THE EFFECT OF AN OUTDOOR RESIDENTIAL ENVIRONMENTAL EDUCATION PROGRAM ON THE DEVELOPMENT OF GRADE SEVEN STUDENTS ENVIRONMENTAL ATTITUDES AND ECOLOGICAL KNOWLEDGE

CENTRE FOR NEWFOUNDLAND STUDIES

TOTAL OF 10 PAGES ONLY
MAY BE XEROXED

(Without Author's Permission)

JEAN BRIDGET HARDING

THE EFFECT OF AN OUTDOOR RESIDENTIAL ENVIRONMENTAL EDUCATION PROGRAM ON THE DEVELOPMENT OF GRADE SEVEN STUDENTS ENVIRONMENTAL ATTITUDES AND ECOLOGICAL KNOWLEDGE

By

Jean Bridget Harding

A Thesis submitted in Partial Fulfilment of the Requirements

for a Masters Degree in Education

Acknowledgements

I am grateful to Dr. Glenn Clark for his support, remarks and criticism from the beginning .

I would like to thank Dick Coombs, for his support and remarks in the development of the questionnaire and test instrument, and his never failing dedication to outdoor environmental education which has always inspired me.

There are many things to thank The Roman Catholic School Board for St. John's for, without there support this study would not be possible. Perhaps the most important is their determination in offering an outdoor education program over the years to their students, despite fiscal cuts and demands from other educational needs.

I am eternally grateful to Gerry White for the hours and concern he took in the analysis of the data for this study with me and to John Kennedy and Richard Harding for their editing and patiences.

I would like to thank those who have helped me more than they will ever know. The staff at the Brother Brennan Centre and all those teachers who helped in the distribution and collection of the surveys.

Abstract

This study deals with the educational effectiveness of an outdoor residential environmental education program. The main purpose was to obtain insight concerning the effect of an outdoor education program on environmental attitudes and ecological knowledge. The study also examined the contribution of students' past informal and non-formal environmental experiences, and gender on ecological knowledge and environmental attitude. The research was conducted in the context of a three day residential environmental field trip by 315 students in Grade seven who attended the program and 243 students who did not attend the program. The study used a quantitative research method and data was collected before and after the field trip, using questionnaires and an ecological knowledge test. The study investigated a) the relationship between environmental attitude and ecological knowledge, b) students' ecological knowledge and environmental attitudes before the field trip, c) changes in students' ecological knowledge and environmental attitudes after the field trip, and d) the relationship and contribution of students' past informal and formal environmental experiences and gender on ecological knowledge and environmental attitude. The findings suggest that the educational effectiveness of the outdoor residential program on ecological knowledge was significant, but decreased a year later although not to original levels. The outdoor program did not significantly change environmental attitude. There was a slight but significant relationship between ecological knowledge and environmental attitudes. Students' past experiences and gender predict a small but significant percentage of environmental attitudes and

ecological knowledge.

Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter One

Introduction

The decade of the 1980's will be characterized as the period in Canada's history during which environmental awareness and concern began to dominate public attitudes and compete with economic issues of the day

Perceptions of a deteriorating local/national/ global environment, major environmental disasters and an increasing world focus on acid rain, climate change and other major issues contributed to this attitudinal change.
National Round Table on the Environment and the Economy, a Report to Canadians, June, 1989-90, p.10

This unprecedented public awareness of the threats to our environment is considered by Gigliotti (1990) as the most important and visible success product of environmental education. Environmental deterioration has become tangible and real to the public. Citizens of the 1990's are acutely aware and constantly reminded of how environmental degradation is directly affecting their lives. People in most major cities have to check a number of pollution indices such as ozone, ultra violet radiation and nitrogen oxide levels , to determine if it is safe to go outside. The collapse of the North Atlantic codfish stocks

are causing the demise of fishing communities in Newfoundland that have been sustainable for hundreds of years. Since the media abounds with scary statistics and random facts, from male sperm counts have fallen by 50% since 1938 to species diversity declining at the rate of about 74 species per day (Wilson 1992), it is not surprising that environmental issues and concerns have dominated public opinion polls in Canada and the United States since the early 1980's.

No longer are environmental hazards abstract issues debated only by scientists. The public is facing these issues first hand (Noe and Snow, 1990). Dunlap and Van Liere (1978) suggested that a "New Environmental Paradigm" (NEP) was emerging in society that challenged the older view of an anthropocentric, anti-ecological order. A number of researchers have provided evidence that a social transformation is occurring in the direction of a New Environmental Paradigm (Catton and Dunlap, 1978; Dunlap, 1980; Dunlap and Von Liere, 1978; Geller and Lasley, 1985; Shetzer, Stockman, and Moore, 1991; and Noe and Snow, 1990). However this viewpoint contradicts a perspective that some observers argue is the more dominant attitude in modern technological society, that the proper of role humans in Earth is to control nature and put it in the service of mankind (Samova, Porter and Nemic 1992, p.67). A study done by Gigliotti (1992) supports this. He compared Cornell University students of 1990 to Cornell University students attitudes' in 1971 and 1981. He found that students today are less willing to make personal sacrifices than students of twenty years ago, and that private materialism has increased. He conjectures that the current value system of most people is not really that much

different from what it was before the environmental movement began. The implication of this for environmental education according to Gigliotti (1990) is that the environmental message must change to stress the link between lifestyles and environmental problems.

Another disturbing fact is that survey research shows that while people tend to score high on environmental attitude , they score low on environmental and ecological knowledge (Arcury and Johnson, 1987; Blum, 1987; Hausbeck, Milbrath, Milbath and Enright, 1992). As Gigliotti (1990 p.9) points out "We seem to have produced a citizenry that is emotionally charged but woefully lacking in basic ecological knowledge". The implications of this is best put by Gigliotti (1990) who says " Environmental Education has produced ecologically concerned citizens who armed with ecological myths, are willing to fight against environmental misdeeds of others but lack the knowledge and conviction of their role in the environmental problems". This type of public awareness has played a significant role in the reduction of many pollutants. Most industries in North America are concerned about their environmental image as public outcry against environmental misdeeds may spell diaster for a company. However while people demonstrate against pollution, the same people are opposed to pollution devices on cars that make them more expensive. Still others demonstrate against commercial use of wildlife, or the hunting and killing of animals for food. Yet, as living animals we have to eat and accept our role as predators in some ecosystems. Otherwise to remove this predator (humans) may have disastrous effect on many other relationships in that ecosystem. This myth that people are somehow separate from, and harmful to, the environment has lead to the belief that if we

set aside reserves for nature then societies can continue with business as usual. Yet, any scientist will point out that the greenhouse effect and ozone depletion will have the same effect on creatures throughout the world, whether they are in reserves or not. Gigliotti (1990) contends that the necessary changes in values have not really occurred, but people have selectively screened the environmental messages and constructed belief structures to support their own value system rather than change their lifestyles to any great degree.

I agree with Gigliotti (1990, p.10) that *The underlying belief - value structure that most needs changing is the myth that people are separate from the environment ... that we are somehow different from all other living things*. The big question is *how* do five billion humans learn to share our planet with 50 million species. I feel that the first step is getting to know the 50 million species. If, as Wilson (1992) estimates that our planet's diversity is declining at the rate of three species hourly, then why do we not know their names. Ask anyone around you to name just one of the thousands of species that went extinct this year. They do not know! This is symptomatic of western societies alienation from nature and our environment in general. As Peled (1989) notes "Our experience of places and our intentions and actions toward them are determined by the way we construe them: by the way we perceive the entities that populate them ... It determines whether we encounter a place as active partners or passive onlookers".

Most people in North America are "passive onlookers" when it comes to nature. I once asked all of the high school students (193) who were in my biology classes, "What kind of

trees are there in the woods next to the school?" Not one student knew the species name or the common name. Most said they were evergreen. Even more surprising were the 18 student responses that called the trees "acorn". Acorn, the seed of an oak! As we live in a boreal forest ecosystem dominated by Balsam fir trees and spruce -bog fens, you would be hard put to find an oak tree in this province except as ornamental in some yards. Weilbacher (1993) states " I guarantee that not one of the almost one million kids in Philadelphia - area schools can show me a grackle". I can guarantee that 90% of the students in Newfoundland can't name the most common tree, the tree species that makes up most of our forest, that line our highways as far as the eye can see. Our kids can do simple - minded things to "save the Earth", like recycling. However where is their emotion and compassion for those tress, whose names they do not know, that make-up the forest that is our ecosystem. When they bulldoze the woods next to the school to build a glitzy shopping mall, visions of overstocked shelves dance through students heads. Not one student will shout or even whisper "Do we need this mall?". Newfoundland school children exemplify the North America population. All of our environmental problems appear to be random from species decline to the hole in the ozone layer. In truth they are not random but part of a larger pattern that includes shopping malls, deforestation, glitzy suburbs, climate change, a gross national product in the trillions for the US We are not "partners" with our environment but onlookers who consume and pollute with no understanding of the consequences for us and millions of other species.

How do we become "environmental partners" instead of onlookers. Jickling (1991b) says

we need to learn to think environmentally. Essential to this thinking is ecology, history, aesthetics (nature studies) and ethics. He says natural history is an experience or way of perceiving the world which involves personal involvement and emotional or empathetic understanding of nature that is different than studying the science of ecology. In this sense natural history is like a form of aesthetics - "environmental aesthetics". Unfortunately the philosophical centre of environmental education abandoned nature study in the 1970's for the "big picture" (Weilbacher 1993). That is, we teach "community" without filling in that community with members. We teach "adaptation" without naming the organisms that posses the adaptation. We teach "seasons" without sharing the name of the creatures who signal the shift in seasons. Weilbacher (1992) feels we threw out the baby with the bath water. He asserts there are knowledge and skills that students must own to achieve environmental literacy. Knowing native plants and animals must be a core knowledge; to know how to identify creatures and discover their life histories seems a critical skill". The ABC's of environmental literacy, the building blocks is species. Species form populations, populations form communities, communities form ecosystems, and ecosystems form the biosphere (Weilbacker 1993). To know species we first need to get our students outside of the schools four walls.

When our children "know" species they will notice if a species decreases in population, or disappears completely. They will know that all 50 million species can not be preserved in reserves and zoos. They will know that our livelihood and survival depends on so many other species. They will know that without species communities and ecosystems fall

apart. They will know that our lives are intricately connected to other species and without them, human as a species may also go extinct. They will know that their own lifestyles have to change to ensure the survival of many species, perhaps even humans.

This research study will examine the effect of an outdoor residential environmental education program, offered by the Roman Catholic School Board for St. John's, on Grade seven students, environmental attitude and ecological knowledge. The study will also explore students past environmental experiences and gender to see their relationship with environmental attitudes including belief, reported behaviour and affective attitude, and ecological knowledge.

Chapter Two

Establishing the Field

"Environmental Education was born in nature study, reached adolescence during conservation education and achieved adulthood with Earth Day (1970)".

Weilbacher, 1993.

2.1 Introduction

This Chapter will give a short historical overview of some of the major influences that contributed to the establishment of Environmental Education in North America (Section 2.1). Section 2.2 describes the development of the goals and objectives for the field of Environmental Education in the 1970's and 1980's. The last section discusses some of the problems that some authors in the Environmental Education field have with the present goals and objectives.

2.2 Historical Review

Education has always been associated with the environment. In earlier societies, and still today among some rural populations, peoples preparation for adulthood revolved around intimate experiences with nature. Indeed, learning by direct experience accompanied by personal instruction was the customary method of passing on human culture long before there were classrooms, libraries, texts or professional teachers. The transition from an agrarian society to a highly industrialized western culture, along with the accompanying

urbanization and mass education system, created a societal setting that led to nature studies, the conservation movement and the camping movement at the turn of the twentieth century in North America (Smith, Carlson, Donaldson and Masters, 1972).

Some of these societal influences are:

1. Urbanization had deprived many children and youth of contact with the land.
2. Automation and mechanization increased the amount of time available for off- the - job living while decreasing the physical labour demands. This created a population which had more leisure time and were generally less physically fit.
3. An exponentially growing human population due to better health and food production techniques.
4. The sudden reduction and disappearance of wildlife species such as Bison and their habitat along with a general deterioration of the environment (Smith et al 1972 , pp. 4 & 5, and Hammerman and Hammerman 1973 pp.58&59).

These factors created a latent need in society and public, semi-public and private agencies sprang up to meet this need. During the early 1900's the first major thrust of the American conservation movement occurred. Scores of articles , pamphlets and books on nature studies and resource management were published. Many conferences on Conservation occurred and a number of conservation and nature organizations like The National Audubon Society (1905) and The American Nature Society (1908) formed. These organizations were committed to the broad field of conservation and nature education and

were very influential in encouraging the inclusion of nature studies in schools. (Smith et al 1972 pp.228-229, and Hammerman and Hammerman 1973 pp.302-303)

The turn of the century also saw the establishment of voluntary youth serving agencies and organizations such as Boys Clubs, Boy Scouts, Girl Scouts, plus many private agencies dedicated to youth camping (Hammerman and Hammerman 1973 p.59 - 62). However it should be noted that most camps emphasized the recreational aspects and were considered by many as a vacation activity for boys and girls of the upper socioeconomic level (Dewitt, 1949 in Hammerman and Hammerman 1973 p.104).

In the 1940's and 50's outdoor learning began to make inroads into the formal education system. In the United States this period saw the growth of outdoor schools in Michigan, California, New York, Washington and elsewhere. The term "outdoor eduction" came into use and outdoor curriculums were developed. Legislation in Michigan which permitted school districts to acquire and operate camps as a part of a school program had a great impact on residential outdoor schools. This gave impetus for the rapid growth of residential outdoor school throughout the United States. In Canada the first conservation school camp was held at a Toronto-area church campsite through a co-operative arrangement involving the Humber Valley conservation authority, York Memorial Collegiate Institute, and York Township. Other early experimenters such as John Ross Robertson Public school in Toronto, Forest Hill Junior High, and King George School in Guelph all sent students to residential outdoor schools in the early 1950's (Canadian

Education Association, 1969). In 1954, the Outdoor Education Project of the American Association for Health, Physical Education and Recreation was initiated and gave added thrust to outdoor education and broadened the concept of the term to include the teaching of skills, attitudes and appreciation necessary for satisfying outdoor pursuits. "Education in and for the outdoors" came to be a common theme (Smith et al 1972, p.50).

On the conservation side a great philosophical change in how we view nature started to develop in the 1930's and 40's. The writings of Aldo Leopold, Hugh Bennett and Robert Marshall called for a new ethic for human-land relations, or the "ecological conscience". Leopold (1949) called for "a state of harmony between man and land". Through the establishment of the fields of ecology and conservation, humans were seen as part of the total environment rather than outside of it. This called for the development of concepts and attitudes in humans as reflected in their behaviour toward their physical environment and is labelled conservation education (Smith et al 1972, p25.)

