Review of Related Literature
CHAPTER – II

REVIEW OF RELATED LITERATURE

The review of related literature is an important aspect in the planning of the new study. It helps the researcher in knowing about the work already been done and provides suggestions for new work. The review of research studies have been presented in five sections.

2.1 Research studies related to outdoor education.
2.2 Research studies related to critical thinking.
2.3 Research studies related to social skills.
2.4 Research studies related to responsible environmental behaviour.

2.1 RESEARCH STUDIES RELATED TO OUTDOOR EDUCATION

“There’s no way that we can help children to learn to love and preserve this planet if we don’t give them direct experiences with the miracles and blessings of nature.”

Olds (2001)

Blomberg (1967) conducted a study to prove the value of direct experience of teaching out of doors in United States. Children were taken on short field trips and excursions and their attitudes and behaviour as well as their accomplishments were evaluated. Trips ranged from 10 minutes to two hours with a VI grade class. The experiments took place for a period of 9 years (1955-1964). Experiences were on subject areas such as Science activities, Mathematics, Language Arts, Social – Studies, Art and Music. The results of the activities were recorded by the writer in the form of notes on the reactions, discoveries and creativity of the children. It
was concluded that direct experience reaching in the out of doors resulted in broader and richer educational opportunities and provided a better climate for learning.

Clarke (1967) performed a study on pupils of 11-15 years of age of determining the value of field study. He found for the group he tested that in all cases tested, and for every test given, the outdoor classes were superior to the corresponding indoor classes. The ability to write biological answer in good lucid English was enhanced by field study. The pupils found the work pleasurable, they conducted themselves more co-operatively, they discussed their work, and the younger ones (11-13 yrs.) derived more benefit from it than the older ones.

OCP (1975) reported in California University, Department of Education, and the measure of the longitudinal impact of outdoor education on the attitudes of the children. Surveys were received from 449 students. Ten topics were presented by questions on the instrument including: interest in natural sciences, appreciation of the environment, peer and cabin leader relationship, interest in camping, impact on attitude toward home responsibilities, feeling about conservation/preservation and potential value of outdoor school for other students. Overall the Orange Country data indicated a positive impact of outdoor experimental education on the students. Pie charts displayed students’ responses that indicated: increased interest in natural sciences was developed by 59% of the students; 80% of the students increased appreciation for the environment; 77% of the students increased positive feelings about conservation and preservation of wilderness and national forests areas; 76% of the students felt that the experience raised their interest in camping and other outdoor activities; 95% of the students felt that the experience is one that every sixth grader should have.

Cobb (1977) described how children use their active imaginations to engage with their surroundings, creating stories as a
means of understanding themselves and their world. The development of imagination and a sense of wonder have been positively linked to children.

Bryant and Hungerford (1979) analyzed the effects of environmental instruction on two primary classes. For three weeks therefore, the experimental group received activity-oriented instruction on pollution and solid waste. The conventional curriculum taught to the control group did not involve environmental issues. The treatments were then reversed. Each child participated in an interview consisting of four knowledge and opinion questions asked before and after the treatment. The evaluators reported a significant change and suggested that the children were capable of forming concepts concerning environmental subjects.

Iozzi (1981) reported that much of the action activities dealt with minor environmental problems (picking up of litter etc. and those activities ought to focus on more serious problems) not only enhanced environmental knowledge but increased students' sensitivity towards the environmental problems and their possible solutions.

Ballard and Pandya (1990) revealed the fact based on their research that the concepts of environmental education could be better understood by providing the direct experiences at earlier grade levels. If one wishes learners to develop an understanding of layering in the forest, it is more effective to visit the oak-hickory forest nearby than to study about the exotic tropical rainforest thousands of miles away.

A cross-cultural research study by Palmer (1993) describes part of a larger research project that uses autobiographical, qualitative analysis to investigate the acquisition and development of environmental subject knowledge and concern during a child's first 3 years of school. It examines the influence the outdoors, educational courses, relatives, the media, and organizations have on the development of environmental educators' knowledge and concern. It was found that the single most important factor in developing
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personal concern for the environment was positive experiences in the outdoors during childhood.

Fox (1993) studied young children’s construction of physical knowledge on swings in the outdoor play environment. The children language interactions were also examined. The findings indicated that young children swinging behaviour developed in eight hierarchical stages. Children experiment with the physics, principle of balance and learnt the balance in nature itself. Children’s cognitive processing and interaction were developed.

A number of cross-cultural studies indicate that positive experiences in the out-of-doors during childhood represent the single most important factor in developing a personal concern for the environment (Tanner, 1980; Palmer, 1993).

Educators in the outdoors already have a head start in addressing issues of sustainability and acknowledging the broader definition of environment. This is because they do not need to externalise nor objectify the environment because they are there, in it, surrounded by it and part of it. The connection is much more apparent to learners particularly if the teaching encourages such ‘connections’ (e.g. Higgins, 1996 a, b). Special places for young children are defined as safe and aesthetically pleasing natural environments where they are free to manipulate and explore various aspects of the natural world. Studies have indicated that the extent to which a place is special for children depends, in large part, on the extent to which children are actively involved in making it their own (Van Andel, 1990). Thus, rather than developing special places for young children, we should be developing them with the children. We should provide places where they can create, change, and personalise the environment. In addition to reflecting childrens’ inner need to influence their environment (Moore, 1989), this practice also honours childrens' way of coming to know and love the world of nature (Wilson, 1997). Positive place experiences provide opportunities for children to
explore, to manipulate, and to be involved with the natural environment. If the environment is limited in opportunities for exploration and involvement, the child’s potential for learning in that environment is also limited. Schools, homes, and neighbourhoods should provide natural habitats that nourish children’s awareness and actively support their learning. Such learning occurs, not only in the cognitive domain, but in the areas of self-esteem, emotional development, and aesthetic appreciation as well (Iozzi, 1989a). An additional benefit for environmental education is that positive place experiences also foster a sense of caring about the natural world (Nabhan & Trimble, 1994).

The Dunn Foundation (1996) in America has created a visual environmental literacy curriculum elementary unit. Through hands-on approach students were encouraged to observe, feel, touch, explore, investigate, and discuss the natural and built environment outside their classroom. This methodology of teaching Environmental Science to primary school children was quite effective and fruitful.

Burnett et al. (1996) emphasized the importance of the location as a factor affecting student’s outdoor learning. A recurring data is that outdoor environment affected the students’ learning demands and emotional challenges, the impacts of which were not always sufficiently recognized by teachers and outdoor educators. Australian researchers reporting on this study of high school science students during visits to a marine theme park argued that teachers need to ensure that students were not distracted by the novelty of the location.

Wilson (1997) in his work “The wonders of nature: Honoring children’s ways of knowing” emphasized that rather than being incorrect or inferior, primal seeing is spiritual and allows children to experience the “magic” or “essence” of things in the world around them. Because, for most people, primary seeing is experienced only (or most intensely) during childhood, it would be good and right and
beautiful for parents and early childhood educators to honour and celebrate this way of knowing and experiencing the world. “Other ways of knowing” can be fostered through art, music, ancient myths and stories, and close encounters with the natural world. Positive experiences with nature increased motivation for life-long learning as well as sense of wonder and imagination.

Without continuous hands-on experience, it is impossible for children to acquire a deep intuitive understanding of the natural world that is the foundation of sustainable development. A critical aspect of the present-day crisis in education is that children are becoming separated from daily experience of the natural world. Experiences with natural world increased language and collaborative skills (Moore & Wong, 1997).

Surbrook (1997) examined the relationship of children’s exposure to the natural environment and their environmental attitudes at varying age levels. Childhood was divided into three age groups of 4, 7 and 10 years old. There were 34 four years old children, 22 seven-year old children and 29 ten-year old children. Children’s exposure to the natural environment and their environmental attitudes were examined overall as well as between age groups. The results indicated that environmental attitudes vary at different age levels. with the 7-year-old children’s environmental attitude mean score being the highest of three groups. The 7-year-old group also had a slightly higher mean score for their exposure to the natural environment. Because of these findings and the developmental stage of a 7-year-old may be a critical time in the formation of environmental attitudes.

