CHAPTER - II

REVIEW OF RELATED LITERATURE

The review of related literature plays a vital role in the field of research. In simple words, the meaning of review of related literature is to locate, read and evaluate literature concerned with the investigation in hand. The phrase ‘review of literature’ consists of two words viz., review and literature. The term ‘review’ means to organize the knowledge of the specific area of research to evolve an edifice of knowledge, to show that this study would be an addition to this field. The term ‘literature’ is used with reference to the languages. It also includes the subject matter. Here in research methodology, this term refers to the knowledge of a particular area of investigation of any discipline which includes theoretical, practical and its research studies.

2.1 IMPORTANCE OF REVIEW OF RELATED LITERATURE

About the importance of review of related literature, Butler has written the praise worthy statement, with a correct sense of mind that the importance of Related Literature can’t be denied in any research. Though, it is time consuming but it is fruitful phase of any scientific investigation. The main purpose is to systematically portray the relevant aspects of the study into a theoretical framework.

Practically all human knowledge can be found in books and libraries unlike other animals that must start a new with each generation, man builds upon the accumulated and recorded knowledge of the past.

The direct as well as indirect related literature is the vast storehouse of the published knowledge in the related field. It is the foundation of any research study undertaken. Review of related studies avoids the risk of duplication, provides theories, ideas, explanations and hypotheses valuable in formulating the problem and contributes to the general scholarship of the
investigator. A familiarity with the literature in any problem area helps the investigator to discover what is already known, what others have attempted to find out, what methods have been adopted to solve the problem and what problems remain to be solved.

Review of the related literature allows the researcher to acquaint himself with current knowledge in the field in which he is going to conduct his research. Besides this, it enables the researcher to define and delimit his problem. It helps the researcher in selecting those areas in which positive findings are very likely to result and his endeavors would be likely to add to the knowledge in a meaningful way. It helps the investigator to gain insight into various aspects of the problem area that is, in formulating framework for the study, developing the methodology, constructing the tool for data collection and planning the analysis of data.

Emphasizing the importance of survey of related literature Good & Scates (1954) have clearly pointed out that, “Survey of related literature helps us to know whether evidences already available can solve problems adequately without further investigation and thus many solves problems adequately without duplication”. It may suggest that findings, the way, in which studies are comparable and in which they are related to one another.

On this basis it seems safe to conclude that a review of the related literature in any of investigation is of paramount significance. Recognizing the advantage of reviewing the related studies, an attempt was made to study the literature concerned with the investigation in hand and to seek some guidelines from the earlier studies in this specific area of research. The present review is by no means complete or exhaustive. It is an attempt to indicate the main trends of research in this specific area which have a direct or indirect bearing on the present problem. In the present study, an attempt has been made to review information related to the problem at hand as well as references, books, educational abstracts, journals etc. and researches conducted in the field.
Since the problem under investigation is ‘Effectiveness of an Environmental Education Programme Utilizing ICT in influencing Environmental Sensitivity, Awareness, Ethics and Attitudes among Secondary School Students’, the researcher tried to study the related literatures which were available in the field of the problem under reference to develop a firm base regarding the research problem. After going through the profuse literature, the investigator selected only those studies that had a relevance to the present study. It was useful to design the research. The investigator studied methods, measures, treatments, teaching aids and experimental designs employed by other researchers whose studies were related to the Environmental Education. The findings of some relevant and representative studies have been classified and presented in the following section:-

1. Studies Related to Environmental Education.
2. Studies Related to Environmental Education through Various Electronic Media and ICT.
4. Studies Related to Environmental Awareness.
5. Studies Related to Environmental Ethics.

2.2 STUDIES RELATED TO ENVIRONMENTAL EDUCATION

Iyer’s (1961) approach was directed towards formulating the principles of construction of a syllabus in general science for schools of Kerala. While formulating the principles, the investigator found out that the present elementary science curriculum is not based on problems of living and social needs related to environment. It was not based on environmental factors and there was almost total lack of correlation between science and environment.
The issue of Environmental Education has been discussed at length in several International and National conferences and seminars held at Founex and later at Stockholm (1972) followed by the workshop on Environmental Education at Belgrade (1975) and the Inter Government Conference as the subject at Tbilsi (1977) organized by UNESCO are some of the notable academic gatherings on Environmental Education.

A comparison of the performance of secondary school students on the ecological concepts and knowledge test before and after completing the field experiences was done by Shoemaker & Hugh (1975). The conclusions of the study were that ecological concepts can be presented effectively at the secondary level through field experiences. Students who participated in the field studies exercise have better understanding of ecological concepts than those who do not.

The use of environment both as means and end of the education was discovered by Madhyastha (1982). Environmental Education can be used for development of basic skills, study skills and social skills (health, personal hygiene, cleanliness of surroundings, and conservation and judicious use of environmental resources for teaching science). From analysis it was seen that teachers and students show their unawareness about many of these resources which may be due to the ignorance about the use and presence of these materials.

Environmental Education curriculum needs in the United States were perceived in a study conducted by Volk (1983). The results of the study showed that professional environmental educators believe that there exists considerable discrepancy between the desired and existing system of Environmental Education. It was perceived that Environmental Education goals were not being met with existing curriculum. Need for in-service Teacher Education for Environmental Education curricula was perceived at all academic levels. Iozzi (1984) stated that the preponderance of research studies in Environmental Education had, to that point, dealt with attitudes
and values rather than with cognitive knowledge. This is still true and continues to make Environmental Education different from other educational areas of study, where educational researchers have focused more heavily in factors related to cognition. Iozzi attributed this difference to a need for establishing a descriptive baseline for Environmental Education. He also commented that environmental educators attach importance to teaching that would develop positive attitudes and values, implying that they believe the education, focusing on their promotion, will lead to the fostering of responsible environmental behavior.

Malhotra (1985) identified that the necessity of Environmental Education was voiced by the IUCN way back in the sixties and reiterated over the years in many conferences. Syntnik (1985) examined that Environmental Education concept, which considers environment as scientific and aesthetic resources. He concluded that Environment Education should inculcate in individuals a sense of responsibility for the improvement of environmental quality for the benefit of all humanity.

Simmons (1989) noted that Environmental Education has not been infused within the curriculum, but tends to be treated mostly as an enrichment of the science program. The danger is that scientific literacy is typically built on a disciplinary model, whereas environmental literacy is based on interdisciplinary model.

According to Ballard & Pandya (1990), the three components i.e. attitude, knowledge and awareness play an important role and show impact on students throughout their lives inside and outside the classrooms. Levels of awareness are important goals in Environmental Education between kindergarten and 3rd grade. Levels of knowledge are important goals from 3rd to 9th grade. Levels of attitude are important throughout the entire educational career.

The impact of Environmental Education on 1415 children studying in standard V from 30 primary schools was studied by Gopalakrishnan &
Sarojini (1992). For conducting this study, ten students each from Madras, Coimbatore and the Nilgiris were given the Environmental Education Test (EET) constructed by the investigator. The major findings of the study were that the distribution of the total Environmental Education Test scores of the entire sample approached the normal form which implied that studying Environmental Education had a very good impact on the children. Analyzing the EET’s area wise, the children of Madras scored better (arithmetic mean: 41.85) when compared to that of Coimbatore and the Nilgiris, and this could be due to better exposure of the Madras children to the environment. The study showed that the participatory learning approach could bring about a better impact on children regarding environment knowledge. Teachers, in general, felt that there was not sufficient time to give importance to learner centered activities.

Serious environmental problems that range from familiar issues such as pollution, loss of biodiversity due to land degradation and waste management are experienced worldwide and Environmental Education is seen to be a key response to these problems. This was examined by United Nations & UNESCO (1992).

A study by Yogamoorthi (1992) stressed the need for environmentally trained teachers for Environmental Education. In India, though we do have in-service programmes for teachers to reinforce their skills and knowledge in their concerned subjects like mathematics and science to make the process of teaching-learning meaningful and up to date, such in-service courses do not include anything substantially on Environmental Education.

Analysis of research on variables related to the fostering and demonstration of environmentally responsible behavior has led to the design and testing of a set of instructional materials. Hungerford, Peyton & Wilkie (1993) stressed upon a hierarchical approach involving four levels of activities i.e. ecological concepts, conceptual awareness, issue investigation
and evaluation, environmental action skills- training and applications. Data from research studies consistently indicate that behavioural changes generally will not occur if students are exposed only to the first two goal levels. Data also indicate that behavior with respect to environment will change, if students are thoroughly exposed to third and fourth goal levels, in addition to the first two.