This philosophical change gave new energy to environmental education. Nature studies and outdoor education now had a higher function. Not just recreational or aestethic use or knowledge of our environment but development of attitudes that reflect a human lifestyle that ensures survival of our natural environment and the human species were to be the goals. The 1960's showed growth in a wide variety of outdoor education in schools and the increase in the in-service preparations of teachers and leaders. Universities offered summer workshops and programs of graduate study in outdoor education. This period

would be characterized as one in which outdoor education had wide acceptance as a development in education (Hammerman and Hammerman, 1973, p51). Canada in the 1960's saw the establishment of a number of outdoor education centres or programs. In 1963 the Albion Hills Conservation Field Centre was opened by the Metropolitan Toronto and Region Conservation Authority and offered five-day programs to schools. The Regina public school system embarked on its four-day outdoor school project at Cypress Hills Provincial Park in the same year. By 1965 the Alberta Field Studies Council was established and Ontario wrote natural science and conservation schools into its legislation, which was a very significant breakthrough for outdoor education for it saw the establishment of hundreds of outdoor programs throughout Ontario. Alberta had legislation written into it's School Act in 1970 which encouraged out- of- school excursions. However it should be noted that outdoor education programs in Eastern Canada at this time were almost non-existent except for some individual initiatives (Canadian Education Association 1969; and Passmore, 1972).

Fuelled by such books as Rachel Carson's *Silent Spring* (1962), Stewart Udall's *The Quiet Crisis* (1963) and Paul Ehrlich's *The Population Bomb* (1968) concern for environment had become a concern for everyone. The 1960's saw an upsurge of environmental groups and public concern which culminated in the establishment of Earth Day in 1970. Bill Stapp (1969) suggested a new approach designed to reach citizens who were increasingly being asked to make decisions which would affect environmental quality. He called it **" Environmental Education".** He defined this endeavour in the

following way:

Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to solve these problems, and motivated to work toward their solution. (p.31)

2.3 Defining Goals and Objectives of Environmental Education:

The early 1970's saw a major emphasis placed on education as the place to start to solve environmental problems. As reflected by Recommendation 96 at the Stockholm Conference on the Human Environment, 1972, they saw environmental education " as one of the most critical elements of an all out attack on the world's environmental crisis" (UNESCO, 1976- p.2). The Conference was held in response to the rising international concern about the environment. It also recommended that organizations of the United Nations system, especially the United Nations Educational, Scientific and Cultural Organizations, (UNESCO) and other international agencies concerned, should take the necessary steps to establish an international programme in Environmental Education (Connect 1972,p.2). This resulted in the International Environmental Education Program in 1975 , headed by Bill Stapp. UNESCO carried out a survey to determine international education needs and priorities and commissioned a number of trend papers. This information was used by participants of the October 1975, International Environmental

Education Workshop at Belgrade to develop the "Belgrade Charter" which was published in the UNESCO-UNEP newsletter Connect (1976).The Belgrade Charter described principles and established guidelines that were to be the cornerstone of the international environmental education movement. The goal of environmental education is defined in this document as:

> **To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones. (UNESCO,1976)**

This conference in turn lead to the 1977 Tbiblisi (Georgian SSR, USSR), International Conference on Environmental Education, which was seen as an effort to consolidate the field. This conference produced what is generally accepted in the literature as the guiding goals and principles for environmental education (Volk et el (1984), Hungerford and Volk (1990) and Simmons (1991)) the "Tbilisi Declaration" (UNESCO, 1978) which states:

> **A Basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and built environments resulting from the interaction of their biological, physical, social, economic, and cultural aspects, and acquire the knowledge, values, attitudes and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and in the management of the quality of the environment. (p.2)**

> **The goals of environmental education are:**
> **- to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas;**
> **- to provide every person with opportunities to acquire [sic] the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;**
> **- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment. (p.3)**

> **The objectives are as follows:**
> **-Awareness - to help social groups and individuals acquire awareness and sensitivity to the total environment and its allied problems**

-Sensitivity- to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of, the environment and its associated problems
-Attitudes- to help social groups and individual acquire a set of value and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection.
- Skills- to help social groups and individuals acquire skills for identifying and solving environmental problems.
- Participation-to provide social groups and individuals with an opportunity to be actively involved at all levels in working towards resolutions of environmental problems.

Seeking to provide further order to the field, and to facilitate the application of its definition and structure, Hungerford, Peyton and Wilke (1980) developed goals for use in curriculum development. Their ultimate or "superordinate", goal is to provide an education which results in environmentally affirmative citizenship. These goals were subjected to a rigorous validation by a jury of nationally recognized environmental educators who validated these goals against the goals from the Tbilisi Declaration. In essence, the Goals for Curriculum Development in Environmental Education operationalize the general goals of environmental education (EE) and furnish a set of definitive subgoals to guide curriculum developers in interpreting the more general Tbilisi objectives. Hungerford, Peyton and Wilke (1980) Goals for Curriculum Development:

***The superordinate goal*: . . . to aid citizens in becoming environmentally knowledgable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment.**

Goal Level I. The Ecological Foundations Level
This level seeks to provide learners with sufficient ecological knowledge to permit him/her to eventually make ecological sound decisions with respect to environmental issues.

The Ecological Foundations Level would minimally include the following conceptual components:

A. Individuals and populations
B. Interactions and interdependence
C. Environmental influences and limiting factors
D. Energy flows and nutrient cycling
E. Community and ecosystem concepts
F. Homeostasis
G. Succession
H. Humans as members of ecosystems
I. The ecological implications of human activities and communities

Goal Level II. The Conceptual Awareness Level-Issues and Values

This level seeks to guide the development of a conceptual awareness of how individual and collective actions may influence the relationship between quality of life and quality of the environment and, also, how these actions result in environmental issues which must be resolved through investigation, evaluation, values clarification, decision making, and finally, citizenship action. Goals at this level are formulated to provide opportunities for receivers to conceptualize:

A. How human cultural activities (e.g., religious, economic, political, social, etc.) influence the environment from an ecological perspective
B. How individual behaviours impact on the environment from an ecological perspective.
C. A wide variety of environmental issues and the ecological and cultural implications Of these issues
D. The Alternative solutions available for solving environmental issues and the ecological and cultural implications of these solutions
E. The need for environmental issue investigation and evaluation as prerequisite to sound decision making
F. The roles played by different human values clarification as an integral part of environmental decision making
G. The need for responsible citizenship action in resolving environmental issues

Goal Level III. The Investigation and Evaluation Level

This level provides for the development of the knowledge and skills necessary to permit learners to investigate environmental issues and evaluate alternative solutions for solving these issues. Similarly, values are clarified with respect to these issue and alternative solutions. Goals at this level are presented in two components.

Component A: Goals for Component A are to develop in learners:

A. Knowledge and skills needed to identify and investigate issues and to synthesize the gathered information
B. Ability to analyze environmental issues and the associated value perspectives with respect to their ecological and cultural implications.
C. Ability to identify alternative solutions for specific issues and the value perspectives associated with these solutions.
D. Ability to evaluate alternative solutions and associated value perspectives for specific issues with respect to their cultural and ecological implications
E. The ability to identify and clarify their own value positions related to specific issues and their associated solutions
F. Ability to evaluate, clarify, and change their own values positions in light of new information

Component B: Goals for component B are to provide learners with opportunity to:
G. Participate in environmental issue investigation and evaluation
H. Participate in the valuing process in a manner as to permit the learner to evaluate the extent to which his/her values are consistent with the superordinate goal for environmental education

Goal Level IV. Action Skill Level-Training and Applications
This level seeks to provide the development of those skills necessary for receivers to take positive environmental action for the purpose of achieving and /or maintaining a dynamic equilibrium between quality of life and quality of environment. Goals at this level are presented in two components.

Component A: The goal in component A is to develop in learners:
A. Skill which will permit them to effectively work towards ends which are consistent with their values and take either individual or group action when appropriate
Component B: The goals for component B are to provide learners with opportunity to:
B. Make decision concerning action strategies to be used with respect to particular environment issues
C. Apply action skills to specific issues, i.e., to take citizen action on one or more issues
D. Evaluate the actions taken with respect to their influence on achieving and/or maintaining a dynamic equilibrium between the quality of life and the quality of environment.

2.4 Problems with the Goals of Environmental Education:

While the previous description shows a consistent and non-disputed pattern in EE goal development it should be noted that the goals of EE have been widely debated by many in the literature (Harvey 1977; Childress 1978; Disinger 1983; Volk et al 1984; Jickling 1991a ,b and c). The literature does contain papers and thoughts that challenge the established goals. A brief discussion of these thoughts here may help explain, why Environmental Education Curricula frequently do not reflect the goals or objectives accepted by most in the environmental education field.

The first time I read the Hungerford et al (1980) Goals of EE two very clear thoughts ran through my mind. One was to ask which type of environmentally active citizen do we train students to imitate, such as members of Geenpeace, Canadian Wildlife Federation or any of the host of other environmental groups. From personal experiences these environmental group are quite different in philosophy and approach. The second thought was that there are not many educators, including myself, who would endorse wholeheartedly these goals past Goal Level I, for they seem like indoctrination not education. Hendee (1972) echoes these thoughts when he contends the EE field is governed primarily by unquestioned truths and unproven beliefs. His following statement echoes my instant reaction to Hungerford et al (1980) EE goals

> ***... Environmental education should aim first at transmitting knowledge and facts and subordinate to that, at changing attitudes, values and cultural perspectives towards the environment and stimulating social action.(p.20)***

> ***While developing positive attitudes towards the environment has merit, particularly since people vote more on attitude than on knowledge and some***

> ***environmental problems are so severe that the end may justify the means, there are some compelling philosophical arguments for keeping such missionary aspects of any educational endeavour subordinate to providing factual knowledge about the subject. In a democratic society, freedom of choice to believe as one sees fit is a necessary ideal and coercing belief through publicly financed or sanctioned educational efforts is anathema. (p.20)***

Reality also seems to reflect Hendee's (1972) sentiments. Simmons (1991) gathered information from Nature and Environmental Centres on their goals and objectives to investigate if they were meeting the goal of responsible environmental behaviour. She found that the objective of explicitly trying to change attitudes is not wholeheartedly embraced and "some centres found actively promoting a set of values distasteful". Keen (1991a&b) in her study of the effect of the Sunship Earth Program on school children encountered classroom teachers who did not feel comfortable teaching lessons specifically aimed at environmental attitudes. The implications of this is, if the teacher or educator delivering the message has problems or philosophical differences with the message, then the delivery of the message is at risk.

Jickling (1991b) in his PhD. Thesis **Thinking Environmentally: Consideration for Education and Curriculum in the Yukon** does a critical analysis of the literature on the definitions and goals of environmental education. He clearly argues that the ultimate goal for EE, "environmentally affirmative citizenship", is not Education. He contends the ultimate goal for EE is training a person to be an activist or advocate and "is at considerable variance with the concept of education and our understanding of what it

means to be educated", which "is inextricably linked to knowledge and understanding... educational achievement should enable individuals to act intelligently. People will not act intelligently if they have been trained, brainwashed, conditioned, indoctrinated, cajoled, coerced, bribed, or otherwise manipulated to behave in a certain way."

There is also considerable objection to problem solving as a goal of EE. Bogan (1973) stresses that problem solving is justified as a pedagogical process rather than an aim. As he explains using the following analogy:

> ***We believe that population education should not approach population as a "problem" to be solved or a point of view to be promoted. The goal of population education is to incorporate concepts and materials related to population into the curriculum in order to educate future generations, enabling them to make more intelligent decisions with regard to population.(p.3)***

Disinger (1985-86) point out that the complexities of environmental problems and the lack of societal consensus as to what is an acceptable solution creates difficulties about what it means to problem solve in Environmental education. Passmore (1974) clarifies these difficulties succinctly: " an ecological problem is not, in the first place, the same thing as a problem in ecology"(p 43). A problem in ecology arises out of missing information or understanding of a particular phenomenon, whereas an ecological problem is a social problem that describes a phenomenon which we judge unacceptable. These problems are not solved but cease to exit when society takes steps to stop them or reduce them to acceptable levels of tolerance. For example the seal hunt of Newfoundland is not an ecology problem. We know there is large population of seals that can sustain being hunted, but it is an ecological problem because members of our society deemed it to be

so. There is no clear answer to the seal hunt problem for it depends on ethical values or views of what should be socially acceptable. As Jickling (1991b) points out

> ***It is clear that at the heart of the issue are questions, about what is , or should be, socially acceptable. Critical reflection about these values which determine social acceptability is essential to clear thinking about an issue. Perpetuating the "problem solving" myth is antithetical to the notion of clear thinking. Ethical positions are not static and do not provide concrete solutions; they are constantly being re-examined, re-evaluated, and re-defined. Surely this sort of activity is more consistent with the educational enterprise. Unfortunately, concentrating on problem resolution distracts from these fundamental issues (p.57). At the very least we must ensure that students can distinguish between empirical and philosophical questions, a point lost in much environmental education literature (p 69).***

Jickling (1990) also points out, that given the complexities of environmental issues and the difficulty of defining problem solving in this area, identifying a discrete set of "skills" needed for environmental problem solving is an almost impossible task.. Thus, expecting a child to develop a discrete set of environmental problem solving skills and to solve environmental problems is setting the child up for potential failure.

This does not mean the dismissal of action strategies or discussion of environmentally appropriate behaviour in schools. We do expect an educated person to be transformed by their experiences and to act in a way consistent with their education. Environmentally responsible behaviours are correctly seen as logical consequences of education rather than aims in themselves (Jickling, 1991b). Schools are often charged with the task of developing generally accepted patterns of behaviour, socialization or training. We might socialize or train a student not to litter, to recycle and not to destroy the environment.

However when it comes to more complex environmental issues like hunting, overpopulation or forestry practises we should not train or socialize people in a prescribed way. These issues require an educated person to think intelligently and to know that generalizations do not work. Hunting, for example, might be acceptable in some situations but not in others. To train or socialize that all hunting must be banned could have disastrous effects in ecosystems where humans are the main predator, not to mention the effects on some human cultures. School programs must play a facilitating role in allowing investigation of some important social issues. Through investigations they should provide some strategies in how to access and organize information, and general skills of being effective members of society. This author feels that Hungerford et al's (1980) Goal Level II, III and IV are an attempt to do this. The inherent problem with these goal levels is the prescribed direction of "resolving environmental issues" which for most complex issues may never be resolved but just mitigated, or the "need for responsible environmental citizenship action ... consistent with the superordinate goal". As stated earlier, which environmental citizen do we model, and whose standard of "quality of life" and "quality of environment" do we go by are major unanswered questions.

Chapter Three

Literature Review and Theoretical Models

3.1 Introduction

Throughout the development of environmental education, goals have been widely described and debated in the literature (Harvey 1977 ; Childress 1978; Disinger 1983; Volk et al 1994). Many in the field of Environmental education seem to agree that the ultimate goal of environmental education is responsible environmental behaviour (Stapp 1971; and Marcinkowski 1990). Existing empirical studies indicate that this goal is not being met in schools. Childress (1978) found in a national survey of 301 EE programs in the United States that for the most part EE curriculum in the public school was concentrated at an awareness level (knowledge and attitudes). The survey indicated that most teachers who taught environmental education believed that awareness based EE would be enough to accomplish the goal of students participating in responsible environmental action. Volk et al (1984) did a national survey of Curriculum needs as perceived by professional environmental educators. In general they found there was a greater degree of perceived accomplishment to lower level goals (awareness) than to higher level goals (citizen action).