Harding (1997) recorded the educational effectiveness of an Outdoor Residential Environmental Education Program (OREEEP). The main purpose was to obtain insight concerning the effect of an outdoor education program on environmental attitudes and ecological knowledge. The research was conducted in the context of a 3-day
residential environmental field trip by 315 students in grade seven who attended the program. The study used a quantitative research method and data application, using a theory of planned behaviour for their environmental management activities along with other areas of corporate social performances were discussed. It concluded with the results that Outdoor Residential Environmental Education Program (OREEP) produced significantly better ecological knowledge of the students as well as developed their attitudes towards environment.

Barnett (1997) reported that outdoor experiences are an important part of the school curriculum. For most students, these experiences are exciting and challenging. Some children, however, will experience fear. This fear can disable the child, preventing participation.

A study investigated the participation of a group of high school students in Belize, Central America, in an environmental education programme that challenged some of their perceptions about the natural environment of their country. It was an exploratory study that was part of a larger research effort to examine a range of issues in environmental education. Two small groups of high school students (a total of 10) were invited to the Cockscomb Basin Wildlife Sanctuary in Southern Belize for 5 days each. All were female students in the second or third form in school and ranged in age from 15 to 20. An additional pilot group of four fourth form female students spent 2 days at the sanctuary and also provided some data for the study. A variety of educational activities were designed to provide students with positive experiences and many opportunities were planned for students to explore the rainforest environment like trail hikes and 'river floats' to provide students with opportunities to explore and observe, as well as learn about nature, night walks to help familiarise students with an otherwise unfamiliar night-time environment, group discussions to allow students to voice their feelings about the environment and examine their attitudes toward nature. For the
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Belizean students this environmental education programme appeared to be very positive. The length of time that students spent at Cockscomb (5 days for most) appeared to be important in the reduction of negative perceptions of the environment, including fears. There was a positive shift of attitudes of the Belizean students toward snakes and other animals while the data suggest that the programme had a positive influence on sensitivity and attitudes during their participation, evidence is not available to suggest that these perceptions were retained (Emmons, 1997).

Sweet (1998) studied the interpretation of child’s interaction with the natural world, the general level of earth awareness existing in our society and affects that bonding with nature, can have on humans. It leaves information from recording of dozens of outdoor experiences with the children. So the importance of the child having time and place to encounter nature comes to light and adults’ responsibility to provide these was discussed throughout the thesis.

Meanwhile, environmental educators and developmental theorists have proposed that direct contact with the natural world may be crucial for healthy child development, and that such contact during childhood may even be vital for fostering environmental stewardship in adulthood (Shepard, 1996; Sobel, 1998).

Bogner (1998) tested one-day and five-day versions of a long established outdoor ecological program with 700 students aged 11-13 years in a German National Park. It was reported that the five-day program explicitly provoked favourable shifts in individual behaviour, both actual and intended. He reported that outdoor education programme should only be used for teaching sciences especially environment sciences.

Patricia & Tooker (1999) studied about experiences and factors influencing a sample of teachers in New York public elementary and middle schools to focus on Environmental Education in their teaching and found that positive childhood contacts with nature were
important predictors for such behaviour in adulthood.

Cumberbatch (2000) conducted his study to see the effect of outdoor environmental education on in class behaviour of VI, VII, VIII grade students. This study focused on using the natural environment as a classroom with an environmental education curriculum. Three environmental education classes comprising of ninety students were evaluated. The result showed positive behavioural correlation between Environmental Education and academic classes.

Hans (2000) reported that long term shifts towards internal locus of control was observed to occur by virtue of outdoor education especially in environment education. Pupils converted into more confident and self-controlled personalities and 80% of the students showed positive responses.

The field of interpretation is a nonformal medium of information that takes place in thousands of facilities throughout the world. Nature centres, historical sites, parks, museums, zoos, and aquaria all provide opportunities for an interpretive experience. Topics associated with these programs can range from specific awareness of the site to general areas of interest that might include historical science, wildlife, or natural resource management information. A study utilized qualitative measures to further understand if an environmental interpretive experience can enhance an environmental ethic. Twenty-four 4th graders were randomly selected from three classes from a rural town in southern Indiana (USA). These students participated in a field trip to a US Forest Service site near their school district. Methodologies utilized in this program included ranger-led discussions, facilitated explorations, and nature games. The data was collected through post interviews (1 week following treatment) and post interviews (4 months after program). The central phenomenon this study identified is that active experiences aid in recalling aspects of an interpretive program. Concepts matter that is being interpreted must be firmly embedded in the experiential activities offered during
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these programs. The environmental interpreter has a range of goals that he/she may want to achieve: awareness of the site, understanding of environmental issues, or influencing behavior. The emergent theory generated from this study posits that accomplishing one or more of these objectives may be influenced by the use of active experiences. Further qualitative studies should be completed to further investigate the impact of these experiences and how they can be developed to enhance cognitive retention, individual attitudes, and environmental behaviour (Knapp & Poff, 2001).

Children who regularly have positive personal experiences with the natural world show more advanced motor fitness, including coordination, balance and agility (Fjortoft, 2001).

Attention Restoration Theory suggests that contact with nature supports attentional functioning, and a number of studies have found contact with everyday nature to be related to attention in adults. Is contact with everyday nature also related to the attentional functioning of children? This question was addressed through a study focusing on children with Attention Deficit Disorder (ADD). This study examined the relationship between children’s nature exposure through leisure activities and their attentional functioning using both within and between-subjects comparisons. Parents were surveyed regarding their child’s attentional functioning after activities in several settings. Results indicate that children function better than usual after activities in green settings and that the "greener" a child’s play area, the less severe his or her attention deficit symptoms. Thus, contact with nature may support attentional functioning in a population of children who desperately need attentional support (Taylor et al., 2001).

Purdie et al. (2002) observed that outdoor learning is highly fruitful and significant for practical subjects like Science and especially for Environmental Science.
In an era of extensive habitat loss and landscape suburbanization, children face ever decreasing opportunities to spend time in nature. Even in rural areas, many children experience increasingly scheduled lives, with discretionary time often spent in front of the television or computer while outdoor activities and positive experiences with natural world improves awareness, reasoning, and observational skills (Pyle, 2002).

Research has shown that spending time outdoors with a positive role model is the number one reason people begin to develop environmental sensitivity, or awareness and empathy towards the natural world (Sivek, 2002).

Wells (2003) research showed that greater the amount of nature exposure, greater the benefits especially for children of primary classes. Also it researched that nature buffers the impact of life stress on children and helps them deal with adversity. Data showed that exposure in nature not only made them aware but increased their confidence level too.

Identifying mechanisms that buffer children from life’s stress and adversity is an important empirical and practical concern. This study focuses on nature as a buffer of life stress among rural children. To examine whether vegetation near the residential environment might buffer or moderate the impact of stressful life events on children's psychological well-being, data were collected from 337 rural children in Grades 3 through 5 (mean age=9.2 years). Dependent variables include a standard parent-reported measure of children's psychological distress and children's own ratings of global self-worth. In a rural setting, levels of nearby nature moderate the impact of stressful life events on the psychological well-being of children. Specifically, the impact of life stress was lower among children with high levels of nearby nature than among those with little nearby nature. Outdoor activities, positive experiences with nature reduce stress/greater ability to deal with adversity (Wells & Evans, 2003).
Clements (2004) performed a study by surveying mothers and found that 70% of mothers in the U.S. played outdoors everyday, when they were children, compared with only 31% of their children. Due to “Strange danger” many children are no longer free to roam their neighborhood or even their own yards unless accompanied by adults. Although they agreed that nature study should be done in close contact with nature but this fear prevents them to allow their wards to play in nature.