**Hungerford & Peyton (1994)** developed a curriculum that incorporates the Tbilisi objectives into four levels that develop as the students mature. Level I present ecological concepts providing learners with knowledge which can help them to take ecologically sound environmental decisions. Level II focuses on information (awareness) concerning many aspects of human environmental behavior. Level III focuses on those skills needed for investigation, evaluation, and value clarification. Level IV focuses on those processes important to citizenship action.

A study on the importance of Environmental Education at early child level was conducted by **Wilson (1994)**. It discussed guidelines to provide developmentally appropriate Environmental Education experience for young children. Guidelines included keeping children actively involved, beginning with simple experience, encouraging use of the senses, focusing on developing relationship and demonstrating enjoyment of nature.

**Jennifer (1996)** has emphasized Environmental Studies as an interdisciplinary subject which includes socio-economic, political, biological, natural, anthropological, economic, aesthetic and cultural aspects of human life. Hence it intends to control and design environmental problems according to human necessities. It is often remarked that Environmental Education topics should be subject of study in the school.

The role of DIETS in planning, organizing and implementing the comprehensive programme of the Environmental Education at the district level was visualized by **Ravindranath (1996)**. He cautioned that the statutory effects of efforts made by different agencies will not be sustained
unless these are accompanied by appropriate curriculum, teacher training and a mechanism for sustained implementation and follow up of the programme.

An integrated model of Environmental Education was presented by Palmer (1998), that reflects the relationship between education about the environment, for the environment, and in/from the environment. At the center of this model are the learning process and curriculum elements driven by knowledge and understanding, concepts, skills and attitudes. Planning for such a curriculum model requires the interaction of concern, experience and action. This model according to Palmer requires appropriate task that provide students with experiences in problem solving, decision making and participation in decisions concerning the environment with considerations based on ecological, political, economic, social, aesthetic and ethical aspects.

Kumar (2000) observed that there is now an acceptance of the idea of oneness of survival of animals and plant life. The hoary tradition of our country in conservation continues everywhere today and we have the inspiring example of Bishnoi community in Rajasthan, Haryana and Uttar Pradesh, dedicated to protecting our tree and wild animals.

According to Wagiet (2002), the Department of Education of the University of South Africa had acknowledged the need to increase the focus on Environmental Education within formal education. The National Environmental Education Programme for general education and training was established to advance Environmental Education within the curriculum.

Jerath (2003) conducted a study to determine the effect of integrated Environment Education in technical and vocational education at the secondary education level. Five countries for study were chosen to make the content as representative as possible by mutual consultation. The countries chosen were Malaysia, Philippines, Indonesia, India & China. The study revealed that EE (Environment Education) in TVE (Technical Vocational Education) had not been given great importance. There were some major
problems like, only the technical aspects of EE were promoted in TVE. It does not develop understanding of natural systems and cycles and environmental awareness. No efforts were taken to integrate EE concepts in TVE curriculum. There were no proper practical components and case studies in the curriculum and there was lack of teaching and learning materials. Very few trained staff and curriculum developers are there to frame curriculum.

Manninen, Miettinen & Kiviniemi (2005) examined conceptions of students about technology and environmental issues and school science. Their results showed that girls show more concern towards environmental issues. Their results also showed that both boys and girls believe in science and technology capacities and capabilities.

Effect of full and quasi- participatory learning strategies on Nigerian senior secondary students’ environmental knowledge was studied by Josion, Ajiboye & Ajitoni (2008). 360 students from nine secondary schools from Kwara state were selected to conduct the study. It was found that the students taught by participatory mode perform better in gaining environmental knowledge than the students in the conventional lecture group. Quasi participatory students performed better than the full participatory group as they had a better opportunity to work in a more flexible way.

It was concluded in a study conducted on Bostwana children by Josiah, Ajiboye & Nthalivi (2008) that teaching environmental issues for children was found to be more effective through civic club activities rather than classroom teaching. It was also observed that civic club play an important role in promoting environmental issues in Botswana and other countries. Hence this method is promoted in these countries. A significant change was also observed in the knowledge and attitude of the students after their exposure to the activities in the civic club.
Jeronen & Raustia (2009) conducted a case study to familiarize about Environmental Education in Finland and to find out how it is taken into account on Finnish nature schools. The data was collected from 23 nature schools in the year 2006, by using a questionnaire. It was found that most of the nature school gave their service for children and young people and students of primary and lower secondary schools visited the nature school. Educational methods used were nature trips, enquiry learning method and learning by doing. The impact of the nature school was not very strong, as the students attended the nature school only once or twice in their entire compulsory education.

A study was conducted by Qablan et al. (2009) on 65 Environmental Science faculty members from 3 public University in Jordan to examine their attitude towards environment and classroom practice in Jordanian university. It was found that the Environmental Science faculty members supported for Environmental Sustainable Development (ESD) in university classrooms at Jordanian University and there was a moderate level of attitude among Environmental Science faculty members towards ESD. The study further recommended that to increase the pedagogical knowledge related to ESD it is necessary to organize special training course and workshops by the University.

A research was conducted on thirteen primary and pre-primary schools in Spain by Conde, Del & Sanchez (2010) to understand the contribution of environmental audit experience that can achieve the objectives of Environmental Education. For conducting this research the “Eccentrics” project was carried out in collaboration with the teachers of the school their advisers and university teachers. The project was framed in such a way that it provides solution to environmental problems otherwise it will be just a mere activity with no content. The content had been revised in such a way that more environment related activities were included in the curriculum and also the quality of activity had been increased in a more
committed way. The qualities of activities were improved due to support provided by the organizing community in the form of teaching aids on each topic and there was a quality improvement in the activities due to the global approach and motivation not only of pupils but also educational community as a whole.

The students’ knowledge on ecology was investigated by Koksal (2010). The results revealed that there were no differences found within grade levels. The male students were significantly higher than the female in knowledge on ecology.

Environmental risk perception and their preference in educational strategies and risk communication in China and United States were examined by Hongxian & Fortner (2011). The researchers found that the Chinese students felt that the environmental risk is more harmful to human health, economic development and environment than the American students. Female students of America and China felt that the risk is more to human health and environment rather than the male students. The findings also found that the public in both the countries wanted to know more about environmental risk and wanted a transparent and democratic risk communication strategy. The Chinese and American students felt that coverage in mass media would increase the understanding of environmental issues.

Meerah et al. (2011) found that students who were exposed to the curricular and extra curricular environmental intervention module significantly improved their environmental skills.

A research study was conducted by Steel (2011) to investigate how the significant tradition of secondary science and Environmental Education was merged by the science teachers in their high school classroom in North Ontario. The study proved that teachers play an important role in embedding Environmental Education to secondary science program. Only if a powerful structure for professional development is provided to the secondary teachers
then only they will be able to integrate Environmental Education and science for the students.

**Marcus (2012)** conducted a study that examined the contribution of implementing the "Green School" programme (an educational initiative undertaken in Israel in order to promote sustainable development and active environmental citizenship) in relation to students' environmental literacy in terms of its three major components: knowledge, attitudes and behaviour. Research findings indicated that implementing the "Green School" programme might promote pro-environmental behavior. Furthermore, this programme was found to affect both school's curriculum and activities and the community in which it operated. The practical implication of this research suggests the importance of infusing “Green School” programme as an integral part of schools’ lifestyle.

**Alexander & Poyyamoli (2014)** conducted a study on the effectiveness of Environmental Education for sustainable development based on active teaching and learning at high school level. They concluded that active teaching and learning approach and innovative curriculum on Environmental Education is more effective in facilitating Environmental Education for sustainable development among school children.

The findings of a study conducted by **Omran, Yarmohammadian & Keshtiaray (2015)** showed that curriculum based on the integrated and based on three main components knowledge, skills and attitudes facilitate environmental literacy in high school students. In this context it can be a combination of objectives, content, teaching methods and evaluation are applying and environmental literacy integrated method proposed in the study was interdisciplinary.

### 2.3 STUDIES RELATED TO ENVIRONMENTAL EDUCATION THROUGH VARIOUS ELECTRONIC MEDIA AND ICT

The Central Institute of Educational Technology (CIET) of the **NCERT (1975)** has produced a multimedia package on Environmental
Education. The package is in the form of videotapes, slides and posters that deal with such issues as air pollution, destruction of forests, soil erosion etc. This package underscores the message of the need to protect environment.

The instructional material developed by Hungerford, Peyton & Wilke (1988) include six modules, “Environmental problem solving”, “Issue investigation”, “How to gather information”, “Investigation of issues” and “Environmental action strategies”. An additional set of instructional material were presented on educational case study dealing with municipal solid waste.

