of experimental group of classes V, VIII, IX, X obtained higher achievement scores due to teaching of science through environmental approach and showed greater cognitive gain in knowledge, understanding and application of science concepts related to EE at primary, middle and secondary school levels.

Patel, G. (1995) conducted an investigation into the environmental awareness and its enhancement in the secondary school teachers. They also determined various aspects of EE interwoven in textbooks of social studies and science in secondary level and implemented an Environmental Awareness Programme (EAP) to enhance the environmental awareness of secondary school teachers. The study concludes that EAP had its very high effect in raising environmental awareness of teacher. Levenson’s scale for Locus of Control standardized for Indian sample group by Vohra (1992) and Environmental Pollution Attitude Scale (1998) constructed by Rajamanickam were administered on the subjects. The data was analyzed using ‘t’ test. The findings of the present study reveal that the postgraduate students have higher level of Internal Locus of Control and lower level of External Locus of Control than the uneducated
individuals. It was also found that the postgraduate students have highly favourable attitude towards environmental pollution than uneducated individuals. However, the present study revealed that among the postgraduate students, there is no significant difference on Locus of Control and environmental pollution attitude in relation to their domicile. The experience of teacher did not play an important role on the environmental awareness. Bismi (2000) conducted a study on the relationship between environmental awareness and attitude towards environmental education of school teachers. It was found that there is a positive and significant relationship between environmental awareness and attitude towards environmental education among teachers. Badkobi (2001) conducted a study on the assessment of primary school teacher’s educational conditions in different zones of Tehran municipality in environmental subjects and the ways of alleviating their awareness. The results indicated that gender (male teachers), subjects studied (science) & educational level had high influence on environmental awareness for issues or describe them in any other than general terms.

Joshi (2002) conducted a study on relationship between environmental Awareness and process outcomes in science of higher secondary school students in Thrissur District. It was noticed that there existed significant substantial positive correlation between environmental awareness and process outcomes in science of Higher Secondary School pupils of Thrissur district. Kaise and Lappalainen (2004) examined the environmental awareness of children and adolescent in the Ranomafana region Madagascar 8 to 21 year old students and pupils in 18 schools were used to data collection. The objective of their comparative study was to examine the environmental awareness and knowledge of children and adolescents
living under different ecological conditions. The role of education in forming environmental awareness was also considered. The results of the study showed that children in rural area of Madagascar are aware of environmental issues and can relate them to human activities. The effects of education on environmental concern were significant, but when the effects of degradation could be felt and science in daily life, there is an increase in this awareness. Children’s environmental concern and demand for action was stronger in deforested areas.

Mary and Raj (2005) conducted a study on the Environmental awareness among high school students. The aim of the study was to find the Environmental awareness among High School Students in Pondicherry region and to find the relationship between environmental awareness of students in terms of gender, locality of school, medium of instruction, type of family, size of family and also to study the difference in the environmental awareness of students in terms of caste. The result of the study revealed that environmental awareness among the Higher Secondary Students was above average. The medium of instruction in the school and locality of the school influence the environmental awareness among students. The gender, type of family and size of family did not affect the environmental awareness among students. The caste of the students with in the group affects the environmental awareness among students. Sumitha (2005) conducted a study to prepare an instructional package on environmental studies, to teach environmental studies with the prepared instructional package to students of standard VII and to determine the effectiveness of the instructional package in promoting better understanding of the environment. The instructional package was found effective in prompting a better understanding of the environment. The analysis of the
responses of the student through the interview schedule revealed increased sensitivity towards environmental concern and a better understanding of the environment.

Abraham and Arjunan (2005) conducted a study on the environmental interest of secondary school students in relation to their environmental attitude. The result of the study was that, the secondary students did not have high level of environmental interest. The differential effect of gender and local was observed in their environmental interest with the boys and urban subjects having more interest in environmental as compared to their rural counter parts. A positive and significant correlation was found between environmental interest and environmental attitude in all the sample groups studied.

Mercy and Arjunan (2005) conducted a study on environmental attitude and pro-environmental behaviour among secondary school children. The result of the study was that boys had better attitude than girls and urban children had better attitude than rural children. Vipinder and Singh (2005) conducted a survey of the environmental education awareness among elementary school teachers. 1800 elementary school teachers were selected using stratified random sampling from five districts. The teachers of urban and rural areas and female and those with science and social science and language specialization were eluded in the study. The conclusion of the study was teachers in urban school were more aware about environment and its related problems. Male and female elementary school teachers showed no significant variation of environmental education. Science teachers had significant variation in imparting environmental education. Fisman Lianne (2005) made an empirical investigation on the effect of local learning on environmental
awareness in children. In this study the researcher examined the effects of an urban environmental education programme on children awareness of their biophysical environment. She examined changes in environmental awareness among 3rd and 5th grade participants. Results showed significant positive effect of the programme on students’ awareness of the local environment and on their knowledge of environmental concepts. Improvements in environmental knowledge were uncorrelated with the children’s socioeconomic status, whereas improvements in local environmental awareness appeared only among students living in high socio economic neighborhood. Sahaya, Paul Raj (2005) conducted a study about environmental awareness among high school students in Pondicherry region. The investigators selected 198 students from standard IX, in both urban and rural areas and different types of schools by random sampling. The results indicated that the environmental awareness among high school students is above average. Santhosh, Sukirti (2006) conducted a study on Environmental Awareness and Environmental Attitude of Students at High School Level. The study was conducted to know the environmental awareness and environmental attitude of the male and female students of science and non-science streams belonging to rural and urban backgrounds studying in class X of different schools of Moradabad city. The findings of the study were: 1. the students of science stream have more environmental awareness and environmental attitude than the students of non-science stream 2. The students belonging to urban background are comparatively better in terms of their environmental awareness and environmental attitude as compared to the students belonging to rural background 3. The male
and female students do not differ significantly in terms of their environmental awareness and environmental attitude.

Shobeiri (2006) conducted a study on secondary school students’ environmental awareness in India and Iran. Results indicated that there is a significant difference between Indian and Iranian students in their level of environmental awareness. Also there were significant differences between them in environmental awareness across and within two groups with regard to their gender. Also the type of school was a factor which can affect student’s environmental awareness in both countries. Larijini and Yeshodhara (2006) conducted a study on the relationship between environmental attitude and environmental awareness (in total and different components) among higher primary schools teachers of India and Iran. The result of the study was that all areas of environmental awareness including total scores correlated positively and significantly with total environmental attitude scores and vice versa. From this study it was proved that the teachers with favourable attitude towards environment also had better awareness and other way was also true.

Huss and Marie (2007) conducted a case study to understand urban teachers perceptive of environmental education. A qualitative case study approach involved the teaching practice of 3 conveniently sampled urban teachers and their implementation of Environmental Education (EE) within the context of their specific class rooms and schools. All three teachers taught in the same urban school system. Observation and interviews of three urban teachers helped the researcher to collect data over a four month period totalling over 120 hours, in the field. Teachers in their study rarely taught their students to be good stewards of the
earth by voting, writing letters, signing petition or researching a locale topic and attending local meeting where environment decisions are made for their city. Each of the prior mentioned ideas represents action towards the environment. Teachers in their study hoped that students’ would learn to appreciate and respect animals and plants. They used hands-on, practical experience in garden and outdoor settings to enhance their students learning about environment. Raju (2007) conducted a study on environmental ethics of Higher Secondary School students of Cuddalore educational district of Tamil Nadu, India and also for the sub samples viz. gender, community types of schools and locality of the schools. The findings of this study were, the environmental ethics of the Higher Secondary students of Cuddalore educational district is high, and girl students have more environmental ethics than the boy students and the rural higher secondary school. Paramanand Singh Yadav and Anita Bharati (2007) conducted a Study of the Relationship between Environmental Awareness and Scientific Attitudes among Higher Secondary Students. The study was conducted to study the environmental awareness among higher Secondary students of Varanasi district of Uttar Pradesh. The findings of the study indicated that environmental awareness has positive relationship with scientific attitude among students. Non-science students were found to be more aware about their environment as compared to arts students.