A study investigated the effects of early-life experiences on an individual’s environmental beliefs. Data from a survey of 533 university undergraduate students from 20 areas of academic study were analyzed using sequential regression to determine the degree to which current environmental beliefs could be explained by early childhood experiences. Results showed that four of the seven independent variables (appreciative outdoor activities, consumptive outdoor activities, media exposure, and witnessing negative environmental events) explained 14% of the variance in the eco-centric/anthropocentric beliefs. Three of the independent variables (early-life participation in mechanized outdoor activities, education, and involvement with organizations) were not significant predictors of eco-centric/anthropocentric beliefs (Ewert et al., 2005).

Bogeholz (2006) illustrated the importance of nature experience for environmental knowledge, values, and action. It argued that nature experience was one central foundation for the development of knowledge and values in relation to the environment. Nature experience had been shown to influence environmental action in everyday situation with low task complexity. In this regard, nature experience is essential because of its role in fostering assessment and judgment competences.

Children have an innate, genetically predisposed tendency to explore and bond with the natural world known as biophilia, i.e. love of nature (Wilson, 1993 & 1996; Tilbury, 1994; Sobel, 1996 & 2002;
Evidence of biophilia has been observed in children even younger than two (Moore & Marcus, 2008). For children’s natural inclination of biophilia to develop they must be given developmentally appropriate opportunities to learn about the natural world based on sound principles of child development and learning (Kellert, 1997; Sobel, 2002; Chawla, 2006). If children’s natural attraction to nature is not given opportunities to flourish during their early years, biophobia, an aversion to nature may develop. Biophobia ranges from discomfort and fear in natural places to contempt for whatever is not man-made, managed or air-conditioned (Cohen, 1992; Cohen & Horm-Wingerg, 1993; Orr, 1993 & 1994; Bixler et al., 1994; White, 2004). Biophobia is also manifest in regarding nature as nothing more than a disposable resource (Dutcher et al., 2007).

Burroughs (1919) cautioned that, “Knowledge without love will not stick. But if love comes first, knowledge is sure to follow”. The problem with most environmental education programs is that they try to impart knowledge and responsibility before children have been allowed to develop a loving relationship with the natural world (Sobel, 1996; Wilson, 1997). Children’s emotional and affective values of nature develop earlier than their abstract, logical and rational perspectives (Kellert, 2002). We need to allow children to develop their biophilia, their love for the Earth, before we ask them to academically learn about nature and become guardians of it (Olds, 2001; Sobel, 2008).

Children’s exposure to relationships with animals needs to be cultivated with live animal contact and animal-based stories, songs and other experiences. Developing an emotional connectiveness—empathy—to the natural world is the essential foundation for the later stages of environmental education (Sobel, 1996 & 2008).

One of the best examples of developmentally appropriate early childhood environmental education are the “outdoors-in-all-weather nursery schools” and “forest kindergartens.” Since the 1990s, parents
and educators in Germany have established 700 Waldkindergärten where children ages 3 to 6 spend their entire day in the outdoors in all but the most extreme weather. Forest kindergartens are now found in many other countries including Scotland, Scandinavia, Switzerland and Austria (Esterl, 2008; Moore & Marcus, 2008). The closest equivalents in the United States are nature center-based preschools, such as The Nature Preschool at the Schlitz Audubon Nature Center near Milwaukee, Wisconsin, where the curriculum includes daily outdoor nature discovery in the nature center's 185 acres of diverse habitat (Moore & Marcus, 2008).

A growing body of research reveals the direct connection between daily exposure to natural environments and individual health. For children, this means exposure to plants and animals through play. Play by its very essence leads to exploration, discovery and informal learning. Outdoor play and informal learning in natural environments can now be seen as crucial to children's health and as a self-motivating means of assimilating knowledge about the natural world (Moore, 2008).

A perusal of the above research studies reveal that outdoor teaching: helped to create better climate for learning by class seven students (Blomberg, 1967); enhanced the ability to write biological answer in good lucid English by pupils of 11-15 years of age. (Clarke, 1967); increased interest in natural sciences , appreciation for the environment, positive feelings about conservation and preservation of wilderness and national forests areas and raised camping and other outdoor activities according to surveys received from 449 students (OCP, 1975); developed children's cognitive processing and interaction (Palmer, 1993); developed better understanding of concepts of environmental education (Ballard and Pandya, 1990); fostered a sense of caring about the natural world (Nabhan & Trimble, 1994); was quite effective and fruitful for teaching Environmental Science to primary school children (The Dunn Foundation, 1996); affected the
students’ learning demands and emotional challenges (Burnett and Dooley, 1996); increased motivation for life-long learning as well as sense of wonder and imagination (Wilson, 1997); increased language and collaborative skills (Moore & Wong, 1997); produced significantly better ecological knowledge among the students as well as developed their attitudes towards environment (Harding, 1997); had a positive influence on sensitivity and attitudes on a group of high school students in Belize, Central America (Emmons, 1997); during childhood may even be vital for fostering environmental stewardship in adulthood (Shepard, 1996; Sobel, 1998); provoked favourable shifts in individual behaviour, both actual and intended in 700 students aged 11-13 years in a German National Park (Bogner, 1998); showed positive behavioural correlation between Environmental Education and academic classes in VI, VII, VIII grade students (Cumberbatch, 2000); showed more advanced motor fitness, including coordination, balance and agility in children (Fjortoft, 2001); supported attentional functioning in a population of children with Attention Deficit Disorder (Taylor et al., 2001); improved awareness, reasoning, and observational skills (Pyle, 2002); increased the confidence level of children of primary classes (Wells, 2003); developed environmental sensitivity, or awareness and empathy towards the natural world (Sivek, 2002); reduced stress/greater ability to deal with adversity (Wells & Evans, 2003); fostered assessment and judgment competences (Bogholz, 2006); was crucial to children’s health and as a self-motivating means of assimilating knowledge about the natural world (Moore, 2008).

2.2 RESEARCH STUDIES RELATED TO CRITICAL THINKING

The goal of improving critical thinking is also fundamental to environmental educators’ efforts to create an environmentally literate
citizenry. In the face of complex environmental issues, environmental education does not advocate a particular solution or action, but instead facilitates a student’s ability to draw on and synthesize knowledge and skills from a variety of subject areas to conduct inquiries, solve problems, and make decisions that lead to informed and responsible actions (UNESCO, 1978).

UNESCO’s approach to Environmental Education favours enhancement of critical thinking, problem-solving and effective decision-making skills as well as teaching individuals to make informed and responsible decisions. For this reason, it is essential to foster links between environmental education in the formal curriculum and projects in non-formal education. Projects such as the establishment of environmental clubs in schools, greening of schoolyards, environmental awards, journalistic activities and others, are essential to sensitize young people to their immediate environmental as well as many other complex issues related to sustainable development.

Current and anticipated environmental problems are receiving increased attention in the media, by all levels of government, by citizen groups, and by individuals concerned with the potential implications for humans and other life on Earth. These problems are local, regional, national, and international in scope. Developing workable solutions to environmental problems will require choices and decisions based on a critical examination of information and opinions. Environmental education provides a good mechanism for developing critical thinking skills by (1) providing topics and problems that cut across the school curriculum and can enhance the integration of knowledge, (2) providing real problems that can be studied or simulated, and (3) by providing topics and problems that can be adjusted to the developmental levels of students (Howe & Warren, 1989).
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While there are many environmental education materials available that include critical thinking skill development, there are several that provide for both a structure and a variety of activities and experiences. Examples of materials with many activities include Aquatic Project Wild, Project Wild, Project Learning Tree, Class, Science-Technology-Society: Preparing for Tomorrow's World, and Super Saver Investigators. (Howe & Warren, 1989).