Antonysamy (1989) found that learning through viewing of the video films was more effective than learning through charts with reference to learning environmental concepts. Usha (1990) found that students got higher scores who studied alone with the help of self instructional film strip of topic “Nutrition”. For the objectives knowledge, understanding, application and skill, the gain score was found to be significant.

Kalimuthu (1991) developed a video programme on environmental pollution. He found that group receiving instruction through video programme learned more concepts as compared to the students which learned through conventional method. An alternative model for Environmental Education in natural resources emphasizing a complete system approach was proposed by Francis (1993). The model helped the pupils to evaluate and understand natural resource based on underlying ecological principles.

Singh (1995) developed study material related to video instructional package for teaching environmental awareness. It was field tested and was used in three schools in Gujrat, UP and Rajasthan, and was found to be very effective and interesting. The study also reported that students enjoyed working through video package. The construction and effectiveness of multimedia package to develop population awareness among the trainees of primary teacher training institutes was studied by Kaswaskar (1996). It was
found that multimedia package was more effective in changing the attitude of trainees about different aspects of population awareness.

**Ravindranath, Sowrirajan & Nair (1996)** studied the use of computers in the teaching of environmental education. Computer Assisted Instruction (CAI) was very effective in teaching of environmental awareness. The main objective of the study was to find out how computers could be effectively used in schools to support the teacher with the necessary information on the local environment and how instruction could be made locally specific. The main conclusion of the study was that with the availability of sophisticated gadgets like computers classroom instructions could be made more creative and challenging.

In his study, **Madanakumar (1998)** found that media based instructional strategy is more effective in creating environmental theory and application awareness than conventional text book approach among primary school pupils of Kerala.

To improve the quality of instruction in Environmental Science for primary level school children, activity based intervention programme, written, oral and activity based tests and semi structured interview schedules were used by **Tomar (1998)**. The students of standard IV found the intervention programme in the subject of Environmental Science more interesting and joyful. The intervention programme could be used for developing sensitivity towards environment. It was further suggested that this type of intervention programme could also be used for training teachers for developing and implementing such a programme for different standards.

A developmental cum experimental study on Environmental Education through video-instructional package was conducted by **Indubala & Singh (1999)**. The first part of the study consisted of the development of video-instructional package on ‘Environmental Pollution and Education’ and the second part concerned with the experimental try-out of the package and its two components. Pre-test, post-test design was used for conducting the
experiment. Six experimental groups, each consisted of 40 students were formulated. In all about 240 students of standard IX of secondary schools of Gujarati medium participated in the study. Video instructional package consisted of video-film and learner’s hand book developed by the investigator was used for conducting the experiment. The results of the study indicate that teacher made video-instructional packages can be used effectively for creating awareness and providing information to school students. It was also suggested that such more attempts should be made for some other important aspects of life as per the needs of the students. This study also recommends the organization of the training programmes and workshops for teachers where development of software especially for video package can be learnt by the teachers.

A supplementary curricular programme on Environmental Education for higher primary schools was developed by Suneetha (2000). The experimental treatments using specially designed supplementary curricular programme have been found significantly more effective in developing basic understanding in Environmental Education and also developing a favourable attitude towards the environment in all the selected schools. This study had demonstrated its effectiveness in terms of multi-disciplinary approach, substantiating the infusion technique for teaching of Environmental Education.

A comparative study of the efficacy of teaching health and hygiene through the traditional method and the multimedia approach in the subject of Home Science was conducted by Desai (2004). It was an experimental study which had employed experimental group and control group design. The multimedia package constituted of transparencies, pie graph, charts, diagrams, pictures, video tape, audio tape, and slide set developed by the investigator. All the tests pre-test, post-test, retention test and opinionnaires were constructed by the investigator. The mean achievement of the experimental group was found significantly higher than that of the control
group. From post-test to retention test almost equal reduction in performance was found in both the groups. The students were found to have favourable opinions towards the multimedia approach.

Ramkumar (2004) conducted a study on acquisition of process skills by IV standard pupils through an instructional programme in Environmental Studies. He found that instructional programme in Environmental Studies facilitated the teacher in evolving teaching strategies for enhancing teacher-pupils interactions during the acquisition of process skills. He further concluded that during the context of scientific investigation pupils expressed autonomy in learning through interactions with teachers and with fellow peers. Pupils proposed hypothesis based on certain concepts to explain the occurrence of events during the context of scientific investigation.

Rathod (2005) conducted a study on development and implementation of an information technology based instructional package for Environmental Education to Gujarati medium students of standard VIII of Jamnagar City. The students were divided into experimental and control groups. Two parallel tests were constructed by the investigator to study the achievement of the students. Also, a five point reaction scale was constructed to study the reactions of the students on the developed package. The developed information technology based instructional package was found to be effective for teaching Environmental Education because there was found a significant difference in the mean gain scores of the experimental group and control group. The students were found having positive reactions towards the developed information technology based instructional package.

A case study on students of standard VII was conducted to see the effectiveness of a prepared instructional package in promoting better understanding of the environment among the students. It was found by Sharma (2005) that the instructional package was effective in promoting a better understanding of the environment. The analysis of the responses of
the students through the interview schedule revealed an increased sensitivity towards environment concerns and a better understanding of the environment.

A survey of the facilities of educational television programmes of primary school level was done by Meenu (2006). The findings showed that the ETV lessons in Environmental Science and Mathematics taught to students of both the class III and V significantly improved their learning achievement as compared to their counterparts taught through traditional method.

The effects of multiple intelligences strategy and traditional methods of instruction on elementary students’ environmental awareness knowledge levels and their attitudes towards the environment were studied by Gokhan (2010). It was found that there was a significant difference between environmental awareness and attitude of the experimental group and the control group. The study showed that the multiple intelligence instructional strategy activities helped in the positive development of the students’ attitude and the environmental awareness, knowledge levels. It was further revealed that the students who were educated by multiple intelligence instructional strategy had more environmental awareness, knowledge levels and had a higher motivation level than the students who were educated by the traditional method of instruction. The students who participated in the experimental process in which multiple intelligence strategy was applied enjoyed the activities, had great fun and they became more aware of the environmental issues.

The impact of different teaching strategies on the learning performance of Environmental Education was studied by Chang (2011). Students learned about resource recycling and classification through an instructional website based on the teaching tool of Web Quest. The result showed that using Web Quest in outdoor instruction influences students’ learning performance positively.
Kingdow (2011) designed an intensive ICT integrated environmental learning to analyze the learning performance of college going students. After completing the course, it was found that ICT integrated environmental learning process has more effect on the students’ learning performance. The study observed that for upgrading student’s cognition and learning attitudes it is necessary to design an effective approach.

Halder (2012) in his research study emphasized that use of mass media and modern means of communication are beneficial for teaching the concepts of environment, environment deterioration, conservation of environment etc. and this can develop environmental awareness among the students.

Sukarjita et al. (2014) analyzed that the integration of environmental materials by MOTORIC models in science are contextual material that is part of the MOTORIC model, assist students in understanding the importance of the environment for students. Similarly, the role of instructional videos that are included in the MOTORIC model can develop sense of love and sympathy for the students on the environment. Therefore, the approach to the concept of the use of media character would make it easier for students in recording a variety of knowledge about environmental issues. Increasing students’ knowledge of the environment by 68.07% in the test sample and the small group of 64.15% on a large test sample group indicated that the integration of Environmental Education materials through MOTORIC models in materials science of junior high schools effectively increase students’ knowledge about the environment.

The study conducted by Vassiliki (2014) focused on media cartoons as a teaching strategy in Environmental Education. Findings revealed that exposure to media cartoons results to a significantly better issue resolution skills on Environmental Education topics than the conventional approach. The researcher observed that students actively engaged themselves in media cartoon activities that enabled them to make responsible actions and provide
solutions to local and global environmental problems. Students had an active participation in sharing insights and opinions in evaluating the message of media cartoons. Based on the findings of this study, the researcher concludes that exposure to media cartoons significantly improves the issue resolution skills of students. The strategy provided a learning opportunity in a non-threatening setting that promotes students’ skills of observation, formulation of hypothesis, and creativity. In this regard, the researcher encourages the use of media cartoons as an alternative teaching strategy as it improved the issue resolution skills of students. Learning activities in combination with Environmental Education methods can greatly enhance students’ engagement with environmental and science issues.