Scinta (2008) conducted a study on Enhancing Environmental Education Awareness of the School Students by the use of various Models of Teaching. Means and standard deviations were calculated for three classes. Data was analyzed to see the effect of experimental Models of teaching on environmental awareness of the students of Classes VI–VIII. Analysis of data revealed that
pre-test scores of three classes did not differ much significantly in environmental
awareness of initial behaviour among the three groups of the samples. Inquiry
training model of teaching has influenced the students most, after that concept
attainment model has its place in increasing the environment awareness of
students at elementary stage of schooling. The students taught by traditional model
have not shown any significant gain regarding environment awareness. James and
Bixler (2008) conducted a study about children’s role in meaning making through
their participation in an Environmental Education Programme. Authors conducted
an ethnography investigating children’s live experiences in a 3-day residential
environmental education (EE) program with 20 gifted 4th and 5th grade students.
The authors also conducted participant observation and a series of interviews
before, during, and after the trip. After the authors conducted the interviews and
collected other data, they conducted analyses that identified domains describing
the children’s live experience with a residential EE program (Spradley, J.P., 1979).
Through domain analysis, a theme emerged: Children’s non-formal
environmental-learning experience was negotiated through the feeling of having
choices and enhanced through sensory perception and personal relationships.
Explicit recognition of the importance of informal social interactions, unstructured
time and play, and perception of choice has potential role to enhance the
meaningfulness of residential EE programs.

Mary Joseph and Tania D’Cruz (2009) conducted a study on environmental
knowledge, teaching skills and attitude towards environmental approach among
secondary school teachers. The study was aimed at exploring the level and
relationship between environmental knowledge, environmental teaching skills and
attitude towards environmental approach in education among secondary school teachers. The subjects were 150 secondary school teachers of Ernakulam district. The tools used in the study were Environmental Knowledge Test, The Environmental Approach in Education, Attitude Scale and Environmental teaching skills questionnaire. The results of the study indicate that the attitude towards environmental approach in education significantly increases with increase in environmental knowledge and the attitude towards environmental approach in education significantly increases with increase in environmental teaching skills among secondary school teachers. Sijimol and Sudha (2009) conducted a study on the environmental awareness among the secondary school student. This study attempted to investigate the environmental awareness of the secondary school students and the programmes conducted by the school for assessing the environmental awareness. Interview schedules for teachers to collect information about the programmes conducted in schools for improving environmental awareness among the students were used. This study also concluded that there was an improvement in environmental awareness of secondary school students through the environmental education program conducted by the school. Sarojini (2009) conducted a study on the Level of Environmental Awareness among the School Students. The study was aimed to find the level of environmental awareness among school students and to find level of environmental awareness among school students on the basis of the sub components namely Knowledge, awareness, skill, attitude and participation. And also to find the level of environmental awareness in terms of the independent variables viz. sex, medium type of school locality and annual income of parents. The result of the study was indicating that the level of
environmental awareness among school students was medium and the level of
environmental awareness in terms of sub components (Knowledge, awareness,
attitude and participation) was medium, except for the component via skill was
low. The urban students have higher level of awareness than rural students. There
was no significant difference in awareness of students due to sex, medium and
types of schools. There was a significant difference in awareness due to the
difference in annual income of parents and education of parents. Meethu
Manickan and Sarala (2009) conducted a study about the Environmental Ethics of
Higher Secondary School Students. Students of Standard XI, studying in the
higher secondary schools in Mayiladuthurai Educational District were taken as the
sample for the present study. It was found that the higher secondary students have
high environmental ethics. The girls had high environmental ethics than the boys;
the higher secondary students from urban areas have higher environmental ethics
than: the students from rural areas; the higher secondary students from the private
schools had higher environmental ethics than the students from government
schools. The higher secondary students residing in rent houses had higher
Environmental ethics than the students residing in their own houses. The method
used for this study is descriptive survey method. A Likert-type Pollution Scale is
constructed and validated by the investigator to measure the Environmental Ethics.

Arumugarajan (2010) conducted a study about the Environmental
Awareness of IX standard Students in Tuticorin District. The investigator found
that the students had some but equal level of awareness and warned that mankind
would perish if the protection of environment does not become an integral part of
all development programmes. The investigator adopted the survey method of
research. The Standard IX students form the population of this study. Among them 200 students from 6 higher secondary schools were taken as sample. The investigator constructed a standardized tool and the same was employed to seek information from the students of IX std. Mean, Standard Deviation and ‘t’ test were the statistical techniques used. The result indicated that students have some awareness on environment and they have equal Environmental Awareness. Vellaisamy (2010) conducted a Study of Environmental Achievement in IX Standard Students through Environmental Awareness. The study examined junctions and performances of students in strengthening environmental education and environmental awareness. Correlation had been found between the achievements of the students in environmental education and awareness. Environmental education was very important for self-fulfillment and social development. The environmental education was needed for the protection and preservation of environment in order to maintain the quality of life. The study indicated that the students are not performing to solve the problem of population, exhaustion of natural resources, and pollution of the environmental. As a result, students were not having enough awareness and skills for identifying and solving environmental problems. No significant positive relationship was found between achievement in environmental education and environmental awareness ability. The outdoor project, the orientation programme was to be given to students to enrich and strengthen the environmental education. Project and out of class activities should also be given to students to increase performance of students. Oguz et al. (2010) conducted a study on the environmental awareness of university students in Ankara, Turkey. This study was aimed to present environmental sensitivity and
awareness of university students. The first and fourth year students of landscape architecture, Town and regional planning environmental engineering under graduate program at universities throughout Ankara were selected as participants. A questionnaire survey was applied to 212 students face to face. Result was that even though students take many courses on environmental issues their environmental awareness and environmentally responsible behaviours are low than the expected and students grade show no significance on the result. It was concluded that environmental knowledge do not always influence awareness and behaviour intentions, national strategy is needed for environmental education in higher education and current curricula should be reconsidered in terms of effectiveness.

Ojedokun, Oluyinka, A. and Balogun, S.K. (2010) investigated environmental attitude as a mediator in the relationship between self-concept, environmental-self-efficacy and responsible environmental behaviour among residents of high-density areas in Ibadan metropolis. The sample consists of one thousand, three hundred and sixty participants that comprised five hundred and seventy six from Ibadan South East and seven hundred and eighty-four from Ibadan North East Local Government areas selected using a multi-stage sampling technique (purposive, proportional, and simple random). Data collection was through a self-reported questionnaire that measured demographic factors, self-concept, environmental-self-efficacy, environmental attitude and responsible environmental behaviour. Multiple regression statistical analysis is the technique of data analysis. Results indicated that self-concept, environmental self-efficacy, and environmental attitude jointly contribute 18% to variance in responsible
environmental behaviour. Independently, self-concept and environmental-self-efficacy respectively contributed significantly to responsible environmental behaviour. Lastly, environmental attitude significantly mediated the relationship between self-concept, environmental self-efficacy, and responsible environmental behaviour. Discussion focused on the relevance of environmental attitude in the person-environment transactions. It was recommended that psychologists should design personally relevant environmental attitude change strategies to improve responsible environmental behaviour.

Day and Joanne (2011) conducted a study titled as Combining Environmental Education and Art world in the Primary Grade for Sustainability. This action research study was designed to raise environmental awareness and improve the social responsibility and actions of students in grade 2 and 3 at Montecito Elementary in Burnatry implemented a strategy pairing environmental education lessons with art work projects to engage the students and improve the awareness of aquatic education, ecosystem and sustainability. Students were encouraged in this study to investigate their knowledge, thoughts and feelings regarding nature through direct instruction of the ecosystem concept on behaviour modifications. The analysis of the scores indicated that direct instruction of ecosystem information contributed to an improved rating in environmental skills of students. Jalaja and Singaravelu (2011) conducted a study about the Impact of Eclectic Method in Learning Environmental Education at Primary Level. The investigator, with the accumulated experience as a PG teacher in science over a decade is able to observe the absence of practical skills in environmental science among the students of primary level. Discussion with the senior science teachers
revealed that the traditional method of science teaching at primary level has not produced the requisite skills among the children. Thus the impact of Eclectic Method (combination of different learning approaches and a variety of teaching methods) eliminates this problem. It is taught through some of the important progressive methods like activity – based learning, pay – way, joyful learning and audio, video learning.

Sharad and Seenoa (2012) conducted a study on the Gender Differences in Environmental Sensitivity among Primary School Students. Environmental sensitivity is a sign objective of environment education to create an emotional empathy and bonding with environment so as to enhance environmental responsible behaviour - The purpose of this investigation was to study the environmental sensitivity of primary school students in relation to their gender and locus of control. The sample comprised 400 primary school students of Rohtak. 200 students were with external locus of control (123 boys and 77 girls) and 200 students with internal locus of control (119 boys and 81 girls). The tools employed were environmental sensitivity scale (developed by authors) and locus of control by Roma Pal (1982). Mean, S.D., and ANOVA were used to analyse the data.