The ability to think critically is essential if individuals are to live, work, and function effectively in our current and changing society. The activities included in this publication were selected to identify a variety of effective strategies for teaching critical thinking skills through environmental education. Activities include library research and analysis of information; interviewing and analysis of information obtained through interviews, debates, simulations, and role playing; analyzing speeches and presentations; case studies; critical writing for community action; planning alternative actions; and evaluating alternative actions. The activities also emphasize analyses of materials and ideas by individual students, analyses and comparisons of analyses within small groups of students, class analyses and discussions of materials and ideas, comparing student developed materials and statements to published and community statements, and rethinking ideas at all levels of analyses based on new or different information. Topics include recycling, magnetism, packaging, plastics, water use, energy conservation, waste disposal, ecology, plant growth, soil compaction, wildlife, endangered species, carrying capacity, pollution, and zoning. Each activity includes the title, level, subject, reference, objectives, procedures, extensions and variations, and evaluation (Howe & Disinger, 1990).

Environmental education enhances critical-thinking, problem-solving, and effective decision-making skills. It also teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions. Environmental education does
not advocate a particular viewpoint or course of action (Federal Register, 1996).

A research study, conducted by the State Education & Environmental Roundtable (SEER) observed 40 schools involved with EE. The study consisted of four teacher surveys and interviews with over 400 students and 250 teachers/administrators. An overview of the results includes the following: better performance on standardized tests, reduced discipline problems in the classroom, development of problem-solving skills, increased engagement in the classroom and greater pride and ownership in their education. This study also notes that students that are involved in environmental education programs become more active problem solvers; act as independent decision makers; think critically and creatively; ask thought-provoking questions; understand connections and interrelationships; and transfer learning to other aspects of their lives (Lieberman & Linda, 1998).

Bright and Tarrant (2002) suggested that researchers can better measure the effectiveness of environmental education not by assessing environmental knowledge or perceptions regarding the truth about environmental information, but instead by examining their ability to think critically about complex issues.

Environmental education helps build critical thinking, and relationship skills. Environment-based education emphasizes specific critical thinking skills central to “good science”—questioning, investigating, forming hypotheses, interpreting data, analyzing, developing conclusions, and solving problems (Archie, 2003).

Volk and Cheak (2003) studied the effects of an environmental education program on students, parents, and community and concluded that the students who participated in environment education program significantly outscored the students who didn't participate in environment education program on the critical thinking skills test.
The article “Teaching multiple perspectives on environmental issues in elementary classrooms: a story of teacher inquiry” describes a yearlong, qualitative study that involved an action-inquiry group of 5 elementary school teachers who collaborated on the incorporation of a multiple perspectives approach to environmental issues into their teaching. The teachers used children's literature to discuss different perspectives on diverse viewpoints on environmental issues. The benefits to young students included increased accurate use of environmental vocabulary and greater opportunities for using critical thinking skills. The project also demonstrated a professional development process that could influence teacher attitudes and practice in important ways (Christenson, 2004).

Robinson (2005) determined the extent to which selected environmental education curricula contributed to middle school students critical thinking skills as measured by Critical Thinking Test in Environmental Education (CTTEE). The researcher attempted to determine the variability of the outcome variable, critical thinking attributable to gender, academic ability, socio-economic status and pretest score. This study involved randomly assigned intact sixth, seventh and eighth grade classes representing five different schools. Students in classes included in the experimental treatments experienced instructions in the form of Project WET (n=48), Project WILD (n=61), Project Learning Tree (n=45) Project Investigating and Evaluating Environmental Issues and Action (IEEIA) (n=44). The classes that comprised the control group experienced traditional science instruction (n=48). All students were pre tested. Teachers taught the lessons in the experimental treatments within an 8 week period at a rate of two lessons per week for 8 weeks. A total of 16 lessons were presented to each experimental group. The control classes continued with traditional science instruction. All groups were post-tested. A Hierarchical Linear Model (HTM) was selected as the statistical method for estimating the influence of curriculum on
critical thinking in Environmental Education. Results indicated that 30.3% of variance in critical thinking scores could be explained by differences in curriculum without the influence of students’ level variables. The selected student’s level variables accounted for only 3.59% of the variability in critical thinking scores. An analysis of covariance controlling for the effects of present score indicated that the most effective model was the Investigating and Evaluating Environmental Issues and Actions (IEEIA) followed by Project WILD, Project WET and Project Learning Tree.

Environmental education promotes the use of higher-order thinking skills, encourages informal experiences in school as well as outdoors and brings together children and adults in order to make a contribution to the environment. Its holistic nature, that encompasses various subject matters, learning environments and teaching methods and encourages cognitive, affective and behavioural outcomes, requires the implementation of an appropriate assessment framework. In this study the author introduced a complex assessment method that encompasses pre, in- and after-course assessments and incorporates instruments that assess knowledge, reasoning, decision-making and the active involvement of 27 senior pre-service science and technology teachers who participated in an environmental education course. Findings indicate that the multiple assessment modes employed expressed a wide range of learning in the course. The team investigation project was found to be most suitable for developing environmental awareness, as well as inquiry skills. Self and peer assessment enhanced critical thinking and continuous discussion (Tal, 2005).

In this eloquent and comprehensive work “Last Child in the Woods”, Louv made a convincing case for ensuring that children (and adults) maintain access to pristine natural areas, and even, when those are not available, any bit of nature that we can preserve, such as vacant lots. "I like to play indoors better 'cause that's where all the
electrical outlets are”, reports a fourth grader. But it’s not only computers, television, and video games that are keeping kids inside. It’s also their parents’ fears of traffic, strangers, Lyme disease, and West Nile virus; their schools’ emphasis on more and more homework; their structured schedules; and their lack of access to natural areas. Local governments, neighborhood associations, and even organizations devoted to the outdoors are placing legal and regulatory constraints on many wild spaces, sometimes making natural play a crime. As children’s connections to nature diminish and the social, psychological, and spiritual implications become apparent, new research shows that nature can offer powerful therapy for such maladies as depression, obesity, and attention deficit disorder. Environment-based education dramatically improves standardized test scores and grade-point averages and develops skills in problem solving, critical thinking, and decision making. Anecdotal evidence strongly suggests that childhood experiences in nature stimulate creativity (Louv, 2005).

Learning for Sustainability: The Role and Impact of Outdoor and Environmental Education Centres was a two year ARC Linkage Project conducted by researchers. This project contributed to the National Research Priority for an Environmentally Sustainable Australia by addressing the effectiveness of educational interventions in Outdoor and Environmental Education Centres (O&EECs). Specifically, this project investigated the factors that contribute to effective education and learning for sustainability in the programs of 23 Outdoor and Environmental Education Centres. The study has been conducted in two main phases over the two year period. Data have been collected from principals of 23 participating centres through telephone interviews and two surveys (an online questionnaire; and an overview of programs survey). This data have provided a large amount of information about the type and nature of program provision; principals’ perceptions of success factors in their programs and
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pedagogy; and forms the basis for the selection of specific programs for the in-depth study of student environmental learning outcomes in 2006. Principals rated the goals of their programs on a seven point scale ranging from not a goal (1) to major goal (7). The high means indicates that O&EEC principals considered these to be important goals. Mean and standard deviation of different Program goals are: Raising students’ awareness of the environment 5.74 (1.87), increasing students’ environmental knowledge 5.53 (2.01), developing students’ environmental attitudes 5.68 (1.91), developing students’ environmental skills 4.54 (2.29), getting students to consider the impact of their environmental behaviour 5.40 (2.03), motivating students to take action to care of the environment 5.37 (2.12), promoting students’ personal development and self-discovery 4.85 (2.11), extending students’ critical thinking skills 4.93 (1.99), developing students’ social skills 4.21 (2.33), helping teachers adopt strategies to promote environmental learning 4.33 (2.21), other 0.38 (1.52) (Ballantyne & Packer, 2005).

Ernst and Monroeb (2006) studied the effects of environment-based education on students’ critical thinking skills and disposition toward critical thinking. The results of this research suggested that students who participated in environment-based programs were more skilled in critical thinking than their peers, including peers who were in traditional environmental science classes.