Alami et al. (2015) studied the effectiveness of integration of ICT in environmental education. The analysis of the pre-test responses showed that students associate the cause of the greenhouse effect much more with human activities than with natural phenomena. This was largely be explained by the considerable influence of the media, as a source of information, and thus knowledge, by the students, particularly about the causes of the greenhouse effect and its consequences for the environment. Furthermore, the pre-test results showed that the initial knowledge about the greenhouse effect in the two groups, experimental (EG) and control (CG), were comparable. It was found that the experimental group (EG) had a better understanding of the mechanisms of the greenhouse effect in terms of the causes and consequences of global warming compared to the control group (CG). It was concluded that using ICT in well-developed didactic situations can contribute to better learning outcomes about concepts related to environmental education and it further improve the students’ understanding of the natural causes of the greenhouse effect.

2.4 STUDIES RELATED TO ENVIRONMENTAL SENSITIVITY

Dunlap & Heffernan (1975) researched the association between participation in nature-based recreation activities and environmental
concern. Participation in outdoor recreation activities was measured by presenting respondents with a list of leisure activities and asking them to indicate their rate of participation. Dunlap and Heffernan’s results indicated weak support for their hypothesis, but they noted the association between outdoor recreation participation and environmental concern needed further investigation. They maintained that strong personal attachment to an outdoor recreation activity can lead to an equally strong commitment to protect those features of the environment which contribute directly to enjoyment of the activity.

The relative contribution of eight variables in predicting responsible environmental behavior was examined by Sia, Hungerford & Tomera (1985). Seven of the eight variables were found to be statistically significant. They were:

1. Level of environmental sensitivity
2. Perceived knowledge of environmental action strategies
3. Perceived skill in using environmental action strategies
4. Psychological sex role classification
5. Individual Locus of Control
6. Group Locus of Control
7. Attitude towards pollution
8. Belief in technology

Eighth variable was one non significant variable.

Step wise regression showed that the best predictors for all respondents were variables 1, 2 and 3 stated above. Results imply that the 3 major behavior predictors (perceived skill in and knowledge of environmental action strategies and environmental sensitivity) need to be addressed in curriculum development and instructional practice.
To study the impact of participating in an outdoor educational program at resident 4-H camps in Ohio on children ages 9 to 14, a research was conducted by **Shepard & Speelman (1986)**. The experimental group participated in outdoor educational programmes emphasizing sensory awareness and basic ecological concepts, while the children in the control group did not develop significantly more positive environmental attitudes, researchers found that program length had an effect on positive environmental attitude development. Previous camp experiences, and of residence seemed to affect environmental attitudes as well. The researchers concluded that resident camp programs of five days in length have positive effect on attitudinal development and environmental sensitivity. They also recommended that campers from urban areas receive an initial period of acclimation to the natural environment before environmental concepts are introduced due to their relatively limited exposure to the natural environment on a regular basis.

Association between outdoor participation and environmental concern was studied by **Jackson (1987)**. The researcher examined whether the meaning attached to outdoor recreation participation would help clarify what it is about outdoor recreation that appears to affect people’s environmental sensitivity. This study sought to clarify the factors influencing environmental sensitivity (ES) by comparing three groups with different levels of ES on several variables: (a) claimed influences on their level of ES (b) involvement in outdoor recreation as youths, and (c) involvement in outdoor recreation as adults. It was hypothesized that groups with higher ES would be more likely to cite outdoor recreation experiences as influencing their level of ES and that higher ES groups would report being more involved in outdoor recreation as youths and as adults.

**Mayer & Fortner (1987)** interviewed college students. Both environmental and non-environmental majors cited similar source of interest in the environment. Environmental majors cited more wilderness or family
role model. Minority students differed little from non minority except that they were less likely to report positive childhood experiences. Researchers found that positive childhood experiences or feelings towards environmental destruction do not predict commitment to an environmental career. All students in the sample reported moderate or strong environmental concerns and environmental sensitivity.

It was concluded by Howe & Disinger (1988) that outdoor experiences made a significant impact on student attitudes and found that outdoor settings were effective in teaching awareness of environmental issues and environmental sensitivity. In addition, they reported that the most effective instructional strategies for developing environmental responsibility were case studies, field trips, community inventory projects and community action projects. Other effective methods include small group discussions, dilemma discussions, role playing, and the use of role models and mentoring, participation in community clubs and peer teaching.

Ramsey & Hungerford (1989) used a modified pre-test-post-test design with four groups of seventh grade receiving the Issue Investigation and Action Training (IIAT) instruction for 18 weeks and four groups receiving control instructions for 18 weeks. Data was collected via three instruments using Likert Scale type and two instruments collecting phenomenological data. The investigators found that the IIAT providing training directed at environment issues analysis, investigation and resolution promoted responsible environmental behavior among seventh grade students. The findings further indicated that IIAT promoted the specific knowledge, skills and beliefs critical to responsible environmental behavior. IIAT also significantly increased both individual and group locus of control as well as enhanced the students’ perceptions of their knowledge and skill in the use of environmental strategies. However environmental sensitivity was not increased as a result of the IIAT. Their findings established the connection between IIAT instruction and the cognitive factors influencing
responsible environmental behavior and brought up the question of what influences the affective factors influencing responsible environmental behavior.

A study to investigate responsible environmental behavior in three conservation groups in Wisconsin was conducted by Sivek & Hungerford (1989). They attempted to assess eight selected variables affecting the prediction of responsible environmental behavior, level of environmental sensitivity, perceived individual locus of control, perceived knowledge of environmental action strategies, perceived skill in using environmental action strategies, belief about attitudes towards pollution, belief about attitudes towards technology and psychological sex role classification. They found that perceived skill in environmental action strategies was an extremely strong predictor of responsible environmental behavior. Locus of control of both individual and group was also significant components. The third significant factor was regarding environmental sensitivity. They determined that major precursors for environmental sensitivity include variables associated with the outdoors and related activities, but stated that the environmental sensitivity variables may will be the most difficult of the predictors identified thus for to be affected through formal instruction.

A research study on the development of personal concern and individual commitment for the environment was conducted by Palmer (1992). Without doubt he found out that single most important category of responses at all levels is experience outdoors and particularly at young stage leads to development of environmental sensitivity.

Ford & Blanchard (1993) reported that outdoor activities can create an initial sensitivity towards the environment, the first and essential step on the path towards increased understanding of environmental process increased understanding of our places, and dependence upon the ecosystem and to action on behalf of the environment.
Links between environmental knowledge, sensitivity and environmental attitudes in high school students of Texas were examined by Bradley, Waliczek & Zajicek (1999). Study noted that students’ environmental attitudes were more positive after a ten day Environmental course. Students were pre-tested and post-tested with environmental knowledge and attitude test. The knowledge test was based on ten day course information and the attitude towards the protection of the environment. Students scored higher on the Likert type environmental attitude scale. However, pre-tested students had more positive environmental attitudes before the course started conversely. The study indicated that students with low environmental sensitivity also had low scores in knowledge.

Kalof, Dietz & Stren (2002) examined that gender difference in environmentalism reflect real and symbolic asymmetry between categorical groups in the society. Subordinate groups are to be more environmentally sensitive and express stronger beliefs and attitudes associated with environmentalism due to their greater vulnerability and having less power valuing altruism. Solidarity common resources and public good is therefore significant for them.

A study on culture and gender specific profiles of environmental sensitivity was conducted by Raushdeep (2004). The study had two aims. First was to compare the profile of environmental sensitivity among two culture communities. Second was to analyze gender difference in environmentalism as moderated by culture. Study tested the hypothesis of asymmetry along two dimensions: language (Estonian as the dominant language) and gender (supposed male dominance). According to hypothesis, subdominant social groups expressed greater environmental sensitivity as a compared to the dominant groups. Men and women had also different patterns of environmental sensitivity. As hypothesized, gender differences among Estonians were more pronounced than among non-Estonians.
Bodur & Sarigollıı (2005) studied environmental sensitivity in a developing country. In this study the investigators investigate the relationship between Turkish consumers’ attitudes and their behavior towards the environment. A multistage area sampling procedure was used to select thousand residences in Istanbul at which at home personal interviews were conducted using standard surveys. A consumer cluster analysis based on behavior towards the environment was conducted and three distinct segments were identified: active concerned, passive concerned and unconcerned. For each cluster, attitudinal, demographic, socioeconomic and leisure activity profile were delineated. Attitudes toward specific behavior were found to be the best predictor of behavior, followed by general attitudes, education and locus of control.

Thakur (2012) in her study concluded that science students exhibited very high degree of environmental awareness than the students opting for humanities. Female science students have more environmental sensitivity towards environmental issues than male science students.