Halder Somenath (2012) the study was an attempt to appraise the status of EE in higher school education system in India, especially in North Bengal. The source of the data of this empirical study was from field supported by random sampling survey. In the field survey few selective parameters were examined like frequency of environmental class, frequency of practical class regarding environment studies, frequency of field observation class or nature study, type of teaching methodology used, type of evaluation system etc. The status of EE in
higher school education system was really not satisfactory and there is a need to standardized and upgrade the education system as a whole.

From the above studies, it was clear that the environmental awareness and attitude of both the school children and teachers were above average. The environmental sensitiveness and environment action competencies were not studied much. Also about the teachers’ competencies in environmental education was not focused in the studies.

2.3 STUDIES RELATED TO ENVIRONMENTAL EDUCATION

After reviewing the studies in the environmental education studies at the school level, an attempt was made to review the researches on Environmental Education in general at different levels of higher education pertaining to different variables.

Rajput et al., (1980) conducted a study on environmental approach of teaching at primary level. The Madhya Pradesh State Curriculum for Class III and IV was redesigned to build scope for environmental approach to teaching. The effect of implementing the redesigned curriculum in primary schools was assessed. The study revealed that only one of the four groups was significantly different on environmental awareness at pre-test stage whereas at the post-test stage, the two experimental groups were significantly better than the control group. The experimental and control groups on traditional achievement test was not significant. Pai, S.G. (1981) prepared and tried out a curriculum in environmental studies leading to lifelong education for college students. The study showed that there was a significant difference in the performance of the experimental group as compared with the control group on knowledge scores and attitudes scores. The
experimental group gained more than the control group in environmental activities inventory.

Mahajan, S.D. (1995) studied on the development of environmental studies science curriculum for primary schools of Nepal. In this study, an attempt was made to develop an environmental studies science curriculum for primary schools of Nepal. The development and assessment of teaching programmes of various kinds was another major educational research activity contained in this study.

Fortino, Carol Ann (1996) conducted a study on mentoring experiences as professional development for leaders in environmental education: the cascade of influence. This study explored the importance of mentoring during the personal and professional development of leaders in environmental education. Four major questions were investigated. Whether leaders been mentored during their involvement with environmental education? When and how mentoring had taken place? What was the personal and professional effectiveness of the mentoring relationship? Is there any continuation of the mentoring process which might be appropriate for professional development within the field of environmental education? Leaders were solicited from a broad field of environmental educators, from academia to the private sector. Research elicited data from 57 persons in Queensland, Australia, and Colorado. Three major categories of informal mentoring were revealed: (1) perceived; (2) acknowledged; and (3) deliberate. Further analysis led to the evolution of the core concept: a Cascade of Influence. Heightened awareness and more frequent cascading of mentoring have positive implications for professional development of future leaders. Patnaik, S.P. and Basavayya, D. (1997) studied on the development of training package in
environmental studies for second standard primary teacher trainers. An attempt was made to develop a training strategy for teaching environmental studies for teachers.

Chithra Nair (1998) studied the environmental knowledge of secondary school students of Kerala by taking a stratified random sampling of 613 adolescents. A standardized environmental protection awareness test (Abraham and Chithra Nair, 1998) was administered on the sample to get their awareness about three aspects of environmental protection viz., air pollution, water pollution, land abuse. A comparison of the scores shows that there is no significant difference between boys and girls in their environmental knowledge. Padher (1999) conducted a study on ‘Environmental Awareness among the Teacher Trainees’. The findings of his study revealed that the subject background of the trainees has its effects on the knowledge and understanding of facts and concepts relating to different aspects of environmental problems. The teacher trainees having Master’s Degree and belonging to science group had significantly higher environmental awareness than all the other groups of subjects. Besides, there was significant difference in the environmental awareness between the urban and rural teacher trainees and was in favour of urban teachers.

Rachel Kalpan (2000) reported a case study on ways of finding the natural environment. The ideal was to present a future environment in a way that facilitates envisioning it. The four transition experiences described by Kalpan includes explanatory study of cognitive mapping, use of a board game as prior experiences, different games as prior experience and new location contour map and aerial photograph. Playing the different way finding games had significant
positive effect on confidence in finding their way about knowledge of natural environment and built environment were also distinguished. Suni (2000) developed an identification key on the topic ‘Inflorescence’ of using environmental methods. The study arrived at the conclusion that the environmental methods is significantly superior to lecture method and self-learning method, with regard to post-test achievement, and therefore, environmental method can be adopted as an effective method for ‘Inflorescence’ at higher secondary level.

Janakavalli, C. (2001) conducted a study on the problems of the environment and some means and ways of solving them. It was found that all environmental problems have space dimensions, as the problems are located at village, city, state and the country levels. It was noted that environmental problems were related to immediate or long terms effect of the individuals. The study undertaken by Jackson, M.G. (2001) revealed that the environmental education as introduced in school textbooks has revealed many contradictions and these contradictions could be removed only by questioning the assumptions about the current school text books. Caurin (2001) conducted a study on analysis evaluation and change of attitudes in environment education. The study revealed that it is necessary to impart environmental education combining concepts, procedures and attitudes. Environmental education must be imparted between different subject and course of study in the teaching learning process.

Lali’s doctoral study (2002) on integrated education models using environmental and community resources in education is also based on a lot of textual contextual and situational and other relevant analysis. It also included a survey (a schedule cum attitude scale) to appraise the effect of approaches to the
curriculum integrating environmental and community resources introduced during the six years prior to 2002 and found that on the whole the effects of the environment integrated curriculum were positive on the relevant dimensions. Alexander (2004) examined the relationship between environmental attitude and pro-environmental behaviour. A structural model linking environmental awareness, emotions, personal philosophical values perceived control and behaviour was proposed and tested. It was found that strong environmental behaviour stemmed from personal philosophical values and emotions. No effects on environmental behaviour stemming from factual knowledge were found.

Lenka (2005) conducted a study about the awareness of environmental education among the PG students. The present study attempts to study the awareness towards environment among the postgraduate students. To achieve this objective, the survey method was adopted. The stratified and purposive sampling method was used in this study. The investigator himself developed and standardized a test known as “Environmental Awareness Test” (EAT) to measure the awareness of students towards environment. To analyze the data, two-way analysis of variance (ANOVA) was used by the investigator to test the significance of difference. The findings reveal a significant difference in environmental awareness among the postgraduate students of science, arts and commerce groups. Further it can be interpreted that science students have more environmental awareness as compared to arts and commerce students. And commerce students have lowest environmental awareness as compared to science and arts students. A study on ‘Awareness of environmental education among the P.G. students’ was conducted by Lanka (2005). The important finding is that there
exists a significant difference in environmental awareness among post graduate students of arts, science and commerce group. The study revealed that the science students are more environmental awareness as compared to arts and commerce students.

The study on coral reefs as sites for experiential environmental education: learning with Australian students by Myron (2006), found that reef experiential education had a positive effect on students’ environmental knowledge (awareness), attitudes towards reef environments and stated intention to act. The reef experience alone caused the greatest change in environmental attitudes and ecological intention to act. In this study, students’ initial environmental scores were found to be low, and the relationship was not linear.

Said, Aini Mat, et al. (2007) studied on environmental comprehension and participation of Malaysian secondary school students. The study revealed that students were aware of, but only moderately concerned with, environmental issues. Only 10% of the students were able to define environment in terms of a relational conception (as opposed to an object). The adoption of Janikowski’s four principles of sustainable consumption (selection, reduction, maximization and segregation) in their daily living was modest. Environmental education “in” and “with” nature experiences was found to be minimal among the respondents. The relationship between variables was also investigated. The study showed that environmental education had raised the environmental consciousness of students but was rather ineffective in changing action and behaviour patterns. Kushmerick, Ann, et al., (2007) studied the aspects of ‘environmental justice’ content in mainstream US, 6-12 environmental Education Guides. Over the past three decades, the
environmental justice movement has developed out of the growing concern regarding unequal distribution of environmental resources and unequal access to environmental resources. The mainstream environmental movement was criticized for failing to address adequately the environmental justice issues. This content analysis examined the level of inclusion of environmental justice concepts, as well as their context of representation, within the mainstream, US national, 6-12 Environmental Education Curricula. The results suggested that these curriculum guides often address issues related to environmental justice (e.g. environmental health impacts on humans); however, they rarely present the issues within an explicit environmental justice context. Meyers, Ronald B. et al., (2007) in their study focused on creating an inclusive community of researchers. They studied the first three years of the North American Association for Environmental Education and Research Symposium. This study used a series of interlinked, personal vignettes to discuss the first three years of the North American Association for Environmental Education Research Symposium, from the perspectives of the key organizers. Seven challenges in the field of environmental education research were identified. The challenges of Environmental Education Research is that, it has been marginalized in some areas and not recognized in others.