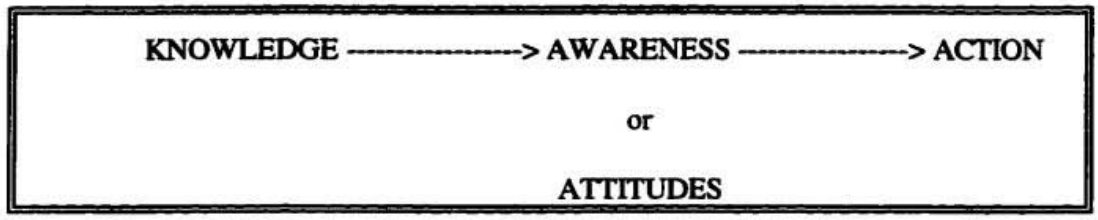
This is not surprising as most formal and informal methodologies were not designed to achieve the goal of responsible environmental behaviour (Volk et al 1984; Simmons

1991). Most environmental education programs are designed on linear models (see Figure 3.1) for changing behaviour based on traditional thinking . . . if we make human beings more knowledgeable, they will, in turn, become more aware of the environment and its problems which leads to favourable attitudes, which in turn leads to action promoting better environmental quality (Hungerford and Volk 1990). This model is suspect as the literature does not show a clear and sequential relationship as the model suggests. More complex behavioural models that may promote responsible environmental behaviour are proposed by Hine et. al (1986/87), and Hungerford and Volk (1990) (see figures 3.2 and 3.3). This chapter will examine the three behavioural models and the literature associated with each. From these models and the literature a prospectus for this research study is developed.

3.2 Traditional behaviour model

The field of EE has been occupied with attitude and awareness research. Iozzi (1989) states "the gateway to the learning process is the affective domain". Indeed many early researchers in environmental education agreed with this statement, as a large portion of the research focused on the affective domain. In Monograph #2, A Summary of Research in Environmental Education, 1971-1982, Iozzi et al. (1984) noted the following:

Figure 3.1: Traditional Behavioural Change System (from Hungerford and Volk 1990)



> **The greatest number of studies (in environmental education) dealt , surprisingly, with the affective domain (57.7%) followed by the cognitive domain (41.1%). " Surprisingly" here refers to the fact that in most research in other disciplinary areas, researchers have tended to focus more heavily on the cognitive domain rather than on the affective domain.** (p.9)

They also noted that most of the research conducted in the area of environmental education and the affective domain has been essentially descriptive ; that is, researchers have attempted to develop environmental profiles of various sectors of society. More than 70% of the research conducted between 1971-1982 was classified as descriptive (p.9). Very few studies attempted to determine the effects of specific interventions or programs designed to improve, change, or alter existing attitudes or values and the ways they impact on the environment.

This section will examine the literature related to the Traditional Behaviour model. In

Section 3.2.1 the different components of the behaviour model are examined to set definitions for the Chapter and the study. Section 3.2.2 will examine what the descriptive research tells us about the traditional behaviour model, and section 3.2.3 will look at the intervention research.

3.2.1 Setting definitions for the components of the traditional behaviour model

A brief review of what the educational literature tells us about the components of the traditional behaviour model and their relationship to each other will be discussed here to provide definitions for the literature review and the study.

Knowledge:

The value of pure information in changing attitudes is difficult to assess because of the multiplicity of other factors that may be involved, such as the source of the message, message content and characteristics of the recipients (Petty and Cacioppo, 1981). The issue is further clouded because many attitude theorists believe that attitudes themselves contain a cognitive component and it is difficult to separate knowledge from attitude (Millar & Tesser, 1989). Some forms of behaviour are thought to be influenced mainly by the affective domain and others by cognitive factors. Motivational theory also suggest that each person possesses pieces of knowledge that are linked together to form a cognitive system. It is believed that people have a value equilibrium in their cognitive system so that information that puts their value system into disequilibrium is somehow

incorporated to form a new value equilibrium or ignored (Newhouse, 1990). Some knowledge of an issue must clearly be a prerequisite for appropriate behaviour. Jorden et al (1986) also feel that knowledge of a problems is only part of the catalyst required; a person must also know what to do to help.

Attitude:

Attitude is considered by many to be one of the most important influences on behaviour (Iozzi,1989). Before we examine the research, attitude needs to be defined. Most early attempts to measure attitude assessed only the affective or evaluative dimension. That is, attitudes are operationally defined as preferences; hence Bem's (1970) definition - "attitudes are likes and dislikes". However a definition that includes many of the central ideas used by attitude theorists would be as follows "Attitude is an idea charged with emotion which predisposes a class of actions, to a particular class of social situations." (Triandis, 1971, p.2). This definition suggests that attitudes have three components or constructs: cognitive, affective and conative.

Affective domain is defined as an enduring positive or negative feeling about some person, object, or issue.

Cognitive domain refers to beliefs and is defined as the information that a person has about a person, object or issue. This may be factual or based on personal opinion.

Conative domain refers to action or behavioural tendencies of an individual regarding a person, object or issue. (Borden and Schettino, 1979; Triandis, 1971).

There is relatively little research about how environmental attitudes are formed or changed. The literature seems to indicate that life experiences rather than any one specific program determine attitudes (Newhouse 1990). Newhouse describes four specific methodologies that may induce attitude change: mere exposure, direct contact, modelling and information. It is also possible that a majority of an individual's basic attitudes and, therefore, their behavioural tendencies are formulated between the ages of seven and twelve (Tourney and Tescni, 1977).

Attitude and behaviour relationship

The social psychology literature contains an extensive treatment of the relationship between attitude change and behaviour change, and the connection appears to be tenuous (Baron and Byrne, 1991). Rajecki (1982) has offered a comprehensive overview of the potential causes for the attitude-behaviour discrepancy. These include temporal instability, direct versus indirect experience, normative influences and attitude behaviour measurement correspondence.

Temporal instability refers to the general rule that the longer the interval between the collection of two types of data, the less consistent the results. In other words many

incidents can happen to an individual over a time period that can change the individual's attitude and behaviour with respect to a particular object or issue.. Also related to this is the idea that, if a specific attitude is drawn from a stable attitude pool, then that specific attitude will be a better predictor of behaviour compared to those drawn from an unstable attitude pool (Shwartz, 1978).

Direct experience with an object is also believed to result in more attitude-behaviour consistency than indirect experiences. (Fazio and Zanna (1978, p 241). They suggest three possible reasons for this:

1. Direct experience may simply make more information available and thus results in a more accurate attitude.
2. Direct experience may cause the person to focus on his or her behaviour, and behaviour itself may be the bases of an attitude.
3. Direct experience may involve repetition or mental rehearsal, leading to an attitude that is more easily or accurately remembered.

Normative influences or social norms may prevent a person from acting the way he or she would like to, given their attitude. When there are no strong social norms attitudes often predict behaviour (Ajen and Fishbein, 1977). It is also important to note that normative influences may also affect how a person responds on a questionnaire, causing them to give the social norm response rather than their true opinion.

Measurement correspondence: The final explanation suggested by Rajecki(1982) is the theory of lack of correspondence criteria. The theory states that the attitudes or behaviours measured do not correspond. The closer the behaviour corresponds with the attitude then the better the level of behavioural prediction.

3.2.2 What does the descriptive research tell us about the traditional behaviour model

This section examines the descriptive research literature. The section is organized under three general statements that summarize what we know from the descriptive research: most studies indicate that environmental attitudes seem to be high while knowledge is low, the relationship between knowledge and attitudes is unclear, and males generally display greater environmental knowledge while females show stronger feelings and verbal commitment to the environment.

Most studies indicate that environmental attitudes seems to be high while knowledge tends to be low. Research appears to support Gigliotti's conclusion (1990) that " we seem to have produced a citizenry that is emotionally charged but woefully lacking in basic ecological knowledge"(p.9). Indeed poll after poll shows that people are concerned about the environment. In a 1990 poll in the United States 84% of the individuals surveyed reported that they believed that pollution in the country as a whole is serious and getting worse, while only 71% agreed that we must protect the environment even if it means

higher taxes (Berke 1990). A 1992 opinion poll conducted by the Columbia Broadcasting System (CBS) reported that two thirds of Americans polled believed that " environmental problems are so important that solutions must be found regardless of the cost." Similarly, a national public opinion poll conducted by Peter D. Hart Research Associates (Fuller,1992) revealed that the highest ranked issue cited by young people looking toward the year 2000 is the environment. Results of the poll indicated that young people are more motivated and environmentally aware than their parents, although their understanding of the issues is limited.

Blum (1987) found that high school students in four countries possessed low levels of environmental knowledge. He compared five surveys conducted in the United States , Australia. England and Israel that assessed environmental knowledge and beliefs of 9th and 10th grade students. The survey showed several items that assessed student knowledge of environmental facts and concepts. Results indicated that student beliefs in environmental causes were generally stronger than their factual or conceptual knowledge. Housbeck, Milbrath and Enright (1992) found similar results in a 1990 study of New York State 11th-grade students. They concluded: "students are fairly highly aware of and concerned about environmental problems, but have a weak substantive knowledge about how environments work, how societal and personal action impact the environment and how environmental problems impact society".

Surprising little research has been reported on the general populations level of

environmental knowledge but what research there is indicates low environmental literacy. Gambro and Switzky (1996) assessed the Environmental Knowledge of approximately 2900 high school students in a national Longitudinal Study of American Youth (LSAY). The analysis revealed low levels of environmental knowledge. A majority of the students were able to recognize basic facts concerning environmental problems; however most students could not apply their knowledge to comprehend the consequences or potential solutions related to the problem. The author acknowledged the limitations of the Environmental Knowledge Scale used in the study which consisted of only 7 items. Arcury and Johnson (1987) using data from a state wide survey found that public environmental knowledge was painfully low and the major correlates for knowledge were education, income and sex. A 1980 national survey conducted by Resources For Future (RFF) (Council on Environmental Quality, 1980), included a series of environmental knowledge questions. The results showed that only about 20% of the sample were able to answer 70% of the questions correctly and the majority could answer only 3 of the 9 questions correctly. The Council concluded that " because opinion based on knowledge is highly desirable, the knowledge findings in the RFF survey challenge environmental educators and others concerned with dissemination of information on these issues"(p.37).

Several studies have examined specific forms of environmental knowledge among school students. Barrow and Morrisey (1988-1989) examined knowledge about energy in a sample of 9th grade students in Maine, USA and New Brunswick, Canada. Energy knowledge was measured by the Test of Energy Concepts and Values (Holden and

Barrow, 1984), which included 35 multiple-choice items. The results indicated that energy literacy is low. The mean number of correct responses was 51.4% for the Maine students and 48.6% for the New Brunswick students. The author suggested that an energy-literate individuals should correctly answer at least 75% on this test. Similarly, Brody, Chipman and Marion (1988-1989) conducted interviews to investigate the level of knowledge concerning acid rain in a sample of 4th-grade, 8th-grade, and 11th-grade students in Maine. The grade 11 students recognized and understood most of the concept on four of the 12 concepts tested. Younger students displayed even lower levels of comprehension. The results led the authors to conclude: *It is apparent that students understand only a small fraction of what we consider necessary for a full understanding of acid deposition phenomena.(p.40).*

A number of researchers have provided evidence that a social transformation is occurring in the direction of a "new environmental paradigm" (Dunlap and Von Liere,1978; Geller and Lasley, 1985). Shetzer, Stockman and Moore (1991) have proposed that a strong pro-environmental sentiment is currently emerging among business students. Whereas research by Thompson and Gasteiger (1985) and Gigliotti (1992) suggest that a move away from environmental concerns in favour of materialism is occurring. Both authors investigated changes in attitudes of Cornell University students to their willingness to give up 35 specific items. They found that students in 1981 and 1990 were more materialistic than students in 1971. Gigliotti (1992) suggests these results contradict most studies that find an increase in environmental concern because most studies use some measure of the

importance of environmental issue without involving tradeoffs.

The literature shows that in general surveys, most populations examined have high environmental attitudes except for those studies which involve tradeoffs. Environmental and ecological knowledge appears to be low in both adults and children. The implications of these studies for society is that public decision - making may be based on false premises, which could have disastrous environmental result.

The relationship between knowledge and attitudes is unclear. A number of studies indicate that knowledge and attitudes are related. Hausbeck and colleagues (1992) found that in a study on 11th-grade students that levels of knowledge, awareness and concern were correlated. Similarly, after a water conservation unit, Birch and Schwaab (1993) found a strong correlation between the knowledge and attitude scores of seventh-grade students. Fortner and Mayer (1983) reported that fifth and ninth graders with higher knowledge scores on a survey of knowledge and attitudes for the oceans and the Great Lakes had more positive attitudes than students with lower scores. Ramey and Rickson (1976) reported that increased knowledge regarding the nature and causes of pollution seemed to elicit more positive attitudes toward pollution abatement. They also suggested that their is a circularity between knowledge and attitudes in that one does not cause or precede the other but acquisition of one may in turn lead to the formation of the other. Hart (1978) in a study of twelfth-grade students (153 BSCS Biology and 147 non-biology) in Saskatchewan found that BSCS achievement and IQ were significant

predictors of the cognitive criteria variables, ecology comprehension and environmental information, but not of the affective variable environmental attitude. He did find that ecology comprehension was a significant predictor of environmental attitude but not environmental information. This conflicted with Moore (1971) where no relationship was found between ecology comprehension and environmental attitude of volunteers from the Madison area League of Women.

A number of other studies also show that the relationship between knowledge and attitude is unclear. Alaimo and Doran (1980) reported that science classes over a two year period seemed to have a positive effect on students knowledge about the environment but no effect on environmental concern. In fact, as some students acquired greater knowledge, they also acquired a more pessimistic view about the environment and environmental quality. Morgan and Gramam (1988) found that the presentation of a slide-tape show about snakes resulted in improvements in knowledge about snakes but did not result in attitude change. However modelling was effective in producing attitude changes toward snakes. Kinsey and Wheatly (1984) have suggested that perhaps the parameter that should be tested is defensibility of environmental attitudes rather than attitude change. They found that although completion of an environmental studies course at the college level did not lead to a change of attitude, it did lead to a more defensible attitude. They have proposed that, at least in adults , attitude shifts rarely occur; but rather that informational supports are developed that bridge the gap between cognition and attitudes to strengthen ones value system.

People often assume that knowledge will influence attitude which will in turn affect behaviour. A more complicated relationship was suggested by Borden and Schettino (1979). They surveyed a sample of 203 male and 327 female undergraduates enrolled in introductory psychology course at Purdue University to test the assumption that factual knowledge and feelings are independent variables, and to test to what extent each produces environmentally responsible action. They used the Moloney-Ward test which is composed of four subscales: affect, knowledge, actual commitment and verbal commitment. They found that affect and knowledge scales showed virtually no correlation. They found that environmental knowledge had a strong positive effect on actual commitment but relatively small effect on willingness to adopt responsible activities in the future. They also found that the effects of feeling toward the environment and environmental knowledge were completely additive in their influence on current behaviour. Further they found that what a person says he or she would be willing to do in the future is based almost entirely on his or her emotional reaction toward the issue.

It is very hard to draw any conclusions from the descriptive research about the relationship between knowledge and attitudes. The fact that different instruments are used in most studies makes the drawing of conclusions even more precarious. Also, only one study, (Borden and Schettino 1979), differentiated among types of attitudes being studied: affective, belief or behavioural. It is also possible that age may have an effect on the relationship between knowledge and attitudes, as the three studies that used adult populations (Moore, 1971; Kinsey and Wheatly, 1984; and Borden and Schettino, 1979)

found no relationship.