Chen & Zheng (2015) compared people’s sensitivity to environmental change in China, Japan and South Korea across spatial and temporal dimensions by analyzing the data derived from a cross national survey. Based on the analytical results derived from 3907 samples, the consistency of people’s environmental sensitivity on the temporal dimension and the gap on the spatial dimension were clarified. The analysis on the temporal dimension indicated that people were inclined to hold a consistent evaluation toward environmental change, while the analysis on the spatial dimension of environmental sensitivity indicated that people were more sensitive to the deterioration of global rather than domestic environmental change. Data analysis also indicated that Japanese and South Koreans were pessimistic regarding the change of the environment while the Chinese were optimistic.
2.5 STUDIES RELATED TO ENVIRONMENTAL AWARENESS

In India, introduction of ten year school curriculum envisages teaching of Environmental Studies from the beginning of school education (NCERT, 1975). The concept of environmental studies though not alien to the field of education yet has a specific purpose during the present period of environmental crisis and deterioration. The primary education being the terminal point for most of the children of our country, the main objective of introduction of environmental studies in school curriculum is to develop an awareness and understanding of environment and problems related to it. Through understanding of environmental crisis children will develop both skills and attitudes for better adjustment with environment.

A study in environmental approach of teaching at primary level was conducted by Rajput, Saxena & Jadhoa (1980). The objectives of the study were to study the existing awareness towards the scientific and social environment in children, and to identify the community resources that can be gainfully utilized for teaching. The study revealed that only one of the four groups was significantly different on environmental awareness at the present stage. Experimental groups were significantly better than the control groups. The difference between control groups on a traditional achievement test was not significant.

Gupta & Rajput (1981) examined the awareness of environment among rural and urban schools and non-formal education centers, with the help of 20 rural, 35 urban and 60 non-formal centre students of class IV. It was found that school going rural children did better than the urban sample. Also non-formal centre students were more aware about environment than urban students. In this study the components of environment in which students of these three groups were lacking or well acquainted were also identified.

The environment awareness and attitude of students was compared by Deopuria (1984) when they were taught by the traditional method and
environmental approach. The results revealed that the students who have gone through the environmental approach, showed a considerable improvement towards environmental awareness than those who studied through traditional method.

It was suggested by Treagust (1985) that there is need for including topic noise pollution in the science curriculum and he also described different activities for improving students’ awareness and understanding of a concern for noise and its effects.

Saxena (1986) observed Environmental Education as a process to promote the awareness and understanding of the environment, its relationship with man and his activities. It is also aimed at developing responsible actions necessary for preservation, conservation and improvement of the environment and its components. According to him there are three concepts of Environmental Education: (a) about the environment (b) from the environment and (c) for the environment. When the environment is used as a vehicle for gathering concepts, knowledge and skills related to specific academic disciplines, it is learning about and from environment. And finally the development of attitudes, skills and evaluation abilities for the proper use and the development of Environmental Education is education for the environment.

Rajput (1988) did a sequel to “project environment” encompassing environmental studies I and II for identifying the concepts, teaching skills and strategies for their inclusion in the teacher training programme at the primary level. From the mean scores of environmental awareness for the experimental and control group, out of 14 groups nine groups had a significant difference as a result of the treatment.

Nat (1990) conducted a study on the Environmental Education to develop an awareness of and responsibility for the environment at present and in future. He concluded that this could be achieved by bringing environment to school and as well as school to environment. Shanawaj
(1990) worked on the environmental awareness and attitudes towards environmental issues of secondary and higher secondary school teachers and students at Udaipur. He found that there was a very high level of awareness on the part of teachers and students regarding the environment oriented curriculum. It was found that 95% teachers and 94% students possessed positive environmental attitudes. The trained teachers and untrained teachers about concepts of environment did not differ in their attitude. Girls possessed significantly more awareness of the environment than boys.

Praharaj (1991) conducted a study on environmental knowledge, attitude, awareness and perception regarding Environmental Education among pre-service and in-service secondary school teachers and he concluded that:

1. The level of environmental knowledge was found low among pre-service teachers, although conceptual knowledge was moderate.

2. Among the in-service teachers, environmental knowledge was moderate and factual knowledge about the environment was low.

3. Both the groups differed significantly in their level of environmental knowledge. They had a favourable attitude towards Environmental Education although the in-service group had a higher level of attitude than that of the pre-service group.

4. There was a moderate correlation between environmental knowledge, environmental awareness and environmental attitude.

5. Teachers perceived that Environmental Education could be core part of ‘social science’ and ‘general science’ also and science subjects in secondary schools as well as mass media have a potential role to play in imparting Environmental Education.

Environmental awareness was studied along with environmental knowledge and concern by Hausbeck, Milbrath & Enright (1992). In this study, the researchers concluded that awareness and concern scores for
environment were significantly higher than knowledge levels in high school students. They linked this result with the fact that a primary source of environmental information is electronic media, whereas awareness and concern can be picked up with little substantive knowledge.

The level of population awareness was not related to the attitude towards Environmental Education. This was concluded by Kaur (1992) in her study related to population awareness in relation to attitudes towards Environmental Education and population education of professional teachers. She also found that in the case of both males and females no differences existed in the population awareness of different categories of teachers and sex difference existed in the population awareness of different categories of teachers.

Environmental awareness among the teacher trainees was examined by Padhan (1994). Environmental Awareness Test (EAT) was used in the study and it revealed variation in environmental awareness between the urban and rural teacher trainees where former group scored significantly higher than the later. Post graduate trainees exhibited higher environmental awareness compared to under graduate trainees. It was concluded that higher the educational qualification, more the awareness relating to environment and its problems.

It was studied by Simpson (1995) that students’ awareness of nature and environmental issues can be increased by providing an interdisciplinary curriculum for environmental issues, encouraging students to use a variety of current nonfiction sources for research activities and by encouraging students to work together on environmental issues in small groups.

Madsen (1996) emphasized the concept that awareness is the ultimate driving force that stimulates knowledge. The acknowledgement that an environmental problem exists entails being more cognizant of the facts about the state of the environment. This degree of environmental awareness involves a personal commitment to work to solve environmental problems.
He emphasized the power behind the awareness factor by categorizing three levels of awareness as: basic belief of an environmental problem, factual and scientific knowledge, and a commitment to solve environmental problems.

A research work by Pareer & Sidana (1996) was done on environmental awareness among the teacher trainees. The findings of the study revealed 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 degree and belonging to science group had significantly higher environmental awareness than all other group of subjects. Besides there was significant difference in the environmental awareness between urban and rural teacher trainee and was in favour of urban teacher trainee.

A Study of adolescents’ environment awareness in context of religious attitude, scientific attitude and scholastic achievement was conducted by Gupta (1997). The study was conducted on 500 students of class XII of Hadoti district. He concluded that the effect of religious attitude on environmental awareness was not found significant and the effect of scientific attitude on environmental awareness was found significant. Further, it was found that urban students were environmentally more aware than rural students. The effect of sex on environmental awareness was found significant. The girls have been found environmentally more aware than boys.

The need for teacher training can hardly be over emphasized at the present juncture. Special training and commitment is required in brining an environmental thrust to education and developing environmental awareness. This is a new focus which might not have been developed in the rest of their educational career. This was suggested by Jagadeesh (1999) in his study conducted on Environmental Education in teacher training.

It was stated by Athman & Monroe (2000) that awareness and knowledge of environmental processes and systems play an important role in
Environmental Education. Further they stated that, these were not the only factors affecting the behavior outcome. Behavior is what people do, whether it is environmentally appropriate or inappropriate. Behavior in general is supported by knowledge and attitude but there is not a direct cause-and-effect progression from knowledge to attitude to behavior.

It is now a well established fact that the temperature of world’s atmosphere has been increasing at an alarming rate. In the history of the world, the hottest ten years so far have been recognized after 1982. The 1990’s decade has been recording hotter than that of the 1980’s decade. In the last one year the earth’s surface has increased by 0.43 degree C. It has created a problem called global warming which is the most concern for one and all. Also it has put challenge before scientists, researchers, educationists and environmentalist to make people aware about this problem and to find a solution to this problem. This was reported by Verma, Lonere & Verma (2000) in their study on ‘Global warming – A challenge’.

The environmental attitude and pre-environmental behavior among secondary school children was examined by Abraham & Arjun (2006). They used Environmental Attitude Scale (EAS) developed by them for the purpose of the study. The mean and standard deviation for the total sample and relevant sub-samples based on the sex and location were computed and the group of comparisons was done by applying t-test. A gender difference was noticed with respect to environmental attitude of secondary school children; boys possessed better environmental attitude than girls.