Environmental Education Research and environmental Education practice need to be brought closer together.

- It is still in early development of a professional perspective.
- It has to give a voice to early career scholars and graduate students.
- It needs to enable discourse about both process and outcomes.
It needs social learning contexts to help develop professional identities and create more meaningful dialogue to address the challenge.

Methodologies, theoretical frameworks and differences in beliefs in environmental education research need to be accommodated. The last challenge was seen as the most significant with which to continue to engage, in developing open, inclusive forums for researchers of environmental education.

Wheeler, Gilda et al. (2007) in a study on environmental education report: empirical evidence, exemplary models, and recommendations on the impact of environmental education on K-12 Students, reported the programmes from across the State, the Nation and from international sources to gather a broad selection of published and unpublished material on environmental education research. This could identify a number of general conclusions on the effectiveness of environmental education programmes, the state of environmental education in Washington and indicated opportunities for additional research.

Kumar (2007) conducted a study on influence of environmental education on environmental attitude of the post graduate students. For this purpose 120 post graduate students were selected and were administrated the environmental pollution attitude scale. It was found that students with environmental education back ground had better environments attitude. It was also found that there is no significant difference between male and female students in their attitude towards environmental pollution and related issues. Shivakumar and Mangala (2007) conducted a study on the influence of environmental education on environmental attitude of the post graduate students. This was conducted with the aim of studying the level of favourable attitude of the students towards environment in relation to
their environmental education. For this purpose, 120 post graduate students were selected and were administered the environmental pollution attitude scale. It was found students with environmental education background had better environmental attitude. It was also found that there is no significant difference between male and female students in their attitude toward environmental pollution and related issues.

Keedeep (2007) conducted a study on a model lesson on environmental education using inclusive approach. The author calls for on inclusive approach to teaching environmental education and avers that the subject teachers of a class should confer among themselves and develop activities and lessons for that class by including various strands of knowledge that exist in other subject text books of that class. Students learn about the efficient use of renewable resources to meet human needs in this lesson. Five small groups of students build a food system to meet their needs, which is based upon the capacity of their hand resource, climate, topography and economics. The lesson provides information that directs students to understand why grazing is an environmentally sound option in each scenario.

Larijani (2007) conducted a study about the Teachers as Ethical Architects of Environmental Education. Tracing the need for Environmental Education in Iran, the author lists certain aspects in society that should be taught to the children, if conservation of nature and living resources, in the context of their importance; is to be achieved. The purpose here is to focus attention on the critical needs of Environmental Education for sustainable development, as they are seen today, and suggest strategies for the future.

Littledyke, Michael (2008) conducted a study on Science Education for Environmental Awareness: Approaches to Integrating Cognitive and Affective
Domains. It was reported that Science education had an important role in developing understanding of concepts that underpin environmental issues, leading potentially to pro-environmental behaviour. This study argued that the cognitive and affective domains need to be explicitly integrated in science education that informs environmental education, and a sense of relationship is essential for environmental care and responsibility leading to informed action. Elvan, et al. (2008) reported a survey on Turkish elementary school students’ environmental friendly behaviours and associated variables. This study revealed elementary school students’ environmental knowledge and attitudes, the effects of socio demographic variables on environmental knowledge and attitudes, and how self-reported environment friendly behaviour was related to environmental knowledge, behavioural intentions, environmental affects, and the students’ locus of control. The sex difference regarding students’ attitudes towards the environment was statistically significant in favour of girls. Multiple regression analysis results showed that behavioural intentions, environmental affects, and locus of control, were accounted as significant predictors of self-reported environment friendly behaviour. Negev Maya, et al. (2008) studied to evaluate the environmental literacy of Israeli elementary and high school students. The authors conducted a national survey of 6th and 12th grade students in Israel to evaluate their environmental literacy, including the dimensions of environmental knowledge, attitudes, and behaviour. This study did not find a significant correlation between knowledge and behaviour. Ethnic and socioeconomic characteristics were moderately associated with environmental literacy, whereas the presence of an adult who mediated children’s relation to nature was strongly related to
environmental attitudes and behaviour and weakly related to knowledge. The results suggested that the intended objectives of environmental education in Israel were not been achieved. Leege, Lissa, et al. (2008) in their study, on environmental service learning: relevance, rewards and responsibilities, reported that nearly all students participated in the self-learning component of the course and their responses were overwhelmingly positive. This type of learning helped the students, the relevance of content conveyed in the classroom and that they were able to make a difference in their community. Su, Glenn L. Sia (2008) studied on environmental worldview and concern of college students in the Philippines. The study revealed that the gender and environmental attitudes affected students’ environmental concern. Most of the students’ expressed strong environmentally supportive views and beliefs. The derived model confirmed that gender and environmental attitudes were significant factors to students’ environmental concerns. Bierle, Sean et al., (2008) had carried out a study on environmental education and related fields in Idaho secondary schools. The fields of environmental education, outdoor education, adventure education, and experiential education were linked by shared goals, objectives, and characteristics. The results showed that although the goals of environmental education were important to respondents, the programmes represented departure from key characteristics described in the literature. The goals of outdoor, adventure, and experiential education were of mixed importance to respondents, and the characteristics of these fields were variably present in Idaho secondary schools. The study conducted by Mazzatenta, Claudio (2008) on “Can global warming heat up environmental education?” revealed that students who were in direct contact
between themselves noted the issue of climate change and how it affected their future lives.

Uzunboylu, Huseyin et al. (2009) conducted a study on using mobile learning to increase environmental awareness. This study investigated the use of integrating mobile technologies, data services, and multimedia messaging systems to increase students’ use of mobile technologies and to develop environmental awareness. Students voluntarily participated in a six-week programme using mobile telephones to transmit photographs of local environmental blights and to exchange pictures and observations and could find that the students’ environmental awareness improved positively. Neelakantan, Shailaja (2009) studied a recently formed University in India focusing on real-world industry and sustainability. This study showed that a small, relatively new Indian university is making a name for itself – nationally and internationally – in the rapidly growing field of sustainable development. Teri University, the creation of one of India’s leading environmentalists, has won praise from industry executives and academics alike. They say the institution is tackling some of the world’s most pressing environmental problems, including poverty and pollution, and has the intellectual brainpower to make a difference. Deboer, Jennifer (2009) probed into the relationship between environmental factors and usage behaviours at “hole-in-the-wall” computers. This study has gathered and analyzed self-reported user behaviour data of public computers installed in varied neighbourhoods in India, to explore the relationship between environmental factors such as urban city, non-urban and reported usage behaviours. There was evidence of large differences in usage behaviour between urban and non-urban sites. Children at urban sites fit a
profile of dedicated and independent kiosk-goers, while rural children are more likely to use the computers in groups. Total overall computer usage, however, appears similar in both environments. The sites used for the study have other important characteristics, such as proximity to a school complex, which could have large mitigating effects on the measured behaviours. Paloniemi, Riikka and Vilja, Varho (2009) studied the changing ecological and cultural states and preferences of nature conservation policy: the case of ‘nature values’ on trade in South-Western Finland. The study shows how regional actors in nature conservation and forestry were able to combine forest ownership and nature conservation through authentic dialogue, and overcome a nature conservation conflict, brought about by conflicting international biodiversity goals and the cultural preferences of landowners. Later, their ideas were included in the national biodiversity programme and implemented as a pilot project by regional actors, which in turn affected the ecological and cultural state of nature conservation. This reflected international and large-scale trends in environmental policy, and opened new opportunities for further developing environmental policy.

Mathpathi and Jagadeesh (2010) conducted a study on the Outlook and Behaviour towards Environmental issues. The aim of the study was to assess, environmental outlook and behaviour of junior college students of Gulbarga District Karnataka and to examine the relation between urban, rural, government, private, male and female. The result of the study revealed that urban college students have stronger outlook and behaviour towards environmental education, there was a significance difference found between private and government college students and also male and female students possess a good level of outlook and
behaviour towards environmental education. Environment, or in participants understanding of the scientific process could be detected. The results suggest that projects must make explicit to participants the issues that they are experiencing. In addition, the results suggest that more sensitive measures need to be designed to assess attitude change among environmentally aware citizens.