Males generally display greater environmental knowledge and females report stronger feelings and verbal commitment. When gender differences are found in studies they tend to follow the above pattern. Hart (1978), in a study of grade 12 biology majors and non-biology majors found that gender differences were evident concerning environmental information (favouring males) and environmental attitudes (favouring females only among the biology group). Gifford, Hay, and Boros (1982), in a study of undergraduates, found that men had more environmental knowledge about pollution and ecological issues than women did, that the women expressed greater negative affect toward anti-environmental events, and that more women than men reported they would do something about environmental problems. However, they never reported more actual commitment to environmental causes than men. Borden and Schettino (1979) also found that women had more verbal commitment to the environment but no more actual commitment. Similarly, Hausbeck, Milbrath, Milbrath and Enright (1992) found that 11th-grade girls were slightly more aware, whereas boy were slightly more knowledgable about the environment.

Szagun and Mesenholl (1993) conducted a study on German adolescents aged 12, 15 and 18 on their ethical and emotional concern about nature. On three of the researcher scales: consideration in dealing with nature, degree of sympathy, and enjoyment of nature, females scores were higher than their male age-mates. Only for one scale, "harm done to an ecosystem", were male and female scores similar. Szagun and Mesenhol also offer an

explanation for their findings: "The higher levels of sympathy with living things and consideration for nature that we found in female adolescents would seem to be almost exact parallels to the higher level of empathy and prosocial behavioural tendencies toward humans often found in women and girls". They also found a big difference between 12 - year-old and 15-year-old males, and interpret these data as indicating that with the internalization of such sex-typical values as "being tough and non-emotional" ethical and emotional scores go down more for older males, whereas female scores stay high because female gender-typical behaviour allows for more expression of emotion. Gender-typical values may also explain why males are more ecologically knowledgable. Males in many Western societies are given greater exposure and opportunity to do outdoor activities like hunting, fishing or camping which may increase their environmental and ecological knowledge. Lawrenz and Dantchick (1985) investigated developmental and/or sex components of energy attitudes using Kuhn's Energy Opinionnaire (1980). Results indicate that changes in the student attitude through grade levels are consistent with cognitive and affective development literature, and that gender differences are more pronounced in older students, with females having a more external world view.

3.2.3 Intervention Research Findings

Leemings et al (1993) carried out a critical Review of Outcome Research in Environmental Education. Their review included an analysis of 34 environmental education studies published since 1974 that attempted to demonstrate changes in environmentally relevant knowledge, attitudes or behaviour. The authors divided the

studies into two major categories **in-class programs** (17 papers) and **out-of-class programs** (17 papers). This review focused on school children as the primary targets of interventions but also included a few studies with adults. A summary by Leeming et al (1993) of Classroom Interventions (Table 3.1) and Out-of- class Interventions (Table 3.2) is included here to give a general overview of research findings on the dependent variables of attitude, knowledge and behaviour.

Using Leemings et al (1993) review and other environmental reviews and research, four important environmental questions will be addressed. The questions discussed the following matters:

Can EE increase environmental attitudes and knowledge?

Which is more effective in teaching environmental knowledge and attitude, in-door or outdoor interventions?

Once attitudes and knowledge are acquired from an intervention are they long lasting?

What are some of the methodological problems encountered in the EE intervention research?

Environmental attitude and knowledge gains research

Can Environmental Education teach positive environmental attitudes and produce gains

Table 3.1 Summary of Classroom Interventions From Leemings et al., (1993)

Reference	Subject grade	Independent variable	Duration of I.V.	Dependent variable	Effect	Follow up
Aird & Tomera, 1977	6	Instruction & activities	2 weeks	Attitude, Knowledge	+	0
Armstrong & Impara, 1991	5, 7	Instruction	4-8 weeks	Attitude, Knowledge	-	0
Asch & Shore, 1975	5	Instruction	2 years	Behavior	+	0
Birch & Schwab, 1983	7	Instruction	?	Attitude, Knowledge	+	0
Bryant & Hungerford, 1979	K	Instruction	1 month	Knowledge	+	0
Carpenter, 1981	College	Course	Semester?	Attitude	?	0
Fennessey et al., 1974	3,4, & 8	Game vs. simulation vs. traditional	2 weeks	Attitude, Knowledge	-	0
Hepburn et al., 1978	9, 10	Curriculum	15 vs. 30 days	Attitude	Mixed	0
Hounshell & Liggett, 1976	6	Activities	7 weeks	Attitude, Knowledge	Mixed	0
Howell & Wambrod, 1974	11, 12	Manual	6 weeks	Attitude	-	0
Jaus, 1978	Teachers	Instruction	10 days	Attitude	+	0
Jaus, 1982	5	Instruction	10 hours	Attitude	+	0
Jaus, 1984	3	Instruction	2 hours	Attitude	+	2 years
Ramsey et al., 1981	8	Instruction (action vs. issue)	7 month	Knowledge, reported behavior	+	2 month
Ramsey & Hungerford, 1989	7	Instruction (action + issue)	18 weeks	Knowledge, reported behavior	+	0
Simmons et al., 1977	High school	Values clarification	3 weeks	Attitude, Knowledge	?	1 year
Wilson & Tomera, 1980	10	Case study and simulation	3 days	Attitude	Mixed	0

Tables 3.2 **Summary of Out-of-Class Interventions From Leemings et al. (1993)**

Reference	Subject grade	Independent variable	Duration of I.V.	Dependent variable	Effect	Follow up
Bregden et al., 1977	College	Field trip	?	Attitude	-	0
Crater & Mears, 1981	8	Activities	?	Attitude, knowledge	?	0
Dunlop, 1979	Teachers	Workshop	1hour	Attitude	?	0
Fortner, 1985	9	TV vs. lecture	30 min vs. ?	Attitude, knowledge	Mixed	2 weeks
Fortner & Lyon, 1985	Adult	TV program	30 min.	Attitude, knowledge	+	2 weeks
Horsley, 1977	College	Act as agent	12 days	Attitude, behavior	Mixed	7 weeks
Howie, 1974	5	Indoor vs. outdoor	10 hours	Knowledge	+	0
Huber et al., 1981	H.S.	Camp activities	3 weeks	Attitude	?/-	0
Jordan et al., 1986	H.S.	Residential workshop	6 days	Knowledge, reported behavior	+	2 months
Kostka, 1976	6	Activities	2 weeks	Attitude reported behavior	-	0
Lisowski & Disinger, 1991	H.S.	Resdential marine-science programs	7days	Knowledge	?	4 weeks
Quinn, 1976	10	Value sheets	10 days	Attitude	-	0
Ryan, 1991	5	Visit to conservation area	1day	Attitude	?	0
Shepard & Speelman, 1985	9-14 yrs.	Camp program	3 - 5 days	Attitude	-	0
Simmons, 1984	Adult	Workshop	1 day	Attitude, knowledge	-	3 months
Wendling & Wuensch, 1985	5	Activities, field trip	2 weeks	Attitude, knowledge	Mixed	0
Wendling et al., 1989	5	Activities, field trip	2 weeks	Attitude	+	0

in ecological knowledge when programs and methods designed specifically to accomplish those objectives are used? The majority of class intervention studies reported in Leeming et al (1993) showed positive effects of the intervention. Armstrong and Impara (1991) found no significant effect on knowledge or attitudes of grade five and six students after a Nature Scope Supplement intervention of 4-7 weeks. They felt that the effect of the program was diluted by numerous other demands on teachers and students. They stated "Perhaps this is a more realistic assessment of the impact of environmental supplements in today's schools. Those evaluations that instill strict controls on teacher behaviour may produce a biased estimate of the potential of these programs to produce change"(p.40).

For the out-of-class interventions studies in general, the size of the treatment effects in these studies were small and few showed clear positive results (Leeming et.al,1993). There is no clear explanation for why out-of -class studies show such mixed results but novel settings, fear and length of the intervention research may explain some of the results especially for studies involving younger children. No out-of-class intervention was reported below grade five. Research in novel settings has found that, for children between 7-13 years of age, novel environments are poor settings for imposed task learning when compared to familiar environments (Martin et al.,1981). Falk and Balling (1982) found that the younger the child, the more likely the novelty of an unfamiliar setting is to interfere with cognitive learning as the need for familiarization is greater. Bixler, Carlisle, Hammitt and Floyd (1994) states after a review of the literature on fear

"that urban children in wildland areas should initially respond negatively to those environments simply because so much of the area is unknown and highly novel". This issue of novelty may also be why Ignatuik (1978) concluded that only field trips in excess of two and one-half days in duration were significant in changing students attitudes. Furthermore, his results indicated that field trips of 5 days duration exhibited the greatest effect in changing student attitudes. Crompton and Seller (1981) concluded that length of exposure to natural environments may be the single most important variable in program success. "Direct experiences in wildlands must cause students to reconsider many beliefs they acquired through media depictions and hearsay." However Simpson (1985) maintains that results available for five to 17 days programs are inconclusive and often contradictory. He feels it is not the length of the trip but the quality of the experience that determines whether a person's values and perceptions can be altered. Ignatuik (1978) also recognizes that trips resulting in more positive outcomes are ones that are well planned, have well-developed objectives and include some type of follow-up activity.

A recent study by Orion and Hofstein (1994) supports Simpson's conclusions and also helps clarify novelty factors. Their study investigated the factors that might influence the ability of grades nine through 11 high school students in Israel to learn during a one day Geology field trip in a natural environment. Their findings suggest that the educational effectiveness of a field trip is controlled by two major factors; the field trip quality and the "Novelty Space". Field trip quality is determined by its structure, learning materials, teaching method, and the ability to direct learning to concrete interaction with the

psychological, and geographic. They found that those students whose "Novelty Space" was reduced before the field trip scored significantly more on achievement of geology knowledge questionnaire and on attitude questionnaires dealing with attitudes towards field trips and Geology. They conclude that "a field trip should occur early in the concrete part of the curriculum, and should be preceded by a relatively short preparatory unit that focuses on the increasing familiarity with the learning setting of the field trip, thereby limiting the "Novelty Space" factors.

Knowledge acquisition appears to be fairly positive in the intervention research. Three of the studies reviewed by Leeming et al (1993) that focused on knowledge acquisition (Bryant & Hungerford,1979; Howie, 1974; Lisowski & Disinger, 1991) all found positive effects. In the 11 studies that measured changes in both attitude and knowledge all but three studies (Armstrong & Impara , 1991; Fennessey et al. ,1974; Simmons, 1984) found positive effects on knowledge.

However, attitude intervention shows very mixed results. In the eleven studies that measured attitudes and knowledge change in the Leeming et al. (1993) review only four showed clear positive attitude changes. Even more discouraging in this review on studies that targeted attitudes exclusively, they found only three studies (Jaus, 1978, 1982, 1984) that showed strong positive effects. The first study dealt with teachers and the other two with fifth- and third grade students following a two to 10 hours of classroom instruction. It should also be noted that Jaus (1982 & 1984) used only two intact classes and may

reflect Type I errors. A fourth study (Wendling & Wuensch, 1985; Wendling et al., 1989) reported positive attitude change results by fifth-grade students after activities and field trips, but there was only one class per treatment. It is interesting and significant to note that the strongest effect on attitude (Jaus, 1984) used grade three students. This may lend support to Tourney and Tescni (1977) that basic attitudes are formulated between the ages of seven to twelve and Wheatly's suggestion that attitude shifts in adults are rare. The remaining ten studies found either mixed or negative results.

In Leeming's et al., (1993) review only five studies measured behaviours. Three of the studies show strong positive effects in training the subjects specifically for pro-environmental behaviours (Ramsey et al., 1981; Ramsey & Hungerford, 1989) or actually involving the subjects in relevant behaviours (Horsley, 1977). A fourth study found strong positive effects on fifth-grade students after a 2-year educational program (Asch & Shore, 1985). One study (Jordan, Hungerford and Tomera, 1986) reported a small but significant effect on high school students' behaviour after a 6-day residential workshop on action training. Although the literature does not contain many intervention studies measuring behaviour, these five studies indicate the potential for increasing pro-environmental behaviours by means of a variety of types of techniques.

Indoor vs Outdoor interventions

"That which can be learned in the classroom should be taught there, and that which can best

be learned in the out-of-doors should there be taught. " said L. B. Sharp , the father of outdoor education.

"The purpose of outdoor education is to enrich, vitalize and complement content areas of the school curriculum by means of first hand observation outside the classroom" (Hammerman and Hammerman, 1973). Therefore a recurring question in environmental education is whether an outdoor environmental education program is more effective than an indoor program. There appears to be much anecdotal evidence on this question but little empirical proof of this as most researchers study only the one intervention (Disinger 1988). An early study which addressed the merits of learning outdoors was reported by the New York City Board of Education (1948) in Disinger 1988). The study investigated the effects of the Life Camp Program (a residential program) on academic growth of five areas: interest; arithmetic; science and health education; vocabulary; and nature study for 62 grade five and six students. They also had two control class groups of grade five and six students. The results indicated " initial and final superiority of the experimental group". However, re-analysis of the results suggest that the research design was not rigorous and that conclusions were overly optimistic and not definitive (Backman and Crompton, 1984). Also Huntley (1979) tried to replicate the Life Camp study and found no significant differences between groups in any of the 4 curriculum areas.

One study reviewed by Leeming et al (1993) that examined the effectiveness of outdoor education compared to classroom instruction is Howie (1974). Howie placed grade five

students in one of three treatment groups:

1. The indoor treatment group: consisted of ten one-hour or less sessions devoted to the introduction and discussion of environmental topics in a typical classroom setting. Topics included ecological principles and conservation practices.
2. The outdoor treatment group was a two-day experience at an environmental study centre covering the topics listed above.
3. A third group receive both indoor and outdoor treatments. The results suggested that the a combined indoor/outdoor strategy produces significantly higher achievement than either alone ($p < .05$). The outdoor treatment alone was significant, but marginal, over the indoor treatment group.

This is consistent with the results found in Orion and Hofstein (1994) study. They found that students whose "Novelty space" (level and type of knowledge and skills, acquaintance with the field trip area and psychological preparation) was reduced before the field trip made significantly more gains in knowledge and attitude.

A recent study by Keen (1991) also compared grade five and grade six students who had a five day outdoor residential program (Sunship Earth) plus the regular school program, to school classes which didn't attend the Sunship Earth program but studied the same ecological concepts as the residential program. She found that ecological knowledge increased significantly ($p = .001$) for those students who attended the Sunship Earth program but not for the regular school students ($p = .98$). Significant changes in attitude

did not occur for either group. She concluded that this program was successful at conveying ecological concepts to children for the following reasons:

1. Provision of a cognitive framework into which children can fit the ecological concepts they learn
2. The direct experience the child has with the natural environment
3. Having concepts conveyed through first-hand experience
4. The child's immediate application of the ecological concepts after learning
5. Small-group learning

Backman and Crompton (1984) reviewed the literature for empirical reports regarding what can best be learned outdoors. Their conclusions are presented here:

> Ausbel (1962) points out that past experiences influence new learning and retention by having some impact on the cognitive structure of the child. Based upon the findings of Howie (1972), Hosley (1974), and Goldsbury (1969) it is likely that environmental concepts may be learned more effectively if students are oriented in the classroom with relevant concepts, so they have the some sense of structure before going to the outdoor experience.
>
> The review suggests that outdoors may be effective in stimulating critical thinking and increasing problem-solving skills (McNamara, 1971; Slater, 1972), and when concern is with developing concepts and understanding rather than with rote memory (McNamara,1971). Independent field research is likely to be most useful

> with students who are more academic (those who do a lot of reading) while the more guided traditional learning approach in the outdoors is likely to be most useful for slow learners (Buerstatte, 1968).
>
> Little evidence was found to support claims for the teaching of language development in the outdoors. The strongest support was for environmental education which presumably meets Sharp's (1952) criterion of "that which can best be learned in the out-of-doors should be taught there".