A study on the awareness of the environmental education of the trainees of secondary teacher training was conducted by Kumar (2006) on 80 male and 80 female teacher trainees. The awareness scale was used as tool to find out their awareness on Environmental Education. The study was conducted in two B.Ed colleges. No significant differences were found in the environmental awareness of male and female students.
A study conducted on 300 pupils from six schools of Coimbatore city revealed that environmental awareness among students and teachers can be enhanced by the heads of institutions by motivating the teachers to make use of innovative techniques in teaching, by providing facilities such as tape recorder, radio and multimedia package to the teachers in rural area, by encouraging the pupils to listen to the radio programme and television programme related to environment and involve in quiz programme. It was examined further by Annakodi (2008) that special in-service training programmes on Environmental Education are to be organized for the teachers of all the grades. Educational and software packages about Environmental Education is to be developed for lower to higher levels of school education.

In a research done on awareness of teacher educators about environment for protecting human health and quality of life, Rosaline (2008) revealed that majority of the teacher educators had limited awareness and importance of Environmental Education, quality of life and how to protect human health. Keeping the findings of the present study, it was proposed that the entire education system in general and teacher education in particular needs an immediate reorientation in the curriculum towards Environmental Education. The education programme (B.Ed.) of secondary level pre-service teacher curriculum should be based on the following philosophy; “Education for the environment which is concerned with attitude and values for the environment”.

Sridevilalam (2008) conducted a study on awareness towards environmental concepts among students through co-curricular activities. The results of the study showed that strict formation of eco-clubs and endorsement of responsibility to perform the activities would yield proper results and give scope to the other students to follow the same through which they would find out the importance of environmental values. It was further suggested that the teacher should conduct as many co-curricular
activities like drawings, posters, charts, cartoons, maps and role plays to give maximum awareness and to develop competitive spirit among students on regional environmental problems. The printed media and community are to be utilized for acquisition of knowledge and skills required for living eco-friendly.

A research on the effects of instructional methods in the new Biology curriculum on ninth grade students’ environmental awareness was conducted by Nisanci (2010). The findings showed that the instructional methods used in the new Biology curriculum were more effective in enhancing ninth grade students environmental awareness than the traditional method.

A survey on secondary school students’ environmental awareness was conducted by Sulaiman, Hassan & Noordin (2010). The findings revealed that level of environmental awareness in female students were higher than the male students, environmental awareness in science stream students were higher than the arts stream students, and the urban school students had higher environmental awareness than the suburban school students.

Astalin (2011) conducted a study on environmental awareness among higher secondary students and some educational factors affecting it. This study examined that students of 11th and 12th standard were identical as far as their environmental awareness was concerned. Science students had more environmental awareness in comparison to arts students because of the giving more importance on their curriculum framing pattern and their way of social relationship between members of the family may give a lot of values to them. Students following CBSE curriculum had more environmental awareness in comparison to students following UP Board curriculum, because of the rich educational climate of CBSE schools as compared to the UP board schools. Students belonging to undergraduate and post graduate group had more environmental awareness in comparison to high school students and the male students had more environmental awareness in comparison to female students because of the male students of higher
secondary school are normally much attached with the society so, they are having more environmental awareness.

An analysis of environmental awareness and responsibilities among University students was done by Selvam, Abdul & Nazar (2011). It was observed that majority of the students and not all the students are having environmental awareness and responsibilities. It was the duty of Central and State Governments, public and private companies and NGO’s to take initiatives to create more awareness about global warming, natural disaster and environmental degradation. State and Central Educational Departments should allocate more funds to organize conferences, seminars and workshops for creating awareness about environment among students at school, college and university level and insist of all faculties to teach, motivate and inspire the student community. It was suggested that special attention must be given to train the non-science faculties with suitable curriculum so that they can initiate the field level studies. Faculties have greater responsibility of raising the awareness and understanding of environmental issues among students.

The research study conducted by Dave (2012) on the environmentally appropriate behavior and awareness of students of Udaipur and GautamBuddh Nagar city concluded that sex and level of education would improve the level of awareness and attitude regarding to environmental issues. Research findings show that even though students take many courses on the environmental issues, their environmental awareness and environmentally responsible behaviours are lower than the expected and students’ grades show no significance on the results. It was concluded that since environmental knowledge do not always influence awareness and behavioural intentions, a strategy has to be chalked out on national level for Environmental Education in higher education, and current curricula should be reconsidered in terms of effectiveness.

A research on 100 voluntarily participants from three pre-service teacher training institutes of India was carried out by Jena (2012) to find
effect of awareness, openness and eco-friendly (AOE) model. Pre-service teachers were taught on how to use eco-friendly model. The main finding, of AOE model was effective for pre-service teachers, and it enhanced awareness to think for the environment. The participants shared openly their ideas and information for the implementation of environmental education. The AOE model has significant effect directly and indirectly on pre-service teachers, various eco-friendly practices and healthy living habits.

A study based on survey method and stratified sampling was conducted. It was studied that in the higher secondary students of Jabalpur, environmental awareness of the boys ranged from 19 to 51 percent pursuing different disciplines in the schools affiliated to M.P. Board and CBSE, while that of the girls varied from 21 to 51 percent and from 19 to 51 percent in the schools attached to both the Boards, respectively. It was further examined by Singhal & Verma (2012) that the students affiliated to Central Board of Secondary Education (CBSE) recorded significantly higher environmental awareness than those affiliated to the M.P. Board across all the disciplines and both the genders. The impact of quality of the syllabi imparting Environmental Education was found to be minimum for students studying in the discipline of humanities and the maximum for those studying in the discipline of mathematics or biology.

Kant & Sharma (2013) studied environmental awareness of secondary school students of Faridabad district (Haryana). A sample of 100 students was taken by using non-probability purposive sampling technique. Two tools, namely Environmental Awareness Ability Measure (EAAM) and Group Test of General Mental Ability (GTGMA) were used to collect data. Mean, median, SD, t-test, product moment correlation and significance were used for data analysis. Boys and girls were found not to differ significantly on environmental awareness. Rural students were found to have significantly more environmental awareness than their urban counterparts.
Ghosh (2014) studied environmental awareness among secondary school students of Golaghat district in the state of Assam and their attitude towards Environmental Education. He concluded that secondary school students of Golaghat district in the state of Assam possess strong positive correlation between studied environmental awareness and their attitude towards Environmental Education. The reason behind this fact was attributed that Environmental Education has been introduced as a compulsory subject in the curriculum.

Chakrawarthy (2015) revealed that the intervention programme which includes scholastic and non-scholastic activities has a significant effect on the development of awareness on environmental pollution among school students. The intervention programme including Environmental Education topics help the school teachers in improving environmental awareness among students.

2.6 STUDIES RELATED TO ENVIRONMENTAL ETHICS

An Environmental Education programme was conducted, which focuses on nature in Indian myths. The programme involved story telling, free association, play acting involving the members of audience, dancing and sharing of artifacts. It was found by Michael (1984) that the participants developed a good knowledge about environmental ethics.

A critical study of the conception and perception of Environmental Education was done by Sahoo (1992). The philosophical method employing intuition, introspection, reflection and speculation were used with regard to available literature. During the study, field visits and dialogues with selected groups of authors were conducted. It was concluded from the study that the concept of the environment is broadly divided as natural and man-made types. The fusion of different types of environment forms the holistic concept of environment. The relationship between man and environment is symbiotic in nature. Efforts are continuing with regard to environment management, with focus on unity of life, sustainable development, and
human welfare, futuristic and cultural progress. Self-management and environmental ethics perceived as the best formula for good environmental management. Environmental Education is a broad concept and it is perceived as life long experience for all.

Lalonde (1998) did a comparative study of environmental attitudes and religious beliefs of people. The findings suggested that there is a relationship between environmental attitudes and religious beliefs. An unexpected level of unity was revealed in the respondent’s collective contribution to devising a global environmental ethics. A number of principles or concepts appear to represent common ground for an interface between two distinct domains: ecology and spirituality.

To investigate the urban middle school students’ moral reasoning about environmental situation, a study was conducted by Hough (2003). It was suggested that values and ethics should be included in the Environmental Education as they play a central role in the consideration of environmental problems. The findings suggested that care orientation had a stronger influence than gender and race in case of environmental dilemmas on moral reasoning. The study provides information that gender and race have influence on the reasoning power about moral prospective on environmental issues. The findings of the study have great influence to the middle school educators as they can design and implement environmental curricula in such a way that it help students to understand and evaluate environmental issues in a better way.

Khadija (2004) concluded that Islam shares similar fundamental principles to those underpinning “eco centric” perspectives emerging in the west. The conceptual teaching technique from west can help to develop environmental ethics in Islam.

It was found that environmental ethics level is higher in the students from rural than urban region. This was concluded by Selvan (2005) in his study. He also concluded that the girl students possess high environmental ethics level.
Flower (2006) studied environmental awareness and environmental ethics of higher secondary students. The results showed that students from rural areas possess more environmental awareness and environmental ethics than urban students.