Shivakumr, Savitri (2011) conducted a study on the locus of control and environmental attitude in relation to education and domicile. Education level and domicile are important variables which influence Locus of Control and Environmental Attitude of the individuals. In the present study, an attempt has been made to examine the influence of education and domicile on the Locus of Control and Environmental Attitudes of the individuals. It was hypothesized that educated and especially urban postgraduate students have higher level of internal Locus of Control and lower level of external Locus of Control and highly favourable attitude towards the environment than uneducated and rural postgraduate students. To verify the above hypothesis, a sample of 236 uneducated and postgraduate students was selected for the research. Meyden and Ali (2011) conducted a project, the importance of Ecology-based Nature Education project in Terms of Natural-integration and Understanding the Human-Ecosystem Relationship. The aim of this project was to define the importance of 12- day ecology based education training up on integration with nature and understanding the human-ecosystem relationship. In accordance with this purpose, there has been collected some survey data interviewing with the participants of Lake Beysehir National Park and Ecology-based Nature Education Project around Konya. In the qualitative investigation method used study, 29 participants created the working
group. As the data collecting tool, four questioned semi-structured interview form has been used and the data collected from the interviews analyzed with content analysis. At the end of the survey, it has been precipitated, that it is necessary to raise natural and environmental awareness. There has been significant difference in terms of the point of view related to nature at the end of the programme, in which human- ecosystem relationship is understood in general terms and this relationship must be accepted as an inseparable whole.

2.4 DEVELOPMENTAL STUDIES ON EE

There were different studies in developmental areas of Environmental Education such as development of different training packages for teachers, instructional materials, self-learning materials, project based learning, curriculum restructuring etc., by various government and non-governmental agencies across the globe as well as in India.

The Centre for Environment Education (CEE), Ahmedabad is involved in increasing consciousness about the environment among children and the general community. While the need for creating environmental awareness is wide-spread, CEE has developed programme for school children, visitors to national parks and sanctuaries, users of media, the rural poor living in areas where there is severe shortage’ of natural resources, the urban dwellers and the general public (Aganval, 1993).

There has been considerable discussion about the method to be used in environmental education. Cook (1978/79) suggests that, to be effective and useful, it should use problem solving approach because the purpose of environmental education is to teach people to understand their total environment, not only what it
was, but how it worked, as well as why problems existed and what it would take to ‘fix things”. Saxena (1999) suggests that the nature of environmental education requires a different teaching methodology than the ones used in other disciplines. For example survey or experimentation could be more effective than lecture and demonstration methods. This would also require flexibility in approach and curriculum at different places. Palmer and Neal (1994) reveal that they do not recommend any particular teaching style or approach to classroom organization. Rather these are matters of individual schools and teachers to decide. This view is also supported by Bramwell (1993) as well.

The cornerstone of environmental education is the identification of individual with the environment. Curriculum developers should attempt to link the curriculum of secondary education to the local environment and make it relevant to the community at large. Lob (1987) reported the principles of environment education in Germany. The aspects of environmental education are regarded as to be integrated in to curricula already existing and developed in the future so that environmental education should not be perceived as an additional or separate but as an integral aspect of education. Malhotra (1987) reports that the present curricula of general education in India,, that is, classes 1 to 10 has in it, ample materials on the environment, its problems and conservation. But environmental education to mind is not just awareness and knowledge, it is far more. It is development of proper attitudes, the awakening of the urge to make the world a better place to live in, to be aware of what is happening around and above all, to act without fear. In Pakistan the subject of environmental studies is not taught as a separate discipline in elementary or higher education hut ‘infusion approach’ is
adopted based on incorporation of environmental education within the appropriate traditional subjects. Khan (1987) states that all future strategies of formal environmental education emphasize on learning through activities centred on real life situations and the main objective of the future strategy for non-formal education is to help pupils to improve the quality of their life. Emphasize is on competencies which students can use in solving of problems encountered in daily life. Good quality teaching and learning materials can always help to a very great extent in promoting learning and retention. If it is augmented by an attitudinal change in teachers, it would result in making teaching-learning student centred, activity based and participatory. This would be a break through.

The changes with environmental knowledge and environmental attitudes as well as the relationship between the two were examined in Bradley’s (1995) study. Exposure to the environmental curriculum did appear to produce a more positive environmental attitude. In addition, an increase in environmental knowledge, following exposure to the curriculum is strong in relation to environmental knowledge and environmental attitude.

Palmer and Neal (1994) believe that there is no single right or wrong way to approach the teaching and learning of environment in schools and whatever approach or combination of approaches is utilized, it is however, essential that firsthand experience of the environment are at the forefront of teaching and learning. Therefore, it is apparent that environmental education is based on as much firsthand experience as possible so that the idea of moving out of the confines of the traditional classroom is one well rooted in the environmental approach. The most valuable resource available to all schools is the environment
itself and immediate neighbourhood will provide ample opportunities for activities to observe record, analyze and interpret their own investigations. ‘The most effective education about the environment is often not transmitting new information, but rather fostering appreciation of what is already known, practical knowledge about environment, its local use and ways to manage sustainably.

Barr, et al. (1981) developed a need based curriculum plan in EE, based on the needs established by analyzing the results of testing 1,412 X grade students from 53 public schools in Lousiana for their knowledge and opinions about the environment. The results show that the students had limited knowledge most of the cognitive variables. The overall attitudes and opinions demonstrated that the students favoured ideas that did not affect them directly while showing disagreement with those issues that would affect them directly. The plan suggests a multidisciplinary approach to teaching EE. The plan developed from the results of this study shows how various general objectives can be integrated into many different traditional subjects. Pai, S.J. (1981) prepared and conducted a tryout of curriculum in environmental studies for college students to help them acquire an awareness of environment and the interrelationships, interactions and interdependence existing between biological and physical aspects of the total environment and its allied problems. The study also intended to help students acquire strong positive attitudes and sound ecological values towards the need for better environment and to help students develop skills necessary for solving environmental problems and taking preventive measures. The study reveals that, there was significant difference in the performance of the experimental group as compared with control group on knowledge scores and attitude scores. The
experimental group gained more than the control group in environmental activities inventory, indicating effectiveness of the curriculum.

Hopper, W.A.F. (1982) conducted an experimental study in the use of modular approach for teaching biology for Standard XI to design and develop instructional modules on selected units in Morphology, Physiology and Ecology for Higher Secondary classes and to find out the relative effectiveness of three modular approaches involving self-learning, peer group learning and peer group learning with teacher intervention with reference to the cognitive objective. The effectiveness of the three modular approaches was evaluated through an experiment conducted with 156 XI standard students studying in three higher secondary schools of Madvar. Experimental variables were the three types of modular approaches and the three modules. Experiment was conducted adopting the “Rotation group design”. Woods, Amunda Linnette (1993) developed and validated an interdisciplinary EE curriculum based on the tropical rain forest. The curriculum also addressed the complexity of environmental problems by introducing the concept of “sustainable developments”, students investigated a simulated problem where a balance of alternatives was needed and sustainable development was offered as viable option for tropical forest conservation.

Hicks, William Whitefield (1994) conducted a study to know the effects of environmental action oriented lessons on environmental knowledge, attitude and behaviour of high school students. This study reveals several educational implications. Action - oriented lessons should be taught for greater period of time. Education willing to test students’ knowledge of subject, as diverse as EE, should design tests to be specific rather than general in nature. Students taking action
towards solving environmental problem need these behaviours reinforced continuously. Educators can reinforce students’ behaviour by teaching environmental action skills, removing barriers such as negative peer pressure and inconsistent messages about the state of the environment. Sandiford, and Shamili Ajgaonkar (1992) conducted a study to explore the relationship between environmental attitudes, behaviours and future perspectives and the influence of locus of control temporality (i.e., how individuals rank past, present and future in directing their behaviour) and perceived level and scope of knowledge about environmental affairs on attitude, behaviour and future perspective. The results suggest that pro-environmental attitudes were linked to pro-environmental behaviour and to pro-future perspectives; pro-environmental behaviour are linked to pro-future perspectives. Although the inter-relationships do not imply casual links, the positive correlation between attitudes, behaviour and future perspective suggest that an individual who engages in pro-environmental behaviours likely possesses pro-environmental attitudes and was future-oriented. The findings also hint at a changing environmental paradigm. The most visible shift was the ‘positive’ attitudes to technology. The new environmentalism may be more about saving the earth for humans rather than saving the earth from humane.