Bartosh et al. (2006) concluded that environmental activities often require that students engage in inquiry and become investigators. By doing this, students can develop their analytical, problem-solving, and critical-thinking skills.

As environmental education strives to create an informed citizenry capable of addressing complex problems, critical thinking is an integral part of this effort. This research guides environmental educators in defining, teaching, and evaluating critical thinking by summarizing a pilot study with an undergraduate forest issues course.
designed to increase critical thinking skills in students and move them towards responsible environmental citizenship. Involving six faculties, the course was developed to teach each of the critical thinking skills explicitly in six different modules that each addressed a current social issue in forest management. For each module, a specific critical thinking skill was highlighted and modeled. Topics included clear cutting, global warming, genetically modified organisms, and tropical forest management. The course taught critical thinking skills explicitly, correlating each discussion and assignment to the specific critical thinking skills addressed. An essay-based assessment of critical thinking skill, a Likert-scale assessment of critical thinking disposition and qualitative interviews measured critical thinking in students. After the 15-week course, students significantly improved in critical thinking skills ($n = 16$, $p<.05$) and skills were correlated with critical thinking dispositions ($n = 13$, $p<.05$). Phenomenological analysis of interviews revealed that students engaged in critical thinking in a variety of situations, some with citizenship implications, and struggled with the role of emotion in critical thinking. These experiences informed recommendations for instruction and evaluation strategies (Hofreiter et al., 2007).

A survey of the research studies indicates that environmental education: enhances critical-thinking, problem-solving, and effective decision-making skills (Federal Register, 1996); made students more active problem solvers; act as independent decision makers; think critically and creatively; ask thought-provoking questions; understand connections and interrelationships; and transfer learning to other aspects of their lives (Lieberman & Linda, 1998); emphasizes specific critical thinking skills central to "good science"—questioning, investigating, forming hypotheses, interpreting data, analyzing, developing conclusions, and solving problems (Archie, 2003); made students significantly outscore the students who didn't participate in environment education program on the critical thinking skills test.
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(Volk and Cheak, 2003); increased accurate use of environmental vocabulary and greater opportunities for using critical thinking skills (Christenson, 2004); promoted the use of higher-order thinking skills, encouraged informal experiences in school as well as outdoors and enhanced critical thinking and continuous discussion (Tal, 2005); dramatically improved standardized test scores and grade-point averages and developed skills in problem solving, critical thinking, and decision making (Louv, 2005); made students skilled in critical thinking than their peers, including peers who were in traditional environmental science classes (Ernst and Monroeb, 2006).

2.3 RESEARCH STUDIES RELATED TO SOCIAL SKILLS

Environmental education in outdoor setting has been shown to benefit behaviourally challenged students by enabling both students and teachers to work together in an environment free of the restrictions of the classroom. Students have been known to show improvement in self-esteem, social skills, academic achievement, and ability to work in a team (Lappin, 1982).

In resident outdoor education programs, students and their teachers attend an outdoor facility for two days or longer and use the outdoor environment as their primary classroom, focusing on natural sciences, outdoor recreation, social skills, and attitudinal and cognitive development. A resident program should have significant impact on social interactions and environmental attitudes of participants, and should flow from and back into the on-going classroom program. Most of the day at a resident center is devoted to activity sessions involving problem solving, multidisciplinary approaches, group interaction, field science, and outdoor skill development. Outdoor instruction includes use of small groups, emphasis on process of discovery rather than results, and teachers as guides rather than dispensers of information and as facilitators in
group social growth. Considerable planning is necessary, with careful attention to site and personnel selection; program content, timing and length; student groupings; health and safety; classroom preparation; explanation of the program to parents; and funding. Follow-up to a program should review and reinforce program accomplishments and allow parents to share in the excitement (Nolen-Parkhouse, 1982).

Moore (1996) in his study “Compact Nature: The Role of Playing and Learning Gardens on Children’s Lives” said that children who play in nature have more positive feelings about each other.

A meta-analysis of 96 studies published between 1968 and 1994 concludes that outdoor bound environmental education programs stimulate the development of interpersonal competencies (Hattie et al., 1997).

The main goal of the study by Waliczek (1997) was to initiate and integrate Project Green (PG) by an Environmental Education Garden Program (EEGP) into the curriculum of several schools in Kansas and Texas and subsequently, assess its effects on specific affective responses of students involved. Five hundred and fifty students of grade eight from eight schools participated in the study. Project Green (PG) was designed to provide Mathematics and Science oriented garden activities that could be infused into the classroom lessons and would serve to reinforce curriculum in these disciplines with hands-on-activities. The objectives included evaluating whether the students in Project Green (PG) were benefiting in the areas of self-esteem, interpersonal relationship, attitude towards school and environmental attitudes as a result of participation. Pre-test was administered to students prior to the garden program and post-tests were administered after completion. Comparisons were made between the experimental and a control group of children obtained from the data of the psychological inventory. Comparisons were also made between the pre and post-tests of the experimental group. In demographic comparisons, those schools that allocated more
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individual garden space to students had children with more positive attitude and improved interpersonal relationship skills.

Palmberg and Kuru (2000) compared pupils who were experienced in outdoor activities with pupils who were not. This study discusses the results of experiences from outdoor activities involving 11- and 12-year-old pupils in Rovaniemi and Vaasa, Finland. The qualitative research methods comprised case studies involving questionnaires, individual interviews, drawings, photographs of landscapes, and participant observations during camps. Nature experiences developed the pupils’ self-confidence and feelings of safety, in particular, which in turn increased their willingness to participate in future outdoor activities. In this way, nature began to have new meanings for them on a personal level. Comparing pupils who were experienced in outdoor activities with pupils who were not, it was found that the former seemed to have a strong and clearly definable empathic relationship to nature. They also exhibited better social behavior and higher moral judgements.

One quasi experimental study tested the impact of a school garden program on the attitudes toward school and interpersonal relationships of 598 children attending grades 2 through 8. The objectives of this research study were to evaluate whether children participating in garden activities benefited by an improved interpersonal relationships and attitudes towards schools. No significant differences were found between pre- and post tests and the control and experimental group. However, when broken down into demographic comparisons, the findings suggested positive effects for girls but not boys and should be interpreted cautiously given the large variation in grade level and lack of information about students’ actual exposure to the program (Waliczek et al., 2001).

“Environmental Socialization: Qualitative Tests of the Childhood Play Hypothesis” found that natural environments stimulate social interaction between children.

A study of a youth gardening program in Detroit reports that after gardening, kids have an increased interest in eating fruit and vegetables, possess an appreciation for working with neighborhood adults, and have an increased interest in improvement of neighborhood appearance. In addition, they made new friends and showed increased knowledge about nutrition, plant ecology, and gardening (Pothukuchi, 2004).

A 2004 meta-analysis of 150 outdoor learning research studies conducted between 1993-2003 found that there was substantial research evidence to suggest that outdoor adventure programs are associated with positive outcomes for young people, including attitudes toward the environment, independence, confidence, self-esteem and interpersonal and social skills, such as social effectiveness, communication skills, group cohesion, and teamwork (Rickinson et al., 2004).

White (2004) surveyed group of children and resulted in his book on Principles of Psychology that there is a “Surplus energy theory” explaining that the main reason for children’s play is to get rid of surplus energy. Playgrounds are seen as areas for physical play during recess where child “burn off their extra energies” and not for the other domains of development or for learning. Playground design reflects a lack of understanding of how quality outdoor play environment can provide children rich educational opportunities, particularly in the area of social skills and environmental learning.

Dillon et al., (2005) in their work “Engaging and learning with the outdoors—the final report of the Outdoor Classroom in a Rural Context action research project” suggest that the benefits of children having positive experiences with the natural world include an improved personal skills including confidence, social skills, self-
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efficacy and increased knowledge and understanding of geographical, ecological or food production process.