However the authors warn that their conclusions must be taken tenuously due to the paucity of empirical studies and the low scientific standards used in most of the studies.

Historically, it has been assumed that a particular value of out-of-door education is in the affective realm. The "hands-on" or direct experiences that out-of-door programs offer is assumed to promote attitudinal changes. Research by Newcomb et al. (1965 in Morgan and Gramann, 1988) indicates that if initial attitudes are based on erroneous information, direct contact with an object can promote attitude change. As mentioned earlier direct experience with an object is believed to result in more attitude-behaviour consistency than indirect experience. However research has been limited and generally inconclusive in the area of environmental attitude change as a result of an outdoor education program. In Leeming et al's. (1993) review of 17 out-of-class interventions, it is apparent that the effect of the out-of- class treatments on attitudes change is very weak. As mentioned

earlier these mixed results may be due to novelty of a new environment or may occur because attitudes of the subjects are already well formed and thus very hard to change. For example Shepard and Speelman (1985-86) found that attitudes towards conservation, changed for nine year old and first time campers, whereas 10 to 14 year old and repeat campers appear to have already developed a conservation attitude.

Long term effects

Once positive environmental attitudes and knowledge are acquired do they last? Few experimenters have made any attempt to evaluate long-term treatment effects. In Leeming et al.'s (1993) review for classroom interventions only 3 studies provided any follow-up information beyond assessment immediately after the intervention. In the out-of-class interventions six studies did follow-up but all were done within three months.

Hungerford and Volk (1990) described additional follow-up to Ramsey et al (1981). They found that those students who had been in the experimental conditions were still "involved in more environmentally appropriate behaviours than their counterparts. However it is clear that the original behaviour observed in the eighth grade had eroded over time" (p.14). Statistical analysis was not given for this information, nor was it provided for the 2-month data. In another study, Jaus (1984) had a very impressive finding considering this was a two hour intervention. When the students tested in grade three were tested with the same questionnaire in grade five, they continued to show significantly more positive attitudes toward the environment than control subjects.

Simmons et al (1977) study on 14 high school students found after one year only slight decreases in achievement and no decreases in attitude scores. However they had a one group, pre-post test design which contains too many threats to internal validity to allow conclusions about the effect of the lessons.

For the out-of-class interventions reviewed by Leeming et al (1993), four of the studies that had follow-up maintained the effect on subjects (Fortner 1985; Horsley, 1977; Jordan et al, 1986; and Lisowski and Disinger, 1991). Two studies showed a decrease of effect. Fortner and Lyon (1985) tested the effects of viewing a 30-minute Cousteau documentary on adults via cable Television. They found experimental subjects had higher knowledge scores than controls on both the immediate test and the two-week follow-up test. Experimental subjects also showed more positive attitudes than controls did on the immediate test but not the delayed test. Simmons (1984) compared two methods of presenting information concerning hazardous waste management alternatives to adult community leaders. One group visited a hazardous-waste facility, and the other group participated in a visit simulated by slides. No significant difference was found between groups but both had significant changes in knowledge and attitude. However the three-month follow-up test showed that scores returned to pre-test levels.

Methodological Issues

A number of authors who have reviewed environmental education intervention studies

have concluded that research methodology generally is weak (Iozzi 1984; Lewis 1982; Backman and Crompton 1984; Leeming et al 1993). Leeming et al(1993) states:

> We found several studies that used notoriously weak designs, many others that omitted important details concerning procedure, and many that used weak or inappropriate statistical techniques (p. 20).

One of the major problems found in many Environmental Education research studies is a pre-posttest design is used with no control group. It is virtually impossible to assign effect if there is no way of assessing the effect of no treatment. Many experimenters also used pre-post test design simply compared groups in the posttest measures after finding nonsignificant differences on the pretest. Another problem is that the instruments that most investigators used to assess attitude, knowledge or behaviour were constructed specifically for the current project and often have not been constructed by means of rigorous psychometric techniques, and lack of concern with establishing the reliability and validity of the attitude measure employed. This development of instruments by researchers could also lead to experimenter expectancy. This refers to the various ways an experimenter may bias subjects to perform in a way consistent with their hypothesis. In many experiments the experimenter took part in the intervention study and /or administered the instrument. An additional problem of researchers using their own constructed instrument is that it makes it almost impossible to make meaningful comparison of studies as comparability of instruments is not known.

Few investigators, as Leeming (1993) pointed out, collected follow-up data to determine whether observed effects persist over time. Transient effects are more likely to result from artifacts such as demand or experimenter expectancy effects. Also very short programs may result in transitory learning which is soon forgotten. Other important criteria such as length of time of the intervention should be reported. Important criteria such as: age of subjects; the number of subjects; how the study was evaluated; methodology details, and the criteria for accepting or rejecting the results of a study were not mentioned in many studies.

3.3 Formative Influences on Responsible Environmental Behaviour

Many individual studies seem to suggest a number of variables that may be linked to responsible environmental behaviour. Tanner (1980) asked informal environmental citizen activist (volunteers) to describe those experiences which were significant in founding their current interests. The major formative influences found were youthful experiences in the out-of-doors, experiences with pristine environments, parental influences, teacher influences, negative experiences with habitat alterations, and solitude. Sia et. al. (1985-86) found that seven of eight formative variables were significant in predicting environmentally responsible behaviour when they compared Sierra Club members to Elderhostel members. They are as follows with the percent contribution of each variable for each group from a stepwise regression.

Belief in technology was the only variable not found significant. The two major behaviour predictors were: level of environmental sensitivity; perceived skill of environmental action

strategies.

Going one step further, Hines , Hungerford and Tomera (1986) synthesized studies of a wide range of environmental behaviour. Their meta-analysis of this research suggests that environmental behaviour is associated with such components as personality factors (attitudes, locus of control, efficacy perception, personal responsibility); knowledge of issues; intention to act; situation factors (constraints and opportunities). From their meta-analysis, Hines et al. (1986-87) developed a model of responsible environmental behaviour. This is represented in Figure 3.2.

Concurrently with or subsequent to Hines et al.'s (1985-86) research, a number of other researchers were making substantial contributions to the literature on environmental behaviour (Borden 1984-85; Ramsey 1989; Sia et al. 1985-86; Simpson 1989; Sivek 1989). Hungerford & Volk (1990) used these studies and the Hines et al. model to develop a new behaviour model (figure 3.3) with three main categories of variables (entry-level, ownership and empowerment). They hypothesize that the three categories of variables "act more or less in a linear fashion, albeit a complex one".

The discussion that follows represents an attempt to describe the variables listed in the Hungerford and Volk Behaviour flow chart. They are taken from or adapted from Hungerford and Volk (1990).

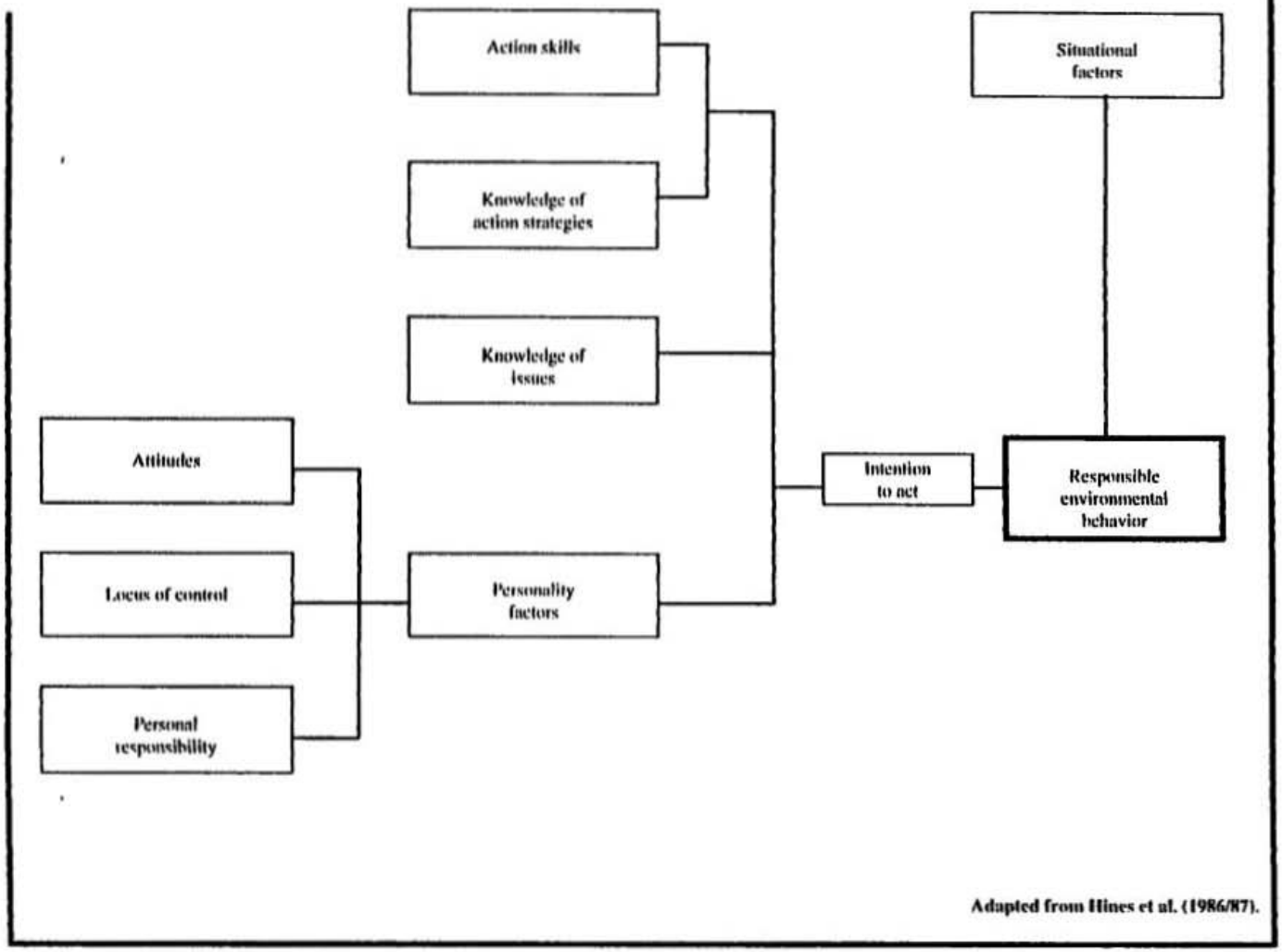
Table 3.3: Eight formative variables found to predict environmental responsible behaviour.

Variable	Sierra Club % contribution	Elderhostel % contribution
Level of environmental sensitivity	9.85	45.24
Perceived skill in using environmental action strategies	30.15	13.41
Perceived group locus of control	0.22	5.91
Belief in/ attitude towards pollution	0.22	2.01
Belief in/ attitude towards technology	0.36	1.86
Psychological sex role classification	0.47	1.66
Perceived knowledge of environmental action strategies	1.78	0.53
Perceived individual locus of control	0.17	0.18

Entry-level variables

Environmental sensitivity: is an empathetic perspective toward the environment. It encompasses the belief that humans must live in ecological harmony with the environment. It is the one entry-level variable that has shown a dramatic relationship to the behaviour research. Sia et al. (1985-86) found it to account for 13% of the variance in

Figure 3.2 The Hines Model of Responsible Environmental Behavior



Adapted from Hines et al. (1986/87).

the overall sample. It was also one of the major predictor variables in research conducted by Sivek and Hungerford (1989) in two of three Wisconsin Conservation Organizations.

Androgyny: refers to those human beings who tend to reflect non-traditional sex-role characteristics.

Knowledge of ecology: refers to ecological conceptual basis for decision making, e.g., concepts associated with population dynamics, nutrient cycles, succession etc. It must always be prerequisite to sound understanding of environmental issues and decision making.

Attitudes toward pollution/technology/economics: are all variables that are significant in some research. The extent of their involvement is still not know.

Ownership Variables

In-depth knowledge of issues: before individuals can engage in responsible citizenship behaviour, they must understand the nature of the issue and its ecological and human implications.

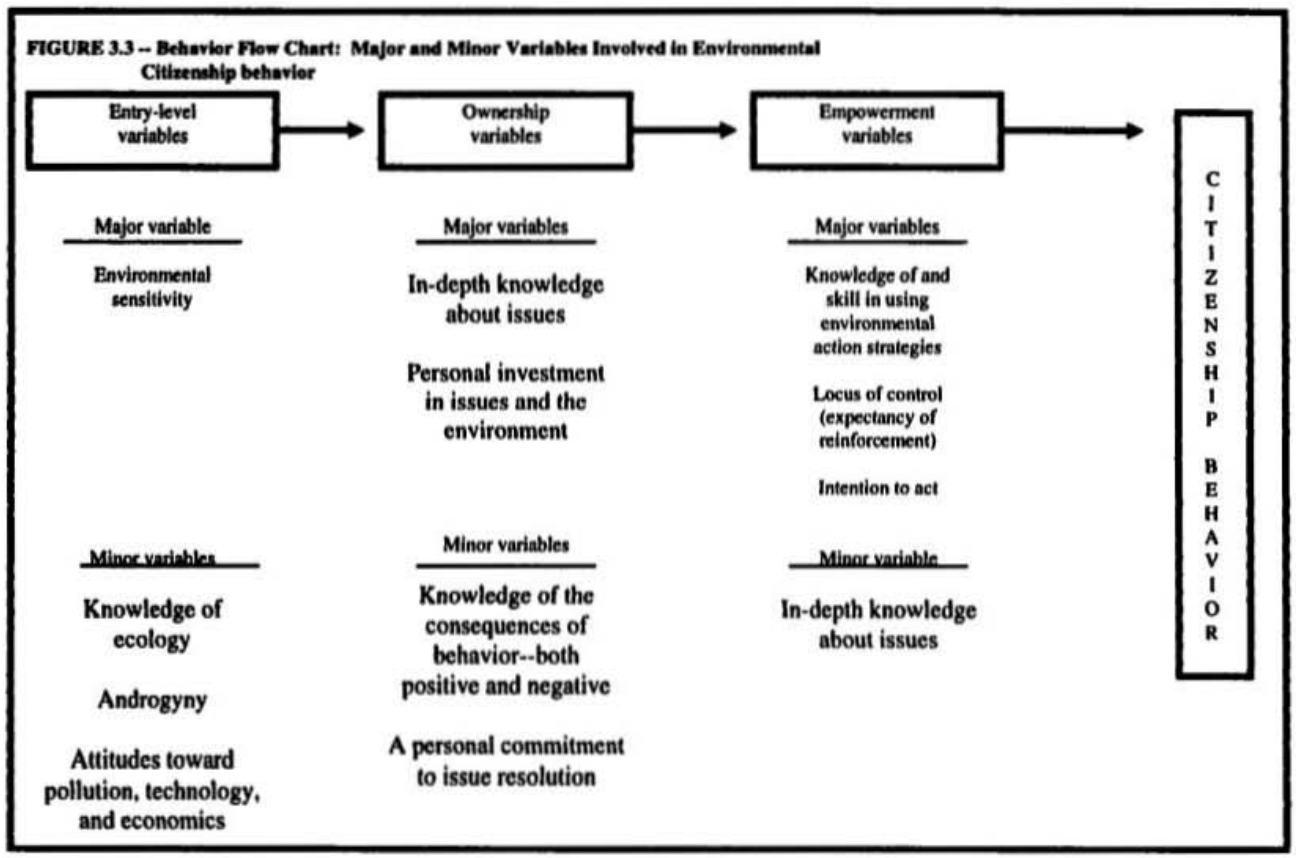


FIGURE 3.3 -- Behavior Flow Chart: Major and Minor Variables Involved in Environmental Citizenship behavior
Entry-level variables
Ownership variables
Empowerment variables
CITIZENSHIP BEHAVIOR
Major variable
Environmental sensitivity
Major variables
In-depth knowledge about issues
Personal investment in issues and the environment
Major variables
Knowledge of and skill in using environmental action strategies
Locus of control (expectancy of reinforcement)
Intention to act
Minor variables
Knowledge of ecology
Androgyny
Attitudes toward pollution, technology, and economics
Minor variables
Knowledge of the consequences of behavior--both positive and negative
A personal commitment to issue resolution
Minor variable
In-depth knowledge about issues

Personal investment: The individual identifies strongly with the issue because he/she has might what might be called a proprietary interest in it.