2.5 STUDIES RELATED TO ENVIRONMENTAL EDUCATION AND TEACHER EDUCATION

The important role of teachers and, more specifically teacher education, in cultivating and developing environmental education in formal education has been well documented in the UNESCO-UNEP International Environmental Education programme (Fien & Tilbury, 1996, p.33). Three core issues emerged from this
programme: (i) the important role that teachers have in providing quality environmental education; (ii) the need for teachers to have the knowledge and skills to teach environmental education; and (iii) the importance of innovative teaching and learning materials and strategies to bring about curriculum change.

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” (p.8). Fien and Tilbury (1996) also acknowledge that a similar message was included in the World Conservation Strategy for the 1990s by ICUN, UNEP and WWF (1991) and also in the Agenda 21 report from the Rio Earth Summit in 1992.


Consequently, teacher education has come to be seen as “potentially the greatest source of educational change” (UNESCO, 1976) for developing environmental literacy. Thus, the UNESCO-UNEP International Environmental Education Programme expressed a concern that “the priority of priorities” was the preparation of teachers to facilitate effective environmental education programmes (UNESCO-UNEP 1990, p.1).

Both pre-service and in-service teacher education has been identified as important in providing the skills, knowledge and practical expertise to help teachers meet the requirements of the environmentally educated teacher (Fien &

Simmons (2001) carried out a study to as the degree to which a special group of students was developing the skills and understanding for environmentally responsible citizenship. A total of 320 students from ethically and socially diverse Chicago, Illinois high school students (160 students from each school) filled out the open ended survey. The survey asked students to describe analyses of environmental issue. The result suggested that the students were familiar with a wide variety of environmental issues; however with their understandings of these issues of few students were able to articulate well throughout cause.

Kaushik and Vivek (2002) conducted a comparative study of environmental awareness and attitude towards environmental education of B.Ed. students. The objective of the study was to construct and standardize an attitude scale to measure environmental education, attitude of B Ed students, to compare the environmental awareness and attitude towards environmental education in relation to (a) male and female students (b) science and non-science students (c) rural and urban students. The major findings of the study were: male B.Ed.
students were significantly better in their environmental awareness than that of their female counterpart. But no significant difference was seen on the part of their attitude towards environmental education in both groups. Awareness and attitude towards environmental education were significantly better in science students of B Ed class in comparison to non-science students. There was a significant and positive relationship between environmental awareness and attitude towards environmental education.

Agnihotri (2004) conducted a study on Environmental awareness in teacher trainees. The aim of the study was to measure the level of environmental awareness of teacher trainees and to study the difference in levels of environmental awareness of male and female teacher trainees, to study the difference in environmental awareness of graduate and post graduate teacher trainees. The result of the study indicated that, there was high awareness found in teacher trainees and there was no significant difference in male and female teacher trainees’ environmental awareness. PG teacher trainees were found to have more awareness as compared to graduate teacher trainees.

Dhawan (2008) conducted a study on Environmental Awareness of pupil teachers. This study was conducted to assess the level of environmental awareness of pupil teachers before and after their training programme and also to investigate the effect of gender on environmental awareness of pupil teachers. The result of the study shows that male and female pupil teachers differ in their environmental awareness before the training. The male pupil teachers had better awareness towards environment than female pupil teachers in selected questions. Statistically, no significant difference was indicated for both the groups in their
environmental awareness after the training. Male pupil teachers did show comparatively better environmental awareness than female pupil teachers. Dixit and Agarwal (2008) conducted a study on the Environmental awareness among Prospective Elementary Teachers. The objective of the study was to find the effect of sex, influence of residence and effect of caste on the environmental awareness among prospective elementary teachers. The result of the study shows that, no significant difference exists in relation to sex and influence of residence but in the dimension, effect of population explosion there exist a difference in the environmental awareness of general and ST Teachers.

Shailendra (2009) conducted a study on the environmental values of pre-service teacher. This was beneficial for the pre-service teachers to suggest them about the inculcation of environmental values and environmental responsibilities within. The survey method has been used for the study. The sample of this study consisted of 180 pre service teachers of education department of Mahatma Gandhi Kashi Vidyapith, Varanasi. Out of 180 pre-service teachers, 130 were male and 50 were female. The tool ‘Environmental value scale’ developed by Misra, K.S., was used to measure the environmental values of pre-service teachers and ‘Environmental Responsibility Scale developed by the researcher was used for collecting data on environmental responsibilities. ‘t’ ratio was calculated to find out whether there was any significant difference between two groups of pre-service teachers or not. This study reveals that that the pre-service teachers are most receptive and sensitive. They are equally aware of their environment, its relationship to them and action necessary to ensure their survival and improve the quality of life on earth.
Dash Mishra and Satapathy (2010) conducted a study on the Education for Sustainable Development. Survey method was followed in the present study. The sample was divided into two (pre-service and in-service) main groups on the basis of teacher training programme and teaching experience of teachers. In the present study, 450 (243 pre and 207 in-service) secondary school teachers volunteered. Knowledge and perception being culture specific, instruments such as Sustainable Development knowledge inventory and questionnaire on perception about SD were developed for collection of required data. Questionnaires were distributed to the teachers who were requested to fill up the necessary information desired about themselves. Seema Dhawan (2010) conducted a study about environmental awareness of pupil teachers. This study was conducted to assess 11 level of environmental awareness of pupil teachers before and after their training programme. This investigation was conducted through normative survey method. The pupil teachers (PTs), i.e., the students of B.Ed. Training programme constituted the population and PTs of Garhwal University were treated as sample for the study. It was found that before training, male and female pupil teachers varied in their environmental awareness. Male pupil teachers had comparatively more awareness as compared to female pupil teachers after the training in all and selected question. It indicates that training does not play-a significant role in relation to the development of environmental awareness among the pupil teachers- It is, therefore, needed to revise the curriculum of B.Ed. programme which requires an effective course to develop environmental awareness among the trainee teachers.
Sandhya (2011) conducted a study on Prospective Teacher’s Responsibility towards Environment. The researcher made an attempt to study the environmental responsibility among prospective teachers. The study was conducted in Ghaziabad district of Uttar Pradesh. The sample of the study comprised 100 prospective teachers of Ghaziabad District. For the selection of sample, multistage stratified random sampling technique was adopted. An urgent need was felt to include environmental education, it’s the syllabi of teacher education programmes at various levels. Teacher education should motivate the prospective teachers to see the real side of environmental problems and ensure their participation, its activities of environmental purity, preservation and protection. In this regard, teacher education should take the major initiatives to aware prospective teachers for future sustainability of environment.

Agnivesh Gupta (2013) conducted a study about Teacher Education and Environmental Awareness. This paper avers that teacher education has a significant role in responding to the environmental problems. For effective teacher education, it needs to be re-oriented. Our education system has traditionally been very weak in nurturing such capacities to feel and examine the prominence of environment-related issues. Policy planners and teachers should actively participate in this change. Necessary political action should be planned for environmental awareness at all educational levels. Teacher educators need to be prepared to become Environmental Education communicators, who will proactively take up the activity-oriented approach to teaching and learning process. This will require extra teacher training, ongoing support that will reach colleges/university and effect the Environmental Education programme. Educational
initiatives have a significant role to play in communicating the nature of the problem and in nurturing the critical, intellectual, ethical and emotional capacities that are likely to help and create a meaningful response.

From the above review, the investigator could identify that there were lot of studies in teacher education related to environmental awareness and attitude. Also studies on environmental responsibility and values were also done. Majority of the studies highlighted the need for environmental action strategies and action skills. The literatures regarding Environmental Education were focusing on the environmental responsible behaviour to be developed, since majority of the stakeholders are acquainted with environmental knowledge, awareness and positive attitude. There is no linear relationship between environmental knowledge, attitude and awareness with environmental action skills, environmental responsible behaviour (Heins, 1987, Hungerford & Volk, 1990).

2.6 ENVIRONMENTAL KNOWLEDGE AND ENVIRONMENTAL RESPONSIBLE BEHAVIOUR

Environmentally Responsible Behaviour (ERB) is a specific term describing “any action, individual or group, directed toward remediation of environmental issues/problems” (Sivek & Hungerford, 1990). ERB is characterized by a combination of self interest and concern for other people, species, or ecosystems (Bamberg & Moser, 2007). It includes both general actions (talking with others about environmental issues; encouraging family and friends to behave in environmentally responsible ways) and specific actions (recycling; purchasing environmentally friendly and sustainable goods; conservation of energy by turning off lights and using alternate sources of energy, such as solar,
hydro, or wind energy; and reduction in fossil fuel dependence by utilizing alternative means of transportation) (Cottrell, 2003; Thogerson, 2007; Vaske & Kobrin, 2007).