Study conducted by American Institute for Research (2005) concluded that participation in outdoor environmental education program was associated with higher ratings for personal and social skills (self-esteem, leadership, cooperation, conflict resolution, and students’ relationship with their teacher).

A research project was conducted by the American Camping Association (ACA). It is the largest study of camper outcomes in the United States to date and included 5,000 families attending 80 different camps. While this study has an emphasis on summer camps, many Outdoor Education programs are run out of camps and may have similar results. It was reported that the students had significant growth in: self-esteem, independence, leadership, friendship skills, social comfort, peer relationships, adventure and exploration, environmental awareness, values and decisions, and spirituality (Burkhardt et al., 2005).

A research project compared 225 students in California who attended environmental education (EE) programs with those who did not. Initial and follow up surveys were given to students, parents, and teachers. One result of the study was that the parents of these students observed positive environmental behaviors being practiced at home (e.g., recycling). Teachers reported significant gains in the following: self-esteem, conflict resolution, relationships with peers, problem-solving skills, motivation to learn, and positive classroom behavior. Students that participated in the environmental education experiences also improved their science score by 27%, as measured by a pre- and post-survey (McQuillan & Kennelly, 2005).

According to Steuer et al. (2006) “Environmental education and outdoor learning environment has been found to motivate young children and improve pupils’ behaviour. Involvement in environmental improvement projects can engender greater pride in the local
community and encourage community involvement and social development for children and young people”.

YMCA Camp Greenville conducted a study in Cedar Mountain, NC where lead chaperones were asked about the effects the Project Worth Outdoor Education Program (which focuses on team building, character development, and adventure) had on their students. In an open-ended question (where they could list more than one effect), teachers replied that their students gained self-confidence & conquered fears (88%), learned to work as a team (75%), community building was enhanced and new friendships were formed (63%), students were challenged to try new things or think in new ways (50%), technical skills were learned (e.g. hiking, rock climbing, interpretive skills) (38%), environmental awareness was enhanced (12%), leadership skills increased (12%). One lead chaperone from the O’Neal School in Southern Pines, NC noted, “The experience allowed our students the opportunity to conquer fears and feelings of inadequacy that they may have had before attending the program. They were allowed to get to know each other better in a way that would not be possible in the classroom. They were challenged to attempt things that they may never have tried under other circumstances. They came away knowing how to work well together and how to be better leaders”. In this same study, over 1,000 participants over a five-season span completed written evaluations including the question, “What did you learn during your stay?” The following is the breakdown of the most common answers: teamwork (28%); survival skills (18%); to challenge myself (11%); about classmates (9%); technical/adventure skills (6%); environmental stewardship (6%); character traits—caring, honesty, respect, responsibility (5%); about nature / the environment (5%) (Lien, 2006).

Miller (2007) conducted a study “The Seeds of Learning: Young Children Develop Important Skills Through Their Gardening
Activities” at a mid western early education program using teachers as co-researchers to collect and analyze data, this case study explored preschool and kindergarteners’ learning when they were engaged in hands-on activities in the garden and greenhouse areas of a model outdoor classroom. Key findings suggest that when young children are participating in garden and greenhouse activities they are: (1) communicating their knowledge about the world to others, (2) conveying (and learning to process and manage) emotions, (3) developing important skills (e.g., initiative, self-confidence, literacy, math, science skills) and (4) developing social skills (e.g., listening, imitating, and collaborating) that will help them be more successful in school and better navigate the world.

A study tested for impacts on youth development of an outdoor environmental education program. The specific research questions included: Does participation in an outdoor environmental education program have an impact on the positive identity of youth? Does participation in an outdoor environmental education program have an impact on the social skills of youth? Does participation in an outdoor environmental education program have an impact on the critical thinking skills of youth? To examine program impacts, students enrolled in the program completed a self-report data collection instrument during a pre and post test. The instrument used was the American Camping Association Camper Growth Index, which assesses participant’s positive identity, social skills, positive values, and critical thinking skills. A pre test-post test design was used for this study. Data were collected from approximately 150 students enrolled in the program. Only those students who gave their assent and whose parents consented participated in the study. Results concluded that the program had a significant positive impact on: Positive Identity - Self confidence (p ≤ .001), -Self-worth (p = .001), -Security (p = .024). Social Skills -Working well with others (p = .041). Physical and Critical
Thinking Skills—Willingness to try new activities \((p > 0.001)\). This program offered an environment where participants could build self-confidence, try activities that are different than those participated in at home, and learn to work well with others. Variety in activity options could allow participants to try many new activities. Being away from home and in an unfamiliar environment could help build self-confidence. Group activities and team challenges could help teach participants to work well with others (Culpepper et al., 2008).

A survey of the research studies indicates that outdoor education programmes: have shown to benefit behaviourally challenged by improving their self esteem, social skills, academic achievement, and ability to work in a team (Lappin, 1982); make students have more positive feelings about each other (Moore, 1996); stimulate the development of interpersonal competencies (Hattie et al., 1997); made 11- and 12-year-old pupils in Rovaniemi and Vaasa, Finland have a strong and clearly definable empathic relationship to nature, better social behavior and higher moral judgements (Palmberg and Kuru, 2000); stimulate social interaction between children (Moore, 1986 and Bixler et al., 2002); are associated with positive outcomes for young people, including attitudes toward the environment, independence, confidence, self-esteem and interpersonal and social skills, such as social effectiveness, communication skills, group cohesion and teamwork, according to meta-analysis of 150 outdoor learning research studies (Rickinson et al., 2004); improved personal skills including confidence, social skills, self-efficacy and increased knowledge and understanding of geographical, ecological or food production process (Dillon et al., 2005); were associated with higher ratings for personal and social skills (self-esteem, leadership, cooperation, conflict resolution) and students’ relationship with their teacher according to a study conducted by American Institute for Research (2005); make students have significant growth in: self-
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esteem, independence, leadership, friendship skills, social comfort, peer relationships, adventure and exploration, environmental awareness, values and decisions, and spirituality (Burkhardt et al., 2005); has been found to motivate young children and improve pupils’ behaviour, encourage community involvement and social development for children and young people” (Steuer et al., 2006); made students gain self-confidence, learned to work as a team, community building was enhanced and new friendships were formed, environmental awareness was enhanced, leadership skills increased (Lien, 2006); had a significant positive impact on: Positive Identity -Self confidence (p ≤ .001)-Self-worth (p = .001)-Security (p = .024), Social Skills-Working well with others (p = .041), Physical and Critical Thinking Skills-Willingness to try new activities (p > .001) on approximately 150 students enrolled in the program (Culpepper et al., 2008).

Gardening programmes: developed more positive attitude and improved interpersonal relationship skills in 550 students of grade eight from eight schools in Kansas and Texas children (Waliczek, 1997); in Detroit reports that kids interest in eating fruit and vegetables increased, possessed an appreciation for working with neighbourhood adults, and have an increased interest in improvement of neighbourhood appearance. In addition, they made new friends and showed increased knowledge about nutrition, plant ecology, and gardening (Pothukuchi, 2004); made preschool and kindergarteners’ communicate their knowledge about the world to others, manage emotions, develop important skills (e.g., initiative, self-confidence, literacy, math, science skills) and develop social skills (e.g., listening, imitating, and collaborating) that will help them to be more successful in school and better navigate the world (Miller, 2007).
2.4 RESEARCH STUDIES RELATED TO RESPONSIBLE ENVIRONMENTAL BEHAVIOUR

Over the years number of researchers have studied the relationship between environmental education and responsible environmental behaviour.

Chawla (1988) reported that studies within natural settings are important if environmental educators are to understand how outdoor experiences formatively contribute to the development of environmental attitudes, sensitivity, and concerns.

Howe et al. (1988) performed research related to environmental education. It had consistently indicated that many students and young adults attribute a large amount of their knowledge of environmental concepts, problems and issues to out-of-school (non-formal) education settings and experiences.