Empowerment Variables

Perceived skill in using environmental action strategies: is one of the best predictors of behaviour. It is the belief that you have the "power" to use citizenship strategies to help resolve issues.

Knowledge of environmental action strategies: refers to one's knowledge of, and ability to use, citizenship action skills to influence decision making.

Locus of control: refers to an individual's belief in being reinforced for a certain behaviour. A person with "internal locus of control" expects success whereas a person with"external locus of control" does not expect to be successful and often won't even attempt an action.

Intention to act: If a person intends to take some sort of action, the chances of that action occurring increases.

It is clear that a carefully planned K-12 environmental education curriculum that incorporates these components in scope and sequence is needed to achieve a responsible environmental citizenship. However, environmental education in most countries is a step -

child of education and receives sporadic attention, with students receiving at best incidental exposure (Hungerford and Volk 1990). Hart (1991) notes the same is true for Canada, although a number of major initiatives are currently in progress. He also notes that, historically, environmental education activity within the various regions of Canada has been the result of individual initiatives. It is interesting to note a year later an environmental scan done for the Canadian Council of Ministers of the Environment, which states that "In most provinces, environmental education has been incorporated at every level of education. Newfoundland for example offers environmental education in Kindergarten and continues through the elementary, intermediate and secondary level. In the social sciences programs it forms an integral part of such courses as World Problems, World Geography, Canadian Issues, and Canadian Economy" (David Runnalls, 1992). This author feels Newfoundland is the exception in the excellent integration of environmental concerns into the social studies curricula due mostly to individual efforts of members of the Global Education Committee of the Newfoundland and Labrador Teacher Association now defunct due to federal government funding cuts. It should also be noted that integration of some environment education can be found in Newfoundland Science Curricula. There is also an excellent high school Environmental Science Course which, however, is taken by a growing but small percentage of the population. The key word here is integrated. There is no carefully planned EE program with certain discrete environmental education experiences at critical points along the K-12 curriculum that ensures an environmentally literate and responsible population. McClaren (1989, as quoted in Hart 1991) finds difficulty with the practise of integration and infusion, and

suggests that when environmental education belongs to everyone, it in fact belongs to no one. Perhaps this is why we are producing emotionally charged citizens with low environmental knowledge.

It is also unreasonable to expect any one intervention, especially in the elementary or junior high, to achieve responsible environmental behaviour. It strikes this author that according to some developmental learning theories, most children 13 years old or younger are not at the developmental stage of morality to deal with ownership and empowerment variables in any complex way. According to Kohlberg's Level and Types of Morality theory, many early adolescents are moving towards more conventional moral thinking, (stage three), where individuals become capable of applying speculation to social problems and in examining moral dilemmas (Kohlberg and Gilligan, 1971) . However, there are many children at this age who are still at stage two of moral development, which consists of what satisfies their own needs and occasionally the needs of others. Kohlberg contends that it is not until the age of 16 to 18 that most individuals reach a stage of moral reasoning beyond an interpersonal to a societal perspective. Paiget's (1963) Intellectual Development Theory also places early adolescents in a transition from a *concrete operations* stage to the development of *formal operations*. He implies that individuals can conduct operations without reference to concrete material. These individuals take a logical, systematic approach to problem solving. Miller and Sellar (1985) states, "The first step of the teacher is to be aware of the child's stage of development and to be sensitive to the child's view of the world, in light of the developmental psychologist's

emphasis on the importance of these factors".

There is not a lot in the EE literature on the appropriateness of educational techniques for the learner. Kellert (1985) did find 3 age-related stages of developing attitudes towards animals. Newhouse (1990) discusses the implication of teaching at Kohlberg's principle stage when children are at a conventional stage. She also recommends that programs be appropriate for the knowledge, attitudes and moral development of the individual. Therefore, the aim at the elementary and most of junior high should be to establish in our students a sound basis in the entry-level variables.

This research study will focus on entry-level variables from Hungerford and Volk Behaviour Flow Chart (1990). Before discussing the perspectives for the study a closer examination of the EE literature on the major variable environmental sensitivity is needed to clarify intent.

Environmental Sensitivity

The Tbilisi Declaration (1978) affirms sensitivity to the environment as the first category of objectives. It is defined as an empathetic perspective toward the environment. Empathetic means to feel empathy. Empathy (form the Greek word empathera, "affection") means emotional or intellectual identification with a person, place or thing. Thus environmental sensitivity is an attitude tied very much with the affective and cognitive (belief) domains. It is the one variable that has shown a dramatic relationship to

behaviour in the research (Sia et al, 1985-86; Sivek 1989; Tanner, 1980) These studies yielded similar results concerning precursors to environmental sensitivity; that is an individual's contact with the outdoors in relatively pristine environments, either alone or with others over long periods of time. Sivek and Hungerford (1989-90) found ten developmental factors that contribute to environmental sensitivity in members of conservation organizations. They are, in descending order of importance: hunting; outdoor family activities; personality; hiking; familial role models; time alone outdoors; friends as role models; nature/environmental books; outdoor activities as part of youth organizations; associate role model; teacher role model. Keen (1991) found that grade-five and six children who reported visiting the bush frequently tended to enjoy and benefit from the Sunship Earth Program more than other students. In a regression analysis, she found the variable that measured visits to the bushland emerged as significantly and positively related to ecological knowledge and to a positive attitude toward learning about nature. The positive attitude towards learning about nature was related to ecological knowledge. She states:

> It is probable that learning experiences that involve bushland visit affect ecological knowledge through engendering an interest in nature and a positive disposition toward learning about the environment. This is not to say that the experience of nature has no direct effect on knowledge. The contact with nature can provide opportunities for discovery learning and learning from adults who accompany the child.

> Children may have little motivation to learn ecological concepts, especially if they have had few experiences with the natural environment. The knowledge takes on meaning when put in context with which the child is familiar. Familiarity can be engendered by school visits to bushlands and field centres. (p.31)

Environmental sensitivity is a particularly troublesome variable for many educators who understand its importance. The variables associated with environmental sensitivity are often not associated with formal education. It is obvious that education agencies need to provide carefully designed and in-depth outdoor opportunities for learners to achieve some level of environmental sensitivity.

3. 4 Purpose of the research study

Given the burgeoning interest in environmental education and its increased status in the school curriculum, it is surprising that very few rigorous evaluations of environmental programs in the school system have been done (Iozzi 1989; Lewis 1981-82; Linke 1981; Lucko, Disinger & Roth 1982). This author, in the Fall of 1993, contacted over 50 school boards or districts in Ontario that have outdoor environmental programs, inquiring about formal evaluations that may help with this research project. The net result was one centre that conducted any formal evaluations and this was at the high school level.

This study will investigate the development of grade-seven students ecological knowledge and environmental attitudes as a result of the Brother Brennan Environmental Education Centre Program conducted by the Roman Catholic School Board of St. John's. With the

perspective gleaned from the literature this study is designed to explore the development and retention of ecological knowledge and environmental attitudes (sensitivity, belief, and reported behaviour) in grade-seven students as it relates to:

1. Students informal and non-formal past experience with nature.
2. The intervention of a three day residential environmental education program
3. gender

The following research questions will be examined.

1. What is the relationship between environmental attitudes and ecological knowledge?
2. What effect students past environmental experiences have on ecological knowledge and attitudes (sensitivity, belief and behaviour)?
3. What effect does a three day residential environmental program have on the development and retention of students ecological knowledge and attitudes?
4. What effect does gender have on ecological knowledge and attitudes?
5. What is the combined effect of students past experiences with nature, and attending a three day residential environmental education program have on the development of ecological knowledge and environmental attitude?

Chapter Four
Study Design

4.1 Introduction

The hypotheses presented in Chapter Three provide a basis on which to develop the study design. Because of the large number of issues relevant to the development of environmental awareness and the inconclusive nature of present research, the study is exploratory. Quantitative data, derived from a questionnaire are used to gain information directly relevant to the hypotheses and insights into outdoor environmental education.

The study was conducted in St. John's city and surrounding areas in the province of Newfoundland and involved the participation of 548 grade seven students. An experimental design was used to evaluate the effectiveness of a residential environmental education program offered by the Roman Catholic School Board for St. John's. A survey attached to the questionnaire was used to investigate students past environmental influence of variables external to the school system.

In the sections which follow, a description of the Brother Brennan Environmental Education Program and a description of the design are given. The study design is described in terms of the sample, the aims, the data collection methods and data analyses.

4.1.1 The Brother Brennan Environmental Education Program

The Brother Brennan Environmental Education Program (BBEEP) is the only residential environmental program conducted through a school board in Atlantic Canada. It opened in 1986 and, since that time, every Fall one grade seven class from each Junior High School for the Roman Catholic School Board attends. The Brother Brennan Environmental Centre is situated on a scenic height of land overlooking a large pond and a vast expanse of the Avalon Wilderness area, approximately 12 km in Tower Road (Deer Park), off Salmonier Line. The centre is about one and a half hours from St. John's.

Aims of Environmental Education for the BBEE Program

Roe and Coombs (1982) state that the overall goal of Environmental education is to develop an awareness and concern about the environment to ensure that our limited resources are appreciated and used wisely. They say that Environmental Education addresses two types of objectives, as follows:

A. Content specific- those objectives which focus primarily on awareness, knowledge, skills and attitudes related to Environmental Education

B. General- Those objectives which seek to develop more general attitudes and skills

The program

The BBEEP is an extension and enrichment of the Junior High Science and Social Studies program in use throughout Newfoundland. The program is based on the firm belief that,

while the regular school and classroom do many things well, a balanced view of the natural environment can only be achieved through an extended out-of-class experience in the environment itself. (Roe and Coombs, 1986).

The program starts with a pre-class visit by the centre's teachers, one week prior to the school's visit to the BBEEC. A slide presentation is made to the grade seven class for orientation, and a discussion of why they are going to the centre is held.

Once on site the program begins with the students' arrival at 10:30 a.m. and concludes three days later when they depart at 1:00 p.m. A wide range of activities are implemented using a number of learning strategies. Usually the program includes two activities in the morning, two in the afternoon, followed by night activities such as role play simulations, star gazing, campfires and night walks. A typical two and one-half day schedule is shown in Appendix A. Also, a teachers guide is available. The model utilized in the teaching-learning situation is the small group unit (10 students to one instructor), and usually involves "hands on", inquiry or investigative learning often re-inforced by games. Students are required to maintain and record accurate observations, measurements and drawings for each activity. At the end of each day students are given time to update their journals. Because the program is multi disciplinary in nature, all facets of the students formal educational process are brought to bear on the various instructional themes and topics. The program is offered by the same two instructors throughout the Fall and by the classroom teacher who is in-serviced before coming to the BBEEC.

4.2 THE AIMS OF THE STUDY

The main aims of this study are to investigate the development of environmental awareness (environmental attitudes and ecological knowledge) in grade seven students due to the intervention of a residential Environmental Education Program, and their past experiences with informal and non-formal nature interaction.

The purpose of studying the development of environmental awareness can be summarized as follows:

1. To evaluate the effectiveness of the Brother Brennan Environmental Education Program;
2. To consider the effects of student's past experiences with nature on the development of environmental awareness, in particular on environmental sensitivity and its implication for Environmental Education.
3. To improve the available data base concerning children's environmental learning in a two and one-half day residential environmental Education program, and on precursors for children on the variable environmental sensitivity.

Specific hypotheses follow from this general purpose. They are stated below in the null form.

4.3 NULL HYPOTHESES OF THE STUDY

GENERAL:

1. There is no discernible relationship between environmental attitudes and ecological knowledge.

2. Past experiences with the natural environment does not affect the development of ecological knowledge or environmental attitudes (including environmental sensitivity, beliefs and reported behaviour).

SPECIFIC:

3. The Brother Brennan Environmental Education Program (hereafter called BBEEP) has no direct effect on the development and retention of environmental attitudes.

4. The BBEEP has no direct effect on the development and retention of ecological knowledge.

CONTROL HYPOTHESES:

5. There is no difference in ecological knowledge and environmental attitude between the Brother Brennan Population and the School-based population before the intervention.

6. There is no difference in ecological knowledge and environmental attitude between the post-test of the school based populations who had the pre-test and the school based

population that had a post-test only.

7. There is no difference in ecological knowledge and environmental attitude between the post-test of the intervention group who had the pre-test and the intervention group that did not have the pre-test.

PERSONAL INFLUENCES:

8. The sex of the student does not affect the development of environmental attitudes or ecological knowledge.

INTERRELATIONSHIP BETWEEN VARIABLES:

9. The combination of students' past experiences with the natural environment and the BBEEP has no direct effect on the development of environmental attitudes or ecological knowledge.

4.4 THE SAMPLE

Because of resource and time constraints the study is limited to students in the Roman Catholic School Board for St. John's, in St. John's the capital city of Newfoundland and Labrador, Canada. The Roman Catholic School Board for St. John's includes mostly urban and suburban populations.

The sample included 577 Grade seven students from the Roman Catholic School for St.

John's. About 315 students attended the Brother Brennan Program in the Fall of 1994. Involvement in the study was completely voluntary, and consent was needed from the Principal and teachers whose classes were involved, and from the parents of the students. Seventeen schools took part in the study. The selection of the classes which would attend the BBEEP was determined by the Principal and teachers at the school, as were the classes who did not attend the BBEEP but took part in the study. The classes which did not attend the BBEEP were from the same schools as the BBEEP populations as to minimize socio-economic variations between groups. It should be noted that two schools had only one class of grade seven students who all attended the BBEEP. All other schools had 2 or more classes of grade seven students.

4.5 STUDY DESIGN

The Solomon four group experimental design was used to evaluate the effect of BBEEP on the development of environmental attitudes, ecological knowledge. The influence of variables studied were examined by T-test, and a combination of correlation and regression analyses. The study was carefully designed so that validity and reliability of the method used could be checked by incorporating different techniques and different sources of information. Student pre- and post-test questionnaires were used..

4.5.1 The Solomon four group design

The Solomon Four Group Design was used to evaluate the effect of the BBEEP on the development of Environmental attitude and ecological knowledge. This experimental

design has been judged to be one of the strongest experimental designs available in terms of external and internal validity (Campbell and Stanley, 1966, p.24). The design is shown in Figure 4.1

Figure 4.1: The Solomon four group design as applied to the study

Group	Pre-test	BBEEP	Post-test
BBEEP	X	X	X
School-based	X		X
Control I		X	X
Control II			X

The main educational stimulus was the environmental education program at the BBEE Centre. The pre-test and post-test in this study consisted of a student questionnaire. The intervention group included students who attended the BBEEP, as did the intervention control group, Control I. The school-based group and Control II included students who did not attend the BBEEP. Table 4.1 shows how the sample was divided between the four study groups with respect to the number of students , classes and schools.