Encouraging ERB is the fundamental goal of the discipline of environmental education (Hines, Hungerford, & Tomera, 1986); as such, research has focused on the precursors of environmentally responsible behaviours in order to successfully cultivate desired behaviours through environmental education programming. By influencing values, attitudes, and behaviours of individuals in positive ways, environmental education ultimately seeks to minimize negative environmental impacts (Hines, Hungerford, & Tomera, 1986). In fact, according to Matre “Environmental education that just educates people about the environment without asking them to make changes in their own lives is not environmental education – its natural science” (1990, p. 27). Generally speaking, however, the effectiveness of environmental education in influencing behaviour is of some debate, and depends on a number of variables, including the setting, duration, affective components, and practical implications. Overall, researchers suggest that longer programs tend to influence behaviour more strongly than short programs, and that practical field based programs have a more positive effect than similar classroom components (Bogner, 1998; Daniels & Marion, 2005; Metzger & McEwen, 1999; Zelezny, 1999; Zint, Kraemer, Northway & Lim, 2002). In a meta-analysis of research in environmental education up to that point, Hines, Hungerford and Tomera (1986) proposed a model of ERB that addresses both cognitive and affective variables. The key components of the Hines model include
general knowledge of environmental issues, knowledge in action strategies, skill in action strategies, attitudes, locus of control, and intention to act.

Sivek and Hungerford (1989/90) found that the most parsimonious predictors of ERB were environmental sensitivity, perceived knowledge of and skills in using environmental action strategies, and locus of control. Cottrell and Graefe (1997) found verbal commitment and perceived knowledge of ecology as significant predictors of ERB. Hsu and Roth (1998) reported most parsimonious set of predictors of ERB as perceived knowledge of environmental action strategies, intention to act, area of residence and perceived skill in using environmental action strategies.

The review of the existing literature reveals that knowledge of the environment entails both individual’s knowledge on ecological behaviour and factual knowledge (e.g. knowledge on ecological concepts, knowledge of environmental problems and issues) (Hines, et al., 1986/87). Environmental knowledge and its different forms have long been investigated in several research studies in the area of EE. Environmental knowledge has been observed to be one of the predictors which explain the variance in responsible behaviour (Armstrong & Impara, 1991; Gillett, et al., 1991; Hungerford & Volk, 1994; Korhoren & Lappalinen, 2004; Sivek & Hungerford, 1989) and observed to be associated with ERB (Cottrell & Allan, 1997; Hines, et al., 1986/87; Hsu & Roth, 1998, 1999; Kaiser, Wölfing, et al., 1999; Kuhlemeier, et al., 1999; Sia et al., 1985/86; Hornik & Cherian, 1995).

Sia, et al. (1985/86) reported very strong correlation between perceived knowledge of environmental action strategies and environmental behaviour.
Subsequently, meta-analysis of seventeen research studies (Hines et al, 1986/87) revealed a correlation between knowledge and environmental behaviour indicating that individuals who had a greater knowledge on environmental issues and/or how to take action tended to show more responsible environmental behaviours than the ones who did not possess this knowledge. Hornik and Cherian (1995) examined 67 empirical studies regarding recycling behaviours. Their analysis indicated that knowledge of recycling was observed to be strongest predictors of recycling behaviour ($r=.541$) and 87% of the correlations regarding these two variables were found statistically significant. Cottrell and Allan (1997) examined the predictors of general responsible environmental behaviours. Their multiple regression analysis revealed that 21.8% of the variance in responsible behaviour could be explained by verbal commitment ($\beta=.386$) and perceived knowledge of ecology ($\beta=.238$). In their two studies in which structural models were proposed, Kaiser, Wölfing, et al. (1999) observed significant correlation between knowledge and general environmental behaviour. In the study of Hsu and Roth (1998) with 226 teachers, significant positive correlation was observed between responsible behaviour and teachers’ perceived knowledge of environmental action strategies, perceived knowledge of environmental problems and issues, and perceived knowledge of ecology and environmental sciences. Hsu and Roth (1999) reported significant correlations between responsible behaviour and teachers’ perceived knowledge of environmental action strategies, perceived knowledge of environmental problems and issues, and perceived knowledge of ecology and environmental sciences.

Kuhlemeier et al. (1999) also reported significant positive correlation between environmental knowledge and ERB of Dutch students. Marcinkowski
(2001) reviewed three dissertations studies (Marcinkowski’s study, Sia’s study and Sivek’s study) with regard to predictors of ERB. He reported knowledge of action strategies as the strongest single predictors of ERB for his sample. Knowledge also contributed to behaviour in other two studies, but their percentage was relatively low. Knowledge of action strategies alone explained nearly 40% of the variance in ERB scores in Marcinkowsk’s study (n=119, members of environmental organizations). In Sivek’s study (n=281, members of environmental organizations), knowledge of action strategies seemed to explain 34% of the variance in ERB scores.

Ogunbiyi Joseph, O. and Ajiboye Josiah, O. (2009) investigated the effects of value analysis, value clarification and action learning on the environmental knowledge, attitudes and problem solving skills of pre-service teachers in some Nigeria Colleges of Education. The pre-test, post-test, control group, quasi-experiment design was used for the study. Two null hypotheses were generated and tested at 0.05 level of significance. Environment knowledge Test (EKT) and Environmental Attitudes Scale (EAS) were the instruments used for data collection. The data were analyzed using Analysis of covariance, multiple classification analysis and Duncan post-hoc test. The study found out that-value education strategies were more effective in promoting subjects’ cognitive and affective achievement in environmental education than conventional lecture method. Based on the findings, the study recommended that innovative instructional strategies like value analysis, value clarification and action learning should be adopted in Nigerian Colleges of Education to enhance effective teaching and learning of environmental education.
Chantal Seguin, Luc G. Pelletier, John Hunsley (1998) done a study were, first, to operationalize the notion of activism by using self-reported behaviours and, second, to propose and test a model of environmental activism. The results show that the Activism Scale is an acceptable measure of environmental activism. Furthermore, the proposed motivational model of environmental activism was supported by a path analysis of the data. Within the model, individuals’ levels of autonomous motivation predicted the perceived responsibility of different organizations to prevent health risks, the amount of information people obtain from various sources, and the perceived importance of problems in the environment. In turn, those latter variables predicted the perception of environmental health risks. Finally, the perception of environmental health risks predicted environmental activism. The model demonstrates the importance of autonomous motivation in the prediction of environmental activists’ behaviours and the central role perceived ecological risks play in the determination of environmental activism.

Chawla Louise (1999) conducted structures open-ended interview with 30 environmentalists in Kentucky and 26 in Norway who represented a broad range of issues, from wilderness protection to urban planning, to determine the sources of their environmental commitment. Experiences of natural areas, family influences, organizations, negative experiences, and education were mentioned most often. People were also asked about the period in life when significant experiences occurred and on this basis a typical life path of predominant sources of commitment at different ages was constructed, Respondents also recommended strategies for effective environmental actions.
Many prior studies of ERB have focused on the use of external rewards and social obligations to elicit and maintain the desired behaviours (Dwyer, Leeming, Cobern, Porter, & Jackson, 1993; Hornik, Cherian, Madansky, & Narayana, 1995; Huffman, Grossnickle, Cope, & Huffman, 1995). We reasoned that a stronger case could be made for the importance of goal internalization if we found that it predicts success above and beyond these other motivationally relevant variables (Sheldon & Kasser, 1998; Sheldon & Houser-Marko, 2001).