Iozzi (1989a, 1989b) suggested that environmental education that focused on affective learning should be incorporated into the curricula at all educational levels. He further suggested that outdoor environmental education experiences were beneficial for students in many ways, including the development of environmental attitudes and values.

According to Fien (1993) 'education for the environment' includes the development of attitudes, sensitivity and concerns for the improvement and maintenance of environmental quality. Such development is ideally incorporated into larger efforts to 'promote lifestyles that are compatible with the sustainable and equitable use of resources'.

Fong (1993) conducted a study on environmental awareness and action at elementary schools in Taiwan, the Republic of China. The purpose of this study was to investigate environmental awareness and action from elementary school students and their parents in
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Taiwan. The findings included 531 grade 5 students and their parents and showed that all subjects agreed strongly that everyone should protect this planet. All subjects also indicated strongly that second hand smoke is as harmful as smoking cigarettes. The study demonstrated that 237 students from Taipei city and their parents scored higher on many environmental awareness items and also that they took more action. This study also suggested that parents’ educational level made significant differences on students and parents’ environmental awareness and environmental action also influenced the students’ behaviour towards the environment. In general, higher the educational level, the more would be concern for environment.

Studies on classroom educational interventions in the United States (Ramsey et al., 1981; Ramsey and Hungerford, 1989; Ramsey, 1993) showed that formal environmental education emphasizing issue investigation and action training did promote students’ responsible environmental behaviour.

Ramsey (1993) designed a study to measure the influence of program based on environmental awareness. Students were introduced to environmental issues, skills needed to analyze issues, skill to investigate issues, skill for information processing and skill needed by responsible citizens to apply action. Eight heterogeneously grouped, eighth grade classes participated in the study using a modified pre-test/ post-test design. Four classes received 18 weeks of the experiential instructions, the other four control classes received standard instructions in science. Data focused on dependent variables, overt environmental behaviour; individual locus of control; group locus of control; environmental action knowledge; perceived knowledge of environmental action skills; perceived skills in the use of environmental action skills and environmental sensitivity. The post-test analysis of variance indicated that at least 0.05 significance levels
Dresner & Gill (1994) found that a 2 week nature camp experience increased levels of environmental concern in students which appeared to result in them showing more environmental behaviour than previously.

Culen (1994) reported on an evaluation of using the issue investigation/evaluation and action skills training model to assess the effects of an extended case study on the subject of wetland issues. A modified pre-test/post-test non equivalent control group design was used with fifteen intact seventh and eighth grade classes. Experimental treatment (four seventh grade and two eighth grade classes), including four levels of instruction, was planned for 10-14 weeks. Experimental treatment second (two seventh grade and two eight grade classes) was completed in four to six weeks and only included two levels of instruction. The control group (two seventh grade and three eighth grade classes) received 12 weeks of traditional science instruction. Experimental treatments were presented by four teachers who had participated in Investigation and Evaluation of Environmental Issues and Action (IEEIA) in-service training. The teaching was planned with an objective of increasing environmental sensitivity training. Five different instruments were used to collect the data. Post-test data were collected to measure the variables of overt environmental behaviour, knowledge of ecological foundations, individual locus of control, knowledge of citizenship action skills and perceived skill in the use of citizenship action skills. Covariance analysis compared means of treatment groups and the control group. Statistically significant differences were found for the overt environmental behaviour variable. Results indicated that the two treatments were more effective than the control. Full treatments were more influential than the partial treatment in increasing overt environmental behaviour.
Matthews and Riley (1995) conclude that the following have not worked in bringing about ethical, behavioural change in students: “lectures, excessive moralizing, externally derived codes of ethics/conduct, adults setting the ethics agenda, and teachers/leaders as authoritarian figures”. As a result, outdoor educators have directed more attention to environmental action activities that develop responsible environmental behaviour.

Outdoor educators have conducted studies to assess the effect of environmental outdoor education programs on knowledge and attitudinal change. The knowledge-attitude-behaviour change model described by Matthews and Riley (1995) holds that an increase in knowledge will lead to a change in attitude which will in turn influence behaviour. Consequently, environmental knowledge and attitudes have been frequently evaluated when attempting to determine the effect of outdoor education programs on the development of environmental responsibility (Matthews and Riley, 1995).

Hewitt (1997) demonstrated that games could lead to significant changes in reported environmentally responsible behaviour. She suggested that games can provide a medium through which students can learn. Children can be taught environmental topics through the use of games and significantly improve their reported environmental behavior.

Gray (1998) demonstrated the effect of an urban studies curriculum upon the sensitivity and the children’s environmental behaviour, which was evaluated through a mental mapping exercise. The research question was put forward: Does children’s environmental relationship to their neighborhood change with the introduction of an urban studies curriculum? This study was based upon the historical fact that children had continuously been disregarded when it came to public planning consultation. By integrating a simple urban studies
curriculum into a classroom, children were given the opportunity to learn many of the background skills needed so that they might look at their neighborhood differently and begin to come up with solutions to the problems they find. The research in this thesis evaluated the effectiveness of the curriculum on the children's perception of their neighborhood by using a technique called 'Mental Mapping' which is simply the process of drawing a map of a location from memory. The urban studies curriculum was seen to enhance their environmental sensitivity. It was also concluded that greater the environmental sensitivity, more was their responsible approach towards the environment.

Palmer (1998) suggests that early experience in the outdoors is a necessary pre-condition to formulating environmental attitudes and behaviour. These views are supported by a number of researchers whose empirical work is contributing to the growing body of literature known as 'Significant Life Experiences'. Their principal quest is to discover those formative experiences in peoples' lives which may, or may not, lead to certain forms of behaviour. (Chawla, 1998).

Mark (1998) performed a research on environmental attitude and environmental management behaviour. Two studies were completed. First validated five environmental attitude scales. Two hundred ninety five usable surveys were collected from environmental managers at American manufacturing facilities. The result showed that environmental managers’ attitude influenced their behaviour intentions to engage in pollution prevention. The most frequent types of experimental variables in this profile were outdoor experiences, environmental destruction, positive formal education and outdoor organization experiences and role models.

Hsu and Roth (1998) suggested that the cooperation of formal and nonformal EE could present an appropriate social context (e.g., social pressure, social support, cooperation of others) in which an
individual can gain reinforcement for responsible environmental behaviour. It points to the importance of closely linking formal and nonformal environment education.

Olson (1999) examined the combination of adventure recreation and adventure education to develop environmental sensitivity. Its aim was to prove that spending time with one another in leisure builds relationships through play and helps maintain our communities. That bonds are strengthened between families and groups through emphasizing co-operation and collaboration over competition and providing the opportunity and locations for families and friends to come together either on an adventure or at the lodge helps people interact with the natural world through encouraging people to spend more time in nature developing attachments and feelings of responsibility to care for our natural environment. It concluded that this combination of adventure recreation and adventure education helped to develop as well as to enhance the environmental sensitivity and also the feelings of responsibility to care for our environment.

Place (2000) determined the differences in early-life outdoor experiences between individuals who have adopted an anthropocentric view of the environment and individuals who have adopted a biocentric or eco-centric view of the environment. To test this difference, three phases of the study were performed. The subjects for the first phase were 5 historical figures (John Muir, Aldo Leopold, Rachel Carson, Theodore Roosevelt and Henry David Thoreau) determined by the use of a Delphi study using various Indiana University faculty as America’s greatest conservationists/environmentalists. The second phase involved ten modern day individuals (four men and six women) who were identified by various Monroe Country agencies as being actively involved in the environmental movement. The reason behind their responsible behaviour towards environment was found to be appreciative early-life outdoor experiences. The third phase involved a
quantitative survey of 583 Indiana University students from a variety of major areas of study. A discriminate analysis was performed on the independent (17 variables based on previous research) and dependent variables. The results showed that the 17 independent variables explained 7.62% of the group variance. In addition, the confusion matrix for classification procedure showed that 75.6% of the respondents were correctly classified as either eco-centric or anthropocentric individuals. This study provides evidence that encouraging and providing opportunities for interaction with natural environment during an individual’s early-life is important in developing environmental attitudes.