Ideally the Solomon four group design would randomly assign each student to one of the four groups. However, given the researchers's lack of control over the classes which attended the BBEEP and the desire of the researcher not to interfere with the

Table 4.1: Division of sample between study groups

Group	# of students	# of classes	# of schools
BBEEP	169	7	7
School-based	126	6	6
Control I	167	7	7
Control II	115	6	6

existing EE program, the school classes were used. It is also an assumed that each class in a school is homogeneous as streaming is not encouraged in this school district. Also the Solomon four group design, controls for homogeneity as we can compare pre-tests between BBEEP and School-based groups to show they are the same populations originally (Null Hypotheses #5).

The Solomon four group design also controls for the effect of the pre-test (if any) to be identified, thus improving external validity. This is done by comparing the post-test results of the BBEEP group with the Control I group (the group that had the intervention but no pre-test), and those of the School-based group with Control II group (the groups that did not participate in the BBEEP). If the pre-test has had no effect, these sets of post-test results should not be significant. (Reject hypotheses 6&7).

The effect of the BBEEP can be determined in two ways. 1) By comparing the pre-test result with the post-test results, significant changes can be detected. This can be done for the BBEEP group and the School-based group separately. 2) By having confirmed

through the pre-test results that both BBEEP group and the School-based group are homogeneous then a comparison of the post-test results of these groups can demonstrate the relative effect of the school-based program coupled with the BBEEP as compared to the school based program alone (School-based group).

4.5.2 Extension of the basic design

A sub-group of the original sample was re-administered the questionnaire a year later in the Fall of 1995 to determine if any observed affects persisted over time. The sub-group was selected by randomly picking 3 schools (from a hat) who participated in the study. Fifty eight students who had the intervention and twenty nine students who didn't have the intervention were re-administered the questionnaire.

4.6 The student pre- and post-test Questionnaires:

This questionnaire was designed to give information on the children's environmental attitudes, ecological knowledge, a number of variables on past non-formal and informal experiences with the natural environment, and the gender of the child. The survey technique was chosen because it could be easily administered to each member of a class of students and because it allowed adequate sampling.. This minimized class disruption and maximized the number of students which could be included in the sample. The questionnaire is shown in Appendix B. The three main components are discussed separately below.

4.6.1 Personal information:

Personal information section includes information on gender and information on students' past interactions with nature from non-formal or informal sources. An individual's past experiences with nature appears to be a precursor to environmental sensitivity (Sia et al. 1984/86; Sivek 1989; Tanner 1980). This scale examined four categories of a person's past experiences: informal centres, organizations, non-formal sources and summer camps.

The **Centres** variable consist of centres in Newfoundland that are nature centres or have a formal nature studies component. There were six centres listed in the questionnaire, and brief description of each follows. SALMONIER NATURE PARK is a nature park with natural habitat exhibits of native animals and is located 40 km. outside of St. John's. They offer school tours. BOTANICAL GARDENS- Memorial University of Newfoundland have a botanical gardens in the city of St. John's that has many natural walk ways. They offer school tours and a school program. FRESHWATER RESOURCE CENTRE- A centre dedicated to freshwater education and has a number of exhibits and a Fluvarium (a window into a stream) in the bottom of the centre. They offer school programs. NATIONAL PARKS- The two national parks in the province have exhibits and guided tours available to the public. PROVINCIAL PARKS - Most have camp grounds and some have formal exhibits and/or public tours. ZOOS - There are no formal zoos in the province. However many students visit zoos in other parts of Canada.

Organizations that have a nature or camping component were included in this variable.

In all, five organizations were chosen for this question. Sparks or Beavers, Brownies or Cubs, Girl Guides or Scouts, 4 H Clubs, and Junior Forest Wardens.

The **Non-formal sources** scale is divided into two parts. The first six items of this scale looks at non-formal nature activities that a student may participate in that have no underlying utilitarian purpose, like walking in the woods. The last four items of this question examine non-formal activities that may have an utilitarian purpose, like hunting, fishing and ATV use.

The **Summer Camps,** question consisted of one item to determine if the students attended a summer camp.

4.6.2 Environmental Attitude and Ecological knowledge scale development:

A review of the literature shows a host of questionnaires, surveys, and scales designed to measure people's knowledge of or attitudes and behaviours towards the environment. Gray, Borden, and Weigel (1995) reviewed numerous ecologically oriented instruments and found none designed specifically to assess the attitudes or knowledge of children. Leeming et.el. (1993) found 33 studies that incorporated an environmental attitude or knowledge scale designed for children. They found that all but one of these studies employed a project-developed questionnaire to measure attitudes and/or knowledge. Typically, the authors of the reviewed studies provided very little information about the reliability of their respective instruments and virtually nothing was reported about validity

except that they were developed and selected by experts.

Development of Attitude Scale

The Environmental attitude scale used in this survey was developed by Musser and Malkus (1994) and called **Children's Attitudes towards the Environment Scale (CATES).** This instrument was chosen for use in this study for six reasons:

1. It was designed to be developmentally appropriate for children from approximately eight to 12 years old. Most students in this study sample were 12 or would turn 12 by December 31, 1994.

2. It was constructed using psychometric principles so that the resulting scale is high on internal-consistency reliability (Cronbach's alpha ranged from .70 to .85) and a test-retest reliability (.68). In addition, the procedures for constructing a Likert scale were followed, so that summing across items to create one attitude score is justified.

3. It is relatively easy and quick instrument to administer, score and interpret.

4. The scale was checked for the ability of children at this age to read and understand it.

5. The scale had three types of statement, based on the classic view that attitudes have three components. Eight belief statements, nine affective statements and eight behaviour statements comprise the scale. This allows the researcher to break down the attitude scale

into sub-scales for closer examination of the effect of the intervention and students past environmental experiences on the three components of attitude.

6. The scale covers a wide variety of environmental topics, three related to recycling, eight related to conservation, six related to animal rights/protection, four related to nature appreciation, and four are related to pollution.

The authors did not mention content validity, which may be a weakness of this scale.

This researcher also added five affective domain items to the CATES scale related to the variable environmental sensitivity. The new scale (CATES plus five items) had an internal reliability of alpha = 0.80 to 0.87. These five items were added in order to create three sub-scales on each of the three components of attitudes discussed in Section 3.1 to enable the researcher to compare relationships between the specific attitude components and ecological knowledge, past nature experiences, and gender.

The three subscales are:

1. Environmental Sensitivity scale: made up of Affective domain scale and items 5, 9, 11, 12, 17, 20, 22, from CATES and the five additional items. This scale has an internal reliability of alpha = 0.71 to 0.79.

2. Belief domain scale: made-up of items 3, 8, 10, 14, 21, and 23 from CATES. This scale

has an internal reliability of alpha = 0.38 to 0.75.

3. Reported behaviour domain scale: made-up of items 1, 2, 13, 15, 16, 18, 24, and 25 from CATES. This scale has an internal reliability of alpha = 0.48 to 0.68.

Development of the Ecological Knowledge scale

The statements for the ecological knowledge scale were developed by the author but based upon an instrument developed by Keen (1991) for use with elementary students to evaluate the effect of an outdoor education program. The scale examines knowledge of ecological concepts and Newfoundland natural history. The ecological concept statements were based on objectives from Science Curriculum for Junior High as laid out by the Newfoundland and Labrador Department of Education (1992) . Also all the concepts used in the knowledge scale were previously covered in the Grade six science curriculum laid out by the Province. Concepts used were: community; energy flows- food chains; population interrelationships; succession; nutrient cycles; photosynthesis; and life cycles. In total, eight statements dealt with Newfoundland natural history.

The knowledge scale was developed using Bloom's (1956) taxonomy of educational objectives for cognitive goals. Over half of the statements of this scale are at the knowledge or comprehension level of Bloom's Taxonomy while the rest of the statements are at the application level or higher.

4.6.3 Interactive sessions

The questionnaire was tested extensively. Initially, a draft questionnaire was tried with five children, three girls and two boys ages 10 to 13, one child at a time. Testing the questionnaire one child at a time enabled the researcher to judge the validity of the statement. Each child was encouraged to discuss their answers with the researcher or to query any item with which they had difficulty. For example, statement number six of the knowledge scale gave three children some problems, as they did not know what a conifer was. Through discussion, it became clear that they recognized conifers as evergreen trees. They had no problem with the statement when "conifers" was changed to "evergreen trees". These children had no problem with the meaning of deciduous and evergreen for, as one students mentioned, "we learned them in grade two and three".

These children were also asked if there were any other experiences with nature they felt were missing from the statements. Four of these students mentioned summer camps , some private and some connected to organizations such as Guides. Therefore summer camps was added as a variable for past experiences and, also, skiing and zoos.

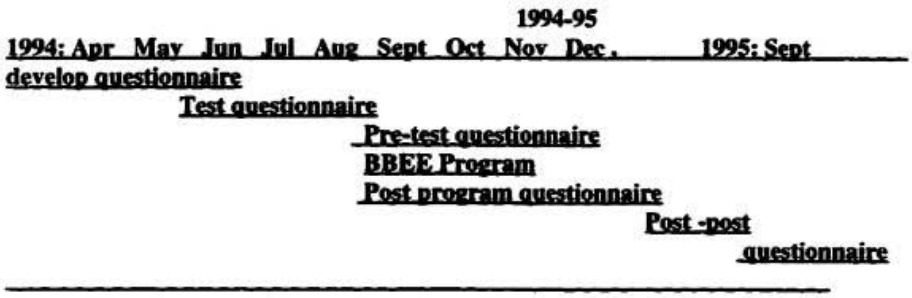
4.6.4 Trial Test administration

In September of 1994 the questionnaire was administered to two classes of grade eight students (13 year olds) by the researcher. Half of the students has gone to the Brother Brennan Environmental Centre the year previous and all had completed an ecology unit in grade seven. All students finished the questionnaire in 25 minutes or less, which met the

criteria of 30 minutes or less suggested by teachers as appropriate for this age group. No frustration or fatigue seemed evident from the students. Students were instructed to raise there hand for help with any question they didn't understand or had problems reading. One student with an identified learning disability needed some of the questions

Figure 4.2

Study Schedule



read to him. No other student raised their hand except for clarification of instructions on the attitude scale.

The students were asked to rate the questionnaire, on clarity of the instructions. All students had no problems with instructions, except for six students who found the attitude scale instructions confusing. They were also asked how easy the questionnaire was to do. All found it easy but 15 students noted that they found some of the knowledge statements hard. Students were also asked how easy were the questions to read. All but one student found the questions easy to read, and that student had a reading disability.

Analysis showed that the items were satisfactory, except for statement 17 from the ecological knowledge scale which was removed because it was too easy (that is, seventy-five percent or more of the responses were correct). The scores from the ecological knowledge scale appeared to be normally distributed with a mean of 9.2. The attitude scale scores were normally distributed and had a reliability of Cronbach's alpha = 0.82. With minor corrections and better instructions for the attitude scale a final questionnaire was developed (Appendix B)..

4.7 The instrument:

The instrument used in this study is shown in appendix B. A few of its features and administration will be noted here.

For ease of description the questionnaire is divided in to three sections: ***Tell us about you*** gathers the personal information. ***What do you think?*** is the attitude scale. ***Think!*** contains the 19 item ecological knowledge scale.

The ecological knowledge scale is multiple choice and includes a "don't know" section to discourage guessing.

The format of the attitude scale is bipolar. Each item contains a description of two types of children. Children are first asked to choose a child most like themselves and then look at the two boxes (one large and one small) under that statement, check the large box if

they are a lot like the child in the statement or check the small box if they are only a little like the child described in the statement.

4.8 Administration of the questionnaire

The questionnaire and parental consent forms for all groups in the study was administered by the home room teacher. A sheet of instructions was given to each teacher who agreed to participate in the study. All pre-test questionnaires were administered a week prior to the intervention group attending the Brother Brennan Centre. All post-test questionnaires were administered a week after the intervention group at their school attended the Brother Brennan Centre.

4.9 Coding, Data and Analysis

All coding was done personally by the author. The data collected were analysed using the SPSS statistical package. The relationship between variables were examined using multiple regression analysis, tests of significance and correlations.

Chapter Five

The Effect of Education

5.1 Introduction

This chapter will examine the effect of education, the Brother Brennan Environmental Education Program, past informal and non-formal educational experiences, and gender on grade seven students ecological knowledge and environmental attitude. First the reliabilities of the attitude scales and sub-sales used in this study will be established. Then, correlation studies between ecological knowledge and environmental attitude will determine if there is any relationship between them. Tests of statistical significance between the means of each sample population will be compared for environmental attitude and ecological knowledge. The last analysis will be multiple regression analysis on the dependent variables environmental attitude and ecological knowledge with independent variables past environmental experiences and gender.

5.2 Tests of Reliability

Reliability as applied to educational measurements may be defined as the level of internal consistency or stability of the measuring device over time (Borg and Gall 1989). Reliability gives us information about the degree to which a measure will yield similar results for the same subject at different times or under different conditions. Tests of low reliability have large errors of measurement and often obscure differences or relationships. Borg and Gall (1989) in a list of representative reliabilities of standardized tests, report

that values of reliabilities for attitude scales are considered low at 0.47, median at 0.79 and high at 0.98.

The method of rational equivalence was chosen to estimate the internal consistency of the attitude instrument used in this study. This method provides an estimate of internal consistency and is a widely used technique for calculating reliability that does not require the calculation of a correlation coefficient. This method gets at the internal consistency of the test through the analysis of the individual test items. It requires only a single administration of the test. A number of formulas were developed by Kuder - Richardson (K-R) to calculate reliability (Borg and Gall, 1989). In this study Cronbach's Coefficient Alpha, a general form of the K-R 20 formula, was used. This method was chosen because it can be used when items are not scored dichotomously but have several possible answers, each of which is given a different weight. All eight of the categories that subjects were assigned in the study are examined for the CATES twenty-five item scale, the thirty item scale (CATES plus five additional items), and the attitude sub-sales Belief (six items), Reported Behaviour (8 items) and Sensitivity (12 items). All reliability analyses are in Appendix C.

Cronbach's Coefficient Alpha for the CATES instrument ranged from 0.76 to 0.84 (see Table 2 in Appendix C). The only alpha below 0.80 was the non-intervention sub-sample for a year later , which consisted of only 29 subjects. All of the other reliabilities are considered well within the median range for acceptability and were similar to the reported

reliability of the CATES developers (Musser and Malkus, 1994). Cronbach's Coefficient Alpha for the thirty item instrument ranged from 0.83 to 0.87 (Table 3 in Appendix C). All are within the median range for acceptability.

For sub-scale Belief (Table 4 in Appendix C), alpha ranged from 0.59 to 0.75. Except for the year later, non-intervention category which had an alpha = 0.38 which is not acceptable and indicates that any interpretation of results for this category with belief must be treated tenuously. All of the other Belief alphas are acceptable.

For the sub-scale Behaviour the alpha ranged from 0.48 to 0.68 (Table 5, Appendix C). This is considered acceptable for a sub-scale. Again the non-intervention year later sub-sample had the lowest alpha.

Cronbach's alpha for the sub-scale Environmental Sensitivity ranged from 0.71 to 0.77 which is considered acceptable for a sub-scale (Table 6, Appendix C).