Villacorta Mark, Koestner Richard and Lekes Natashs (2003) a study was conducted to further validate the Motivation toward the Environment Scale (MTES). Results confirmed both the convergent and discriminant validity of the MTES by showing that peer reports corresponded to self-report of environmental self-regulation and that environmental self-regulation was relatively distinct from self-regulation in academic and political domains. Results also pointed to some possible sources of autonomous self-regulation. Individuals were more likely to engage in autonomous environmental behaviours if (a) their parents had shown an interest in their developing attitudes about the environment, (b) their peers supported their freedom to make decisions about the environment, and (c) they had already developed life aspirations such as concern for their community. Finally, results confirmed the adaptive value of developing an autonomous regulatory style toward environmental activities. Thus, autonomous individuals were shown to report stable pro-environmental attitudes over time, a greater number of environmental behaviours, and higher levels of well-being. Sandhya (2006) conducted a study on environmental responsibility among students. The investigation was undertaken to study the environmental responsibility among the
students in relation to their sex (male/female), locality (rural/urban) and subject stream (science/arts, commerce). The study was conducted in Bareilly district of Uttar Pradesh. The sample of the study compromised 154 male, 116 female, 100 rural, 200 urban, 148 science, 9 arts, and 78 commerce (total 300) secondary level students. For the selection of the sample, multistage stratified random sampling technique was adopted. The data were analysed using Mean, SD, and ‘t’ test techniques. The results of this study revealed that the male students and science background students were having higher environmental responsible behaviour than their counterparts.

Chawla, Louise and Cushing, Debra Flanders (2007) in their article reviewed four bodies of research that shed light on how to promote active care for the environment in children and youth: research on sources of pro-environmental behaviour, socialization for democratic skills and values, the development of a personal sense of competence, and the development of collective competence. The article begins with an overview of studies of formative childhood experiences reported by environmental activists and educators, followed by correlational and experimental studies with young people regarding factors associated with their taking action for the environment. Because behaviours with the largest potential benefits for the environment require political engagement, the article also reviews experiences associated with young people’s interest and engagement in public issues. Action for the environment in the home or in public arena like schools and communities requires a personal sense of competence and a sense of collective competence, or confidence in one’s ability to achieve goals by working with a group. Therefore experiences that promote the development of these assets are
summarized as well. The conclusion compares major findings in these different fields and discusses implications for environmental educators. Gary et al (2007) carried out a study on children’s cross-cultural Environmental attitude and self-reported behaviours. The study concentrated on young children (6-8 years) from United States, Austria, Mexico and Spain. They employed a well validated and reliable instruction consisting of multiple game formats developed to assess, these construct, in young children from all four countries have comparably high levels of environmentally responsible behaviours.

Lahiri Sudeshna (2010) had done a study on Recognizing the importance of ‘Environmental Education’ to be introduced in every level of school education, agencies responsible for curriculum reforms and text books preparation in India have made the subject as an integral part. It was felt necessary to investigate whether the teachers, who are disseminating the knowledge, are equipped with environmental attitude and the behaviour towards environment so that they may shape up the behaviour of their students. Thus, the study was pertinent to be conducted over trainee teachers perusing B.Ed. course intended to hone the skills for future profession and desirable criteria to be a ‘School Teacher’ to ascertain relationship of Responsible Environmental Behaviour (REB) with Environmental Attitude (EA) and Scientific Attitude (SA). The study involved descriptive survey research with a sample of 300 pupil teachers from randomly selecting four Teachers’ training institute affiliated to University of Calcutta, India. The result showed low correlation between EA and REB of pupil teachers while there is a significant correlation between REB and SA. Similarly, there were significant differences for both EA and REB between in-service and pre-service teachers.
whereas a significant effect of courses of study on EA was reported with no significant effect on REB of pupil teachers. The study suggested redesigning activities involved in teachers’ training courses and assessing the determinant attitudes which may lead to responsible behaviour of pupil teachers towards the green earth. The curriculum for teacher training should focus on developing scientific attitude irrespective of stream of affiliation of prospective teachers along with opening a field of research, eco-psychology, for further research. Vandona Mohra, Jagdeep Kaur (2010) conducted a study on the Effect of Experiential Learning Strategy on Enhancement of Environmental Awareness among Primary School Students. The present study was conducted to compare the effect of experiential learning strategy and traditional learning method on enhancement of environmental awareness of 120 fourth graders with internal and external locus of control. The obtained data was analysed with the help of three-way analysis of variance. The major findings of the study were: (i) students when exposed to experiential learning strategy yielded better mean gain on environmental awareness scores as compared to the traditional learning method; (ii) students with internal locus of control yielded better mean gain on environmental awareness scores than the students with external locus of control, and (iii) the students performed better at comprehension level of objectives than at knowledge level of objectives with regard to mean gain on environmental awareness scores.

Muderrisoglu, H. and Altanlar, A. (2011) done a study aimed at determining the environmental attitudes and environmentally responsible behaviours of the undergraduate students of Abant Ýzzet Baysal University toward environmental issues. In addition, the effects of the faculty in which the
students are enrolled, locality and gender on the determined environmental attitudes and environmentally responsible behaviours of the students were investigated. The data were gathered from 507 students in 2005. To explain the environmental attitudes and environmentally responsible behaviours of undergraduate students toward environmental issues, factor analysis was used with Varimax Rotation method. To determine the changes of the environmental attitudes and environmentally responsible behaviours of the students with regard to the faculty, locality and gender, one-way analysis of variance was used. According to the results, students highly support the environmental attitudes and highly participate only in consumerism behaviours. Finally, it was determined if faculty and gender had an effect on the environmental attitudes and behaviours of the students.

Tabernero Carmen and Hernandez Bernardo (2012) had done a study examining whether self-efficacy and intrinsic motivation are related to environmentally responsible behaviour (ERB). The study analyzed past environmental behaviour, self-regulatory mechanisms (self-efficacy, satisfaction, goals), and intrinsic and extrinsic motivation in relation to ERBs in a sample of 156 university students. Results show that all the motivational variables studied are linked to ERB. The effects of self-efficacy on ERB are mediated by the intrinsic motivation responses of the participants. A theoretical model was created by means of path analysis, revealing the power of motivational variables to predict ERB. Structural equation modeling was used to test and fit the research model. The role of motivational variables is discussed with a view to creating adequate learning contexts and experiences to generate interest and new sensations in which
self-efficacy and affective reactions play an important role. Vandana Mehra, Manpreet Kaur (2012) conducted a study on the Effectiveness of Outdoor Environmental Education Programme for Enhancing Responsible Environmental Behaviour among Fifth Grade Students. The present study was conducted to study the effect of outdoor environmental education programme for enhancing responsible environmental behaviour among fifth grade students of high, average and low intelligence. One hundred twenty fifth grade students belonged to two schools of Gurdaspur. The data were analysed with the help of 2-way Analysis of Variance. The major findings of the study were (a) Students taught environmental education by the outdoor environmental education programme exhibited better mean gains on responsible environmental behaviour and its dimensions as compared to students of control group who were taught environmental education by traditional method of instruction. (b) Students with high, average and low intelligence exhibited comparable mean gains on responsible environmental behaviour and its dimensions, locus of control, environmental altitude, beliefs and values related to the environment, environmental sensitivity, personal responsibility, environmental action strategies, and intention to act (c) Students of high intelligence exhibited better mean gains on knowledge of ecological concepts and knowledge of environmental issues and problems than students with low and average intelligence.(d) Students of average intelligence group exhibited better mean gains on knowledge of environmental issues and problems as compared to students of lower intelligence. (e) There was significant interaction between treatment and levels of intelligence in relation to mean gains on knowledge of ecological concepts.
2.7 DISCUSSION

Through the review of related literature on Environmental Education, it was found that the variables like environmental awareness, attitude of various stakeholders were studied repeatedly especially in the Indian context. The different teaching strategies, curriculum, instructional packages have not researched to that extent. Moreover, majority of the studies were suggesting the scope on studying the environmental responsible behaviour. Though studies were done in the variable environmental responsible behaviour, the researcher could find a great scope to study the same variable at the secondary teacher education level. Besides these, it was found that the studies related ERB were scares in India. The environmental knowledge as one of the most important variables as cited in majority of the developmental studies, the same variable also been selected for the present study.

The studies reviewed have provided an insight in to the variables that were commonly and to a great extent researched up on in the western countries and in India. It is also seen that variety of instructional strategies has been used to teach environmental education. Since understanding of environmental education in depth and developing a positive attitude and a responsible behaviour requires an approach which is more learner centred and arriving at one’s own, it was decided to uses experience based approach to teach environmental education. As stated in the earlier chapter, experience based learning involves concrete experience, processing the information, sharing and conceptualizing the matter through exploring, analyzing and reflecting. It was felt that it would be worth trying the approach to teach environmental education. Therefore the present study was
formulated wherein the experience based approach used to environmental education with two major dependent variable under consideration, viz., environmental knowledge and environmental responsible behaviour.

The methodological details pertaining to design, sample, instrumentation and implementation of the study are detailed out in the next chapter.