It was discovered that experimental-narrative method is more effective than story telling method in Environmental Education and ethics learning. The study conducted by Ling (2006) also revealed that students’ life style changed as eco-friendly as the result of the study.

It was suggested by Mario (2006) that modern society will find no solution to the ecological problems unless it takes a serious look at life style, an education in ecological responsibility becomes essential to change the thought and behaviour and to infuse environmental ethics in people. Prayoon (2008) concluded that Environmental Education teaching process using ethics infusion can develop environmental knowledge and environmental ethics in students. A study on the approaches regarding environmental ethics in pre-service teachers studying in pre primary school education, elementary school education and science education was conducted by Oztuna (2009). The result revealed that no significant difference was found between and among the three teacher education programmes. The pre-primary education teachers participated in an environmental course have higher level of eco concentric concern and environmental ethics. It was concluded by Ryerson (2010) that environmental ethics lessons and programmes for daily life should be included in social and educational process to overcome the dangerous issues related to environment in future.

The relationship between environmental moral reasoning and environmental attitudes of pre-service science teachers was studied by Busra et al. (2011). The study was conducted on 120 pre-service science teachers. For data collection, environmental attitude scale was distributed to the participants on whom study was conducted. Constant analysis was
carried out on the written statements of the participants and each statement was coded as eco-centric, anthropo-centric or non-environmental. The results revealed a significant positive correlation between ecocentric moral reasoning and environmental attitudes, whereas there was no statistically significant relationship between anthropocentric or non-environmental moral reasoning and environmental attitudes. Finding of the study supported the argument that an environmental ethic, which extends moral consideration beyond human beings to the nature as a whole is necessary to overcome many of the environmental problems.

Omran & Yarmohammadian (2014) highlighted that the development of attitudes and values about environment cannot be based on the superficial program and systematic attitude should be employed in this context. This includes the use of awareness raising indicators along with variation of intrinsic ethical motivations that comes from human unconscious mind and in addition to education, transfer of awareness should take advantage to the change in environmental attitudes and ethics in form of formal and informal training.

Aziz & Singh (2015) conducted a comparative study on environmental ethics of teachers teaching in primary schools of Kaushambi district. This study tried to describe the environmental ethics of teachers teaching in primary schools of Kaushambi district. For this 160 primary teachers teaching in various government and private primary schools of Kaushambi district of Uttar Pradesh were chosen as sample for the study. Cluster sampling method was adopted in the study. The tool used for the study was Environmental ethics scale constructed and standardised by Haseen Taj. After analysis of data important conclusions were as: 1. There was significant difference in environmental ethics scores of male and female primary teachers teaching in Kaushambi district. Female primary teachers had more environment ethics. 2. There was significant difference in environmental ethics scores of government and private primary teachers

83
teaching in Kaushambi district. The environmental ethics level was greater in government primary teachers’. 3. There was no significant difference in environmental ethics scores of rural and urban primary teachers teaching in Kaushambi district.

2.7 STUDIES RELATED TO ENVIRONMENTAL ATTITUDES

An investigation to find the effect of residential background, age and gender on ecological attitude, value orientation and environmental perception in a sample of 180 school students was carried out by Singh & Pathak (1966). A 2 (age group) × 3 (area urban, rural, urban factory) × 2 (gender) design with 15 participants per cell was used. Male perceived nature as positively good and sensuous. Males had greater environmental awareness than females. Urban people had more positive environmental perception than rural people. The perception of older people was positive than those of younger. Males had more positive perception than females. The component of value orientation and ecological awareness were found to be significantly related.

Misah (1980) conducted a survey on environmental attitude of teachers from western region. In-service secondary school teachers, admitted to summer school cum correspondence courses of Regional College of Education, Bhopal were administered Likert type environmental attitude scale prepared by the investigator. It was found that respondents had positive attitude towards environment. They had positive attitude towards population problem and agreed that population education and Environmental Education should be included in the curriculum. High percentage of respondents had positive attitude towards pollution problems and conservation of natural resources.

According to Arcury & Timothy (1987), education is a key variable on environmental attitudes. Almost all research on environmental attitudes found that highly educated respondents always have more pro-environmentalist values than lower educated respondents. Environmental
knowledge and education are closely associated to each other. An understanding of modern environmental issues requires high level of environmental knowledge, and likelihood of high environmental knowledge is correlated to high level of education. The effect of education on environmental attitudes is not only direct, its effect is also indirect.

The attitude of secondary school students towards environment was analyzed in a study conducted by Nikunja (1990). It was found that all students had a positive attitude towards environment. It was examined further that the girls show more positive attitude towards environment as compared to boys.

The effects of individual demographic characteristics are correlated to each other. This was reported by Freudenburg (1991) in a study conducted by him. He further studied that the effects of education, income, and occupation on environmental attitudes were interrelated with age and residence. He found that urban residents were more environmentally concerned than rural residents because urban residents seem to be more likely affected by environmental problems (air and water pollution etc.) than rural residents. He further concluded that “the well educated, tend to be young and urban residents suggest that much of the gross effect of education on environmental beliefs might be spurious”.

Womens’ attitudes concerning their understanding of and relationship to the environment in relation to Robert Kegan’s structural clinical development model of ego development, using a randomly selected sample of 27 women between the age of forty and forty nine from a Massachusetts town was studied by Greenwald (1992). Ways of thinking about the environment were differentiated qualitatively according to ego stage. External illustration of stage distinction focused on the women’s feelings of relationship/connection to the environment, including the impact of religion and spiritually on their attitudes, and on their presented rationale for their environmentally responsible behavior.
The environmental concern was a reasonable predictor of environmental behavior intention and that socio-demographics had relatively little or no influence on environmental attitudes. These findings were indicated by McGuire (1992), while investigating the relationship between the affective (environmental concerns) and conative (verbal intentions) components of attitudinal construct among college students. His study and many others studied on Environmental Education have focused on the cognitive to affective aspects or the affective components relationship with the conative components. However, not many studies have focused on a total attitudinal model to examine predictors of proactive behavior.

Orr (1992) reflected upon the concept of forming attitudes in order to build on ecological literacy. This ecological literacy should not be interpreted as the knowledge of facts and concepts only, but “the knowledge necessary to comprehend interrelatedness, and an attitude of care or stewardship”. Therefore knowledge, the attitude of caring, and a practical competence are the basis of an ecological literacy.

Stern, Thomas & Linda (1993) discussed gender effect of environmental attitudes. Their findings revealed that female respondents were less environmentally concerned than male respondents.

The direct and indirect effects of the students’ background characteristics, institutional characteristics and college experience variables on environmental attitudes were studied by Quimbita (1994). A causal model was developed based on higher education, literature and environmental attitude research, to explain the development of environmental attitudes in the college students. The findings recognized that the number of science courses and human ethical/social activists’ values play an important role in the development of a positive attitude towards the environment. Furthermore academic and social integration directly influence the development of environmental attitude mediated by human ethical/social activist values.
Wilson (1994) created a positive attitude and values about the word of nature and sense of responsibility towards the natural development through Environmental Education at the early childhood level.

Roli (1995) studied the awareness and attitude of teachers and students of high school towards Environmental Education in Jabalpur district. The major findings were that government and primary schools differ significantly on their environmental awareness in favor of private schools and the boys and girls differed significantly in favor of boys. Male and female teachers differed significantly in their environmental knowledge in favor of teachers. The urban and rural teachers also differed significantly on their environment knowledge in favor of teachers. The urban and rural teachers also differed significantly on their awareness of environmental problems.

Sherlock (1995) conducted a research on the environmental attitudes and behavior of grade eighth students. In this, five case studies were presented which portrayed the live experience of the adolescence. Information was collected through the use of personal journals. This thesis concludes with a discussion of the need for qualitative research in Environmental Education and gave recommendations for improving the commitment to environmental action within adolescents.

The effect of environmental science curriculum on secondary school students’ environmental knowledge and attitude was evaluated by Jennifer (1996). The results showed that environmental knowledge and attitude developed in the students as a result of the learning through environmental science curriculum.

A significant difference in the environmental attitudes between Chinese students and American students was found by Liu (1996) in a research conducted by him. The Chinese students revealed stronger positive attitudes towards environment than the American students.
Age is another factor that affects environmental attitudes. Younger persons are more environmentally concerned than older persons because environmentalism is an appropriate outlet of younger persons’ relatively low commitment to the social order and lower regard of dominant value system. This was concluded by Stuart, Cottrell & Alan (1997) on the basis of a survey conducted by them.