Lucia (2000) conducted a study of environmental behaviour i.e. garbage management in the community of San Paglo del, Lago-Imbacocha, Ecuador. The managerial objective was to provide support for current environmental projects by proposing effective ways to promote environmental behaviour in the community. It was concluded that as their environmental awareness enhanced, there was a positive shift in their environmental responsible behaviour.

Cheak (2002) researched and found that the Environmental Issue Investigation and Evaluation (EIIE) had a very positive effect on broader student learning, knowledge regarding environmental problems and their behaviour too. In addition to classical Environmental Literacy Outcomes (ELOs) the 38 fifth and sixth grade students studied in depth were compared to a control group and were found to be using a wider range of reading materials and more difficult and challenging materials, to be skilled analyst of complex issues; to have improved writing skills, to be more motivated learners, and to have a better command of learning technology. Thus it was concluded that the environmental issues, its investigation and evaluation should be the part of curriculum so that the students might have proper knowledge of environmental problems and their behaviour towards environment should be civilized and responsible.
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Tung et al. (2002) studied the effects of different environmental education programs on the environmental behaviour of fifth-grade students and related factors and concluded that among the four schools that participated in this study, only experimental school III, which combined teaching and activities, had improvement in the area of environmental behaviour. Curriculum or school activities alone simply are not enough to change environmental behaviour.

Hoody (2002) reviewed that at the Huntington Middle School in Pennsylvania, environment based service learning had a profound effect on student motivation and willingness to pitch in within the community. Through its Science Teams in Rural Environment and Aquatic Management Studies (STREAMS), the school has evolved a 60 hour core program for all VI grades. The curriculum integrated environmental topics into hands-on learning projects. Students were taught to undertake complex environmental projects. After completion of the course, 90% of the students chose to participate in rigorous activities after school environmental education programs. It not only enhanced their environmental awareness but also made them more responsible towards environmental problems and their solutions.

Hsu (2004) assessed the effects of an environmental education program on responsible environmental behaviour and associated environmental literacy variables in Taiwanese college students. The results indicated that the environment education course did significantly promote the students', responsible environmental behaviour, locus of control, environmental responsibility, intention to act, perceived knowledge of environmental issues, and perceived knowledge of and skills in using environmental action strategies.

Hughes and Estes (2005) studied the influence of environmental education on environmentally responsible behaviour of undergraduate students in a traditional and non-traditional setting. Results indicated that the traditional setting showed the highest increase, the non
traditional setting showed a moderate increase, and the control group showed little or no increase in environmentally responsible behaviour.

Harjai (2007) studied the effect of experiential learning strategies for teaching environmental education to a sample of 120 students of two schools of Ropar. In fifty action oriented lessons students learnt by the use of media, outdoor experiences and fun based hands on activities, he concluded that students taught EVS by experiential learning strategies exhibited better environmental awareness and environmental sensitivity as compared to students of control group taught by traditional learning method.

A problem with most young children's environmental education programs is that they approach education from an adult's, rather than a child's perspective. Teaching nature abstractly in the classroom does not lead to pro-environmental behaviors in later life (Schultz, 2000). Teaching children at too early of an age about abstract concepts like rainforest destruction, acid rain, ozone holes and whale hunting can lead to dissociation from nature and premature abstraction. When we ask children to deal with problems beyond their cognitive abilities, understanding and control, they can become anxious, tune out and develop a phobia to the issues. In the case of environmental issues, biophobia—a fear of the natural world and ecological problems—a fear of just being outside—can develop. Studying about the loss of rainforests and endangered species may be perfectly appropriate starting in middle school, but is developmentally inappropriate for younger children (Cohen & Horm-Wingerg, 1993; Sobel, 1996; Wilson, 1997; Coffey, 2001; Kellert, 2002).

Research has substantiated that an empathy with and love of nature, along with later positive environmental behaviors and attitudes, grow out of children's regular contact with and play in the natural world. Children's understanding of humans' relationship to nature is both partially under development and complete during early
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childhood (Phenice & Griffore, 2003). Recent research strongly suggests that the opportunity for children younger than age 11 to explore in wild, natural environments is especially important for developing their biophilic tendencies and that the type of play should be child-nature play, such as catching frogs in a creek or fireflies at night, versus only child-child play such as playing war games with walnuts. The best learning environments are informal and naturalistic outdoor nature-scapes where children have unmediated opportunities for adventure and self-initiated play, exploration and discovery. Such informal experiences stimulate genuine interest in and valuing of environmental knowledge that is provided in more structured environmental education programs (Bunting & Cousins, 1985; Chawla, 1988 & 2006; Palmer, 1993; Bixler, 1997; Wilson, 1997; Palmer et al., 1998; Corcoran, 1999; Kals et al., 1999; Schultz, 2000; Bixler et al., 2002; Kals & Ittner, 2003; Ewert et al., 2005; Wells & Lekies, 2006; Berenguer, 2007; Vadala et al., 2007; Hinds & Sparks, 2008; Sobel, 2008; Thompson et al., 2008). Early childhood and grade schools have the opportunity to help fill the void in children's lives of regular access to the natural world. With developmentally appropriate natural outdoor environments and programs, schools can help our children develop to become responsible stewards of the earth (Herrington & Studtmann, 1998; Sobel, 2004).

A perusal of above research studies indicates that formal environmental education: emphasizing issue investigation and action training did promote students' responsible environmental behaviour (Ramsey et al, 1981; Ramsey and Hungerford, 1989; Ramsey, 1993); achieved at least 0.05 significance levels for overt environmental behaviour, individual locus of control, group locus of control, environmental action knowledge, perceived knowledge of environmental action skills, perceived skills in the use of environmental action skills and environmental sensitivity for four
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classes of eighth grade students which received 18 weeks of the experiential instructions (Ramsey, 1993); increased levels of environmental concern in students who attended 2 week nature camp experience which appeared to result in them showing more environmental behaviour than previously (Dresner & Gill, 1994); showed statistically significant differences for the overt environmental behaviour variable for fifteen intact seventh and eighth grade classes in a modified pre-test/post-test non equivalent control group design (Culen, 1994); formal and nonformal could present an appropriate social context (e.g., social pressure, social support, cooperation of others) in which an individual can gain reinforcement for responsible environmental behaviour (Hsu and Roth, 1998); improved the area of environmental behaviour of fifth-grade students when teaching and activities were combined (Tung et al., 2002); enhanced environmental awareness of VI graders of Huntington middle school in Pennsylvania and also made them more responsible towards environmental problems and their solutions (Hoody, 2002); did significantly promote the students' responsible environmental behaviour, locus of control, environmental responsibility, intention to act, perceived knowledge of environmental issues, and perceived knowledge of and skills in using environmental action strategies (Hsu, 2004); showed increase in environmentally responsible behaviour of undergraduate students (Hughes and Estes, 2005).

Outdoor education programmes : have directed more attention to environmental action activities that develop responsible environmental behaviour (Matthews and Riley, 1995); was the reason behind the responsible behaviour towards environment of four men and six women) who were identified by various Monroe Country agencies as being actively involved in the environmental movement (Place, 2000); can help our children develop to become responsible stewards of the earth (Herrington & Studtmann, 1998; Sobel, 2004).
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Environmental topics through the use of games significantly improved environmental behaviour (Hewitt, 1997); integrating simple urban studies curriculum into a classroom was seen to enhance children’s environmental sensitivity. It was also concluded that greater the environmental sensitivity, more was their responsible approach towards the environment (Gray, 1998).

Combination of adventure recreation and adventure education enhanced the environmental sensitivity and also the feelings of responsibility to care for our environment (Olson, 1999).