An exploratory study regarding children’s exposure to the natural environment and their environmental attitudes was conducted by Surbrook (1997). The result indicates that environmental attitudes vary at different age levels. The seven year old children’s environmental attitudes mean score being the highest of the three groups i.e. four years, seven years and ten years old children.

A study was performed with sixth grade students in Canada who attended a week long residential environmental camp called Sinship Earth. The participants were surveyed by Eagles & Demare (1999) on their moral and ecological attitudes before and after the program. The camp results did not indicate a significant change in the students’ attitudes. Although the researchers were surprised with this finding, they noted that the students had a moderate level of environmental experiences before they began the Senship Earth program and the program duration was short. Also they noted that families had an influence on attitude. However, this study also suggested significant influences from media on positive environmental attitude.

Corral & Armandariz (2000) studied environmental attitudes and beliefs across cultures or countries. The purpose of this study was to expand the extent of environmental attitude research in different countries while searching for significant predictors of policy support. This study examined the extent to which general environmental attitude and more specific environmental concern predict policy support in three different countries.
A study to examine the status of basic understanding in Environmental Education and attitude towards environmental issues among the upper primary school students from Mysore was conducted by Sunnetha (2000). In all, 174 students from four schools constituted sample for the study. A post-test parallel group design was followed in the experimental study in which basic understanding test in Environmental Education and a scale of attitude towards environment were developed and used to pool that data in five basic components of environment viz. biosphere, air, water, soil and energy. ANOVA, Duncan’s Multiple Range Test and stepwise multiple regressions were followed to analyze the pooled data. The study observed that experimental treatments, using specially designed supplementary curricular program is significantly much effective in developing favourable attitude towards environment among the school children.

Caste, educational qualification and working experiences have a prominent role in determining the environmental awareness among adult education organizers. This was concluded by Kumari & Surendra (2002) in their study conducted on the attitude of adult education organizers towards environmental awareness. They found no significant differences in the adult education organizers attitude towards environmental awareness with regard to gender and age.

Hsu (2003) surveyed by means of questionnaire, data randomly collected from a sample of college students in Taipei city of Taiwan. Seven major scales of variables were measured: socio-demographic characteristics, situational factors, personality variables, perceived external and internal barrier to action, environmental attitude, perceived self efficacy towards action and appropriate environmental behavior. Significant correlations were found between environmental attitude and three of the social structural variables: external barriers experiences predictor followed by knowledge of environmental issues. Environmental concern was moderately correlated with responsible environmental behavior but did not contribute significantly
to the regression model when socio demographics were added to the model; stand on political issues added another to the two percent to the variance explained.

A study was conducted on environmentalism in the Middle East. A significant difference in attitude towards preservation and conservation according to respondent's country, gender, social class, family income and personal environmental efficacy was found. The empirical findings by Albelia (2004) indicated that levels of support for the environment in Middle East were in line with Inglehat’s (1995) theses of environmentalism in which severity of environmental problems create trends of public support for environmental protection in rapidly developing countries.

Anu (2005) carried out an exploratory investigation to determine the attitudes of student teachers and teacher educators towards environment and perception of Environmental Education. The results of the study revealed that teacher educators possess more favourable attitude towards environment than student teachers. However, teacher educators teaching social science, language, and science in Colleges of Education located either in urban or rural areas did not show any marked difference in their attitude towards environment. It was also concluded that female student teachers have been found to have higher positive attitude towards environment than male student teachers. Rural and urban student teachers were not found to differ in their attitude towards environment. Student teachers from science stream were found to have a favourable attitude towards environment followed by social science and language student teachers. Rural male and rural female; rural and urban student teachers opting social science and science were not found to have much difference in their attitude towards environment. Similarly urban student-teachers of social science, language and science subjects and rural student teachers of social science and science were found alike in their attitude towards environment.
Similarities and differences in environmental values and attitudes between two cultural groups- Chinese in Canada and Anglo-Canadians was examined by Gordon (2006). The result indicates that Chinese were more supportive of social altruistic values than are Anglo-Canadians. However, the two groups were not significantly different in biosphere values. The findings of this study also endorse some previous researches that propose that value orientations may be more helpful in understanding environmental concern than socio-demographic variables such as age, education and income.

A study on the sample of 227 student teachers consisting of 145 girls and 82 boys was conducted to find out the students teachers’ attitude towards environment and environmental issues. Participants were students of Faculty of Education of Pamukkale University, in Turkey. The investigator Gul & Kutret (2006) found that there was not very high attitude towards environment and environmental issues among the students. The environmental attitude was found to be greater for girls than the boys. The study revealed that occupation of the mother affects the environmental attitude of the students. The attitude towards environmental issues differ based on age, and number of siblings, but it was found that the father’s occupation, their house, parents’ education level, families’ economic status do not affect their attitude towards environmental issues.

Turkish students’ attitudes toward the environment and their interest in learning about environment protection with respect to gender were examined by Cavas et al. (2009). Their study was conducted on 1,260 students in 9th grade in Turkey. The findings of this study revealed that Turkish students have favorable attitudes toward environmental issues, students were eager to find solutions to environmental problems and show optimistic trends about the future, students’ interests in learning about environmental protection issues were of moderate level, and statistically significant differences were found in environmental attitudes and interests in
learning about environmental protection mean scores of students regarding gender.

Sacit et al. (2011) assessed the attitude towards environment of undergraduate students at the end of the course “Environment, Human and Society”. They found that the undergraduate students had positive attitude towards the environment as regard to their gender and faculty types. Male students were less sensitive towards environment than the female students. They further concluded that in our education system from pre-school to secondary school, curriculums cover environmental science education as main subject or integrated. In higher education only, few departments include environmental science course such as biology, science education, environmental engineering etc. On the other hand, many departments of social science, medicine and economics do not include environment issues in any way. Now-a-days, environmental problems have increased rapidly, hence, educating people is the main way to reduce environmental problems by creating consciousness and sensibility towards environment.

Hasan (2012) concluded from the research that environmental attitude and awareness can be developed in the secondary school students if proper guidance and counseling is given to them about environment and environment related awareness programmes. The key to successful implementation of any programme are the teachers and the teachers should also themselves be aware of environment issues.

Panth, Verma & Gupta (2015) found that undergraduate students develop positive attitudes towards the environment as regard to their gender and faculty types. It was emphasized that female students were more sensitive towards environment than male students. It was further concluded that boys have more positive attitudes than girls towards environment issues.

2.8 AN OVERVIEW OF REVIEW OF RELATED LITERATURE

The review of related literature helped a lot in developing a wider perspective of the variables selected for the study. The investigator searched
different types of studies and reports conducted in India and abroad related to the topic. Review of the studies done in India and abroad reveals that many studies have been done on the environmental education, environmental problems, environmental knowledge, school teachers’ attitude towards environment, investigation of undergraduate students’ environmental attitude, and perception among pre-service and in-service secondary school teachers about Environmental Education, etc. Studies conducted by Saxena (1986), Gupta (1986) and Gopalakrishnan & Sarojini (1992) point out the following facts related to Environmental Education -

- A wide need of environmental awareness in students.
- Need of environment based curriculum.
- Need of practical knowledge to face environmental problems/ issues.
- Need of implementation of Environmental Education Programme in schools.

The studies of Michael (1984), Mario (2006), and Oztuna (2009) pointed out that environmental ethics are not widely explored in human population. So, there is an urgent need to develop environmental ethics in students and in elders to reduce environmental problems faced by living beings of today and tomorrow. The review of literature related to Computer and Electronic Media based instructional studies conducted by Singh (1995), Madanakumar (1998) and Antonysamy (1989) revealed that Computer and Electronic Media based instruction is a good strategy to transfer wide environmental knowledge to a group of students.

After the analysis of the reviewed studies, the investigator found out that very few studies with direct involvement of Electronic Media and ICT were conducted for strengthening the environmental sensitivity, awareness, ethics and environmental attitudes in classroom situation. All the studies referred in the reviewed literature show that the field of Environment Education needs special attention of the researchers. Still conclusively, it is realized that use of ICT in providing Environmental Education can bring everlasting and enduring changes in the mind of pupils.
Moreover, the investigator could not find any study where Environmental Education Programme utilizing ICT developed to see its effectiveness in influencing environmental sensitivity, awareness, ethics and environmental attitudes among secondary school students. Obviously, it is a valid ground for undertaking the present study. The conclusion drawn from the review of the related literature motivated the investigator to carry out the present study. This review also helped the investigator to have a clear perspective of the problem chosen for the present investigation. It also resulted in providing insight into the selection and use of effective methods for data analysis and interpretation.

The main function of citing Review of Related Literature is to provide base for developing a framework and insight into the methodology. The investigator highlights the details of the work carried out during the study in chapter III i.e. Plan and Procedure.