5.3 Correlation Analysis between Ecological Knowledge and Environmental Attitude.

Correlation analyses were done between ecological knowledge and environmental attitudes for each category that subjects were assigned, to discover the relationship between the two variables. The correlation coefficient lets us express in mathematical terms the degree of relationship between the two variables. Many factors influence most

of the behaviour patterns and characteristic of interest to educators. Therefore, the influence of any one factor is not likely to be large, and correlations in the range of 0.20 to 0.40, although lower in magnitude than those needed for effective prediction can signify important relationships between variables. Borg and Gall (1989) say "Correlations in the range of 0.20 to 0.40 may be all that we should expect to find for many of the relationships between variables studied by educational researchers". Also a two-tailed test for significance is performed, with $p < .05$ to be considered significant in this study.

The results (Table 5.1) show that there is a slight positive and significant relationship between ecological knowledge and environmental attitudes for each group that did not have the BBEEP except for the year end intervention group. The year end result could indicate that the relationship is diminishing with age, education or some other factor. However the small number of subjects (29) in this group could account for the non-significance, as the level of statistical significance of a correlation coefficient is determined in large part by the number of cases upon which the correlation is based (Borg and Gall, 1989 p.631).

What is interesting is the decrease in the positive relationship and statistical significance between ecological knowledge and environmental attitude for the groups that had the intervention. The BBEEP group's pre-test $r = 0.26$ and $p = .001$ compares with the

Table 5.1 Correlation Analysis between Ecological Knowledge and Environmental Attitude for each category studied

Category	cases	means		SD		r	P
		K	A	K	A		
School Base Pre- test	126	6.5	74.1	2.6	11.2	0.28	.002**
BBEEP Pre-test	169	6.8	74.0	2.7	11.2	0.26	.001***
School Base Post-test	128	6.9	73.5	3.1	11.3	0.28	.001***
BBEEP Post-test	148	10.6	74.6	2.9	11.5	0.19	.024*
Control II	115	6.5	71.6	2.9	11.6	0.28	.003**
Control I	167	9.0	71.5	3.0	11.8	-0.14	.071
BBEEP Year later	58	8.3	67.4	3.5	13.3	0.27	.039*
School Base Year later	29	7.1	69.2	3.5	11.9	0.10	.600

* p<.05, ** p<.01, *** p<.001
School Base Pre-test: School Based group who received pre-test.
BBEEP pre-test: BBEEP group who received pre-test
School Base Post-test: School Based group who received pre- and post-test.
BBEEP post-test: BBEEP group who received intervention, pre-test and post-test
Control I: intervention and post-test only.
Control II: no intervention and post-test only.
BBEEP Year later: intervention and a post-post-test one year later.
School Based Year Later: no intervention and a post-post-test one year later
K: Ecological knowledge
A: Environmental attitude

BBEEP groups post - test $r = 0.19$ and $p = .024$, indicates that the intervention decreases the relationship between the variables. However, the School Based group's pre-test $r = 0.28$ and $p < .002$ and the post-test results, $r = 0.28$ and $p < .001$ showed very little change. This could be due to the students' increase in ecological knowledge in the BBEEP group (pre- test mean = 6.78, post-test mean = 10.59) while their environmental attitude means remained fairly stable.

These results, showing a slight positive and significant relationship between environmental attitudes and ecological knowledge are different from Keen (1990). In her study of an outdoor education on elementary students she found no relationship. However these results correspond with a number of studies which found a positive relationship between environmental knowledge and environmental attitude in school children (Birch & Schswaab, 1993; Fortner and Mayer, 1983; Ramsey and Rickson, 1976; and Hart, 1978).

It should be noted that the correlation coefficient results in this study all are below r=0.28, which is lower than those needed for effective prediction, according to Borg and Gall (1989). They are, however, statistically significant and can signify important relationships between the variables of ecological knowledge and environmental attitude.

5.4 T- Tests of Statistical Significance.

A t-test was applied to determine the level of statistical significance of observed differences between sample means. Generally, educational researchers will reject the null hypothesis if the t-value reaches a significance level of .05. In this study the null hypothesis will be rejected at the alpha level of .05. It should be noted that most of the data used in the t-test analysis described here, will be subjected to further analysis in the multiple regression analysis section. Table 5.2 compares the mean scores for the pre- and post-test ecological knowledge scale within groups. Table 5.3 compares the mean scores for the pre- and post-test environmental attitude scale within groups. Table 5.4 compares the mean scores for the post- and post-post-test for ecological knowledge within groups.

Table 5.5 compares the mean scores for the post- and the post-post -test for environmental attitude between groups.

In Tables 5.2 and 5.3 pre-tests of the School Based group are compared with the pre-test of the BBEEP group to check if they are the same populations. The probability value of

Table 5.2: Comparison of the mean scores for the Pre- and Post-test Ecological Knowledge Scale within groups.

Category	cases	mean	SE	t-value	df	Two tail p
SB pre-test BBEEP pre-t	126 169	6.51 6.79	0.24 0.21	-0.88	293	0.38
SB pre-test SB post-test	126 128	6.51 6.90	0.24 0.27	-1.07	252	0.29
BBEEP pre-t BBEEP post-t	169 148	6.79 10.60	0.21 0.24	-12.00	317	0.00
SB post-test BBEEP post-t	128 148	6.70 10.6	0.28 0.24	-10.16	274	0.00
SB post-test Control II	128 115	6.90 6.46	0.28 0.27	1.13	241	0.26
BBEEP post-t Control I	148 168	10.60 9.00	0.24 0.24	4.74	315	0.00
Control II Control I	115 167	6.46 9.00	0.27 0.24	-7.02	280	0.00
SB post-test Control I	128 167	6.90 9.00	0.28 0.24	-5.80	293	0.00

SB Pre-test- School Based group who received pre-test.
BBEEP pre-t- BBEEP group who received pre-test
SB Post-test- School Based group who received pre- and post-test.
BBEEP post-t- BBEEP group who received intervention, pre-test and post-test
Control I - intervention and post-test only.
Control II- no intervention and post-test only.

Table 5.3: Comparison of the mean scores for the pre- and post-test Environmental Attitude scale within groups.

Category	case	mean	SE	t-value	df	two tail p
SB pre-test BBEEP pre-t	126 168	89.5 89.4	1.17 1.00	0.04	293	0.97
SB pre-test SB post-test	126 128	89.5 88.6	1.17 1.17	0.52	252	0.60
BBEEP pre-t BBEEP post-t	169 148	89.4 90.0	1.00 1.14	-0.38	315	0.70
SB post-test BBEEP post-t	128 148	88.6 90.0	1.17 1.13	-0.84	274	0.40
SB post-test Control II	128 115	88.6 86.3	1.17 1.29	1.37	241	0.17
BBEEP post-t Control I	148 167	90.0 87.2	1.14 1.05	1.79	315	0.07
Control II Control I	115 167	86.3 87.2	1.29 1.05	-0.59	280	0.56
SB post-test Control I	128 167	88.6 87.2	1.17 1.05	0.89	293	0.38

See Table 5.2 for key.

$p = .467$ for ecological knowledge and $p = .911$ for environmental attitude are not significant. This accepts the number five Null Hypothesis: There is no differences in ecological knowledge and environmental attitude between the BBEEP population and the School Based population before the intervention. This means that any observed differences seen between the post-test of these two groups could be attributed to the intervention.

The comparison of the means of the School Based group's post-test and the BBEEP

group's post-test is significant, $p<.001$ for ecological knowledge. This is also true for a comparison of the means between the BBEEP group's pre- and post-test results. Thus we reject Null Hypothesis # 4 that the BBEEP has no direct effect on the development and retention of ecological knowledge. However when we look at environmental attitude for both of these comparisons we find no significant differences between groups. Thus we accept Null Hypothesis # 3: The BBEEP has no direct effect on the development and retention of attitudes. A comparison of the mean scores of the intervention group without a pre-test (Control I group) and the non- intervention group with no pre-test (Control II) confirms the same results. The effect of the BBEEP with respect to ecological knowledge was found to be highly significant while environmental attitude was not significant. We can conclude that participation in the BBEEP had changed the populations ecological knowledge significantly but had not significantly altered their environmental attitudes.

A control Null Hypothesis, # 6 was postulated to ensure that any differences observed between the BBEEP groups pre- and post-test was because of the intervention and not the pre-test instrument or other educational factor. Null hypothesis # 6 is accepted as the school based group's pre-test and post-test means are not significantly different. The school based population did not change significantly from the time of the pre-test to the time of the post-test (three to four weeks later) for ecological knowledge or environmental attitude. This is also confirmed by the comparison of the means of the

Table 5.4: Comparison of the mean scores for the post - and a year later post-test Ecological Knowledge Scale within Groups.

Category	case	mean	SE	t-value	df	Two tail p
BBEEP year lat	58	8.33	0.46			
SB year later	29	7.10	0.65	1.53	85	.130
exp. post-test	315	9.75	0.17			
BBEEP year lat	58	8.32	0.46	3.16	371	.002**
exp. Post-test	315	9.75	0.17			
SB year later	29	7.10	0.65	4.37	342	.000***
non-exp post-t	243	6.69	0.19			
BBEEP year lat	58	8.33	0.46	-3.58	299	.000***
non-exp post-t	243	6.69	0.19			
SB year later	29	7.10	0.65	-0.68	270	.496
Exp. post-test	315	9.75	0.17			
non-exp post-t	243	6.69	0.18	11.72	556	.000***

** p<.01 *** p<.001
BBEEP year lat - Students who had the intervention tested a year later
SB year later- Students who had no intervention tested a year later
exp. Post-test- all the students who had the BBEEP intervention
non-exp post-t- all the students who did not have the intervention

school based group post-test and control II (no intervention and post test only). Again ecological knowledge and environmental attitude mean scores are not significantly different, indicating that the pretest or other education did not have a significant effect on the ecological knowledge nor the environmental attitude of the populations who did not have the interventions.

Another control hypothesis was developed to ensure that the pre-test did not affect the intervention group. Null Hypothesis # 7 stated that there is no difference in ecological

Table 5.5: Comparison of the mean scores for the post - and a year later post-test Environmental Attitude Scale within Groups.

Category	case	mean	SE	t-value	df	Two tail p
BBEEP year lat	58	82.0	2.0			
SB year later	29	83.6	2.6	-0.50	85	.357
Exp. post-test	315	88.5	0.78			
BBEEP year lat	58	81.9	1.9	3.30	371	.001***
Exp. Post-test	315	88.5	0.78			
SB year later	29	83.6	2.6	1.83	342	.068
Non-exp post-t	243	87.5	0.87			
BBEEP year lat	58	81.9	2.0	2.74	299	.006**
non-exp post-t	243	87.5	0.87			
SB year later	29	83.6	2.6	1.45	270	.148
Exp. Post-test	315	88.5	0.78			
Non-exp post-t	243	87.5	0.87	0.88	556	.380

See Table 5.4 for key.

knowledge and environmental attitudes between the post-test of the intervention group who had the pre-test and the intervention group that didn't have the pre-test. A comparison of the means between the BBEEP post-test group and the Control I group yielded surprising results. The two group means were significantly different at the $p<.001$ level for ecological knowledge and approached significant for environmental attitude. Thus we reject the Null hypothesis # 7. This indicates that the pre-test for the BBEEP group, which was the only known difference between the two groups, has somehow influenced their gain in ecological knowledge. These results indicate that the pre-test in the BBEEP group may have reduced "Novelty Space " influences as described by Orion and Hofstein, 1994. Again the pre-test may have cued students to some of the expected knowledge and concepts outcomes and when they found success, it may have

improved their attitude towards the environmental centre and the outdoors generally.

A year later sub-sample was taken of the students who attended the BBEEP and the school based group that did not have any intervention. The results of these sub-samples, as well as the comparison to the student populations who attended the BBEEP and those from the school based from the previous year are given in Table 5.4 and Table 5.5. The results of the comparison of means for the two sub-samples taken a year later indicates that there are no significant differences between the populations a year later for E K or EA. However the students that had the BBEEP still had not returned a year later to pre-intervention levels on knowledge, as the comparison with the groups that had no intervention (Non-exp post-t) is still significant. The BBEEP year later sample were a significantly different population form BBEEP group the year previously (exp. Post- test) on EK and EA. While the School based group a year later was still considered the same population as the school based group the previous year (non-exp post-t) as EK and EA were not significant.

What is surprising in the sub-samples taken a year later is the drop in environmental attitude for both groups. This drop was found to be significant or approaching significance, when each group is compared to the Exp. Post-test group. This drop was not expected. It could possibly be caused by aging effects, especially in males. The student population who took part in this study were 13-years old when the sub-sample were taken a year later. Szagun and Mesenhol (1993) found a big differences between 12-year-old

males and 15- year old males in their study on adolescents ethical and emotional concern about nature. They felt males scores decreased with the internalization of gender-typical values at this age.

5.5 Multiple regression Analysis

Multiple regression Analysis is a multivariate technique for exploring the strength of relationship between several independent variables (predictor variables) and one dependent variable. In this study we used the subjects' scores on past environmental experiences, gender and one of following category combinations, BBEEP group pre-test, BBEEP post-test, School Based group pre-test, School Based group post-test, Control I (intervention and post-test only), and Control II (no intervention and post-test), to predict their scores on each criterion measured. The criteria measured are ecological knowledge, environmental attitudes, and three attitude sub-sales Belief, Behaviour, and Environmental Sensitivity (measured in the affective domain).

There were forty multiple regression analysis done for this study (tables numbered 1 to 40 in Appendix D). These tables display the correlational analyses that form the basis for the multiple regression analyses below it. Each criterion has eight multiple regressions analyses on these category combination, School Based group pre-test and BBEEP pre-test, School Based group pre-test with School Based group post-test, BBEEP group pre-test with BBEEP group post-test, School Based group post-test with the BBEEP group post-test, School Based group post-test with Control II group, BBEEP group pre-test

with Control I group, BBEEP group post-test with Control I group, and Control I group and Control II group.

Before we examine each criterion, it is interesting to note some of the relationships between the independent variables observed from the zero order correlation analysis. Organization correlates low to moderately and significantly with summer camps, centres and non-utilitarian activities. This makes sense as organizations with an environmental orientation or component tend to bring their members to environmental centres and give children the opportunity to attend summer camps. There is also an indication that children with membership in the organizations examined are more likely to do non-utilitarian activities like hike or canoe. Gender did not generally appear to be significant for organization, summer camps or centres.

It is also important to note that utilitarian and non-utilitarian activities correlate moderately, r= 0.55 to 0.71 and are highly significant in all tables. This indicates that children who participate in utilitarian activities tend to also participate in non-utilitarian activities. What is very curious is that gender tends to correlate with utilitarian and non-utilitarian activities in favour of boys. Utilitarian has a low to moderate relationship with gender r= -0.30 to -0.46., whereas non-utilitarian activities has a slight relationship with gender, r= -0.13 to -0.23. Visiting centres also appears to correlate and be significant with utilitarian and non-utilitarian activities.

Attitude Multiple Regression Analysis

The environmental attitude (EA) scale has 30 items and analyses are found in Appendix D, Tables 1 to 8.

How important is each variable when they are used to predict attitude? Examination of the correlation analysis coefficients (r) between attitude and the independent variables on each table, we can note that the relationship is none r= 0.003 to slight, r=0.27. Gender was significant at the $p < .001$ level or approached it for each of the eight categories investigated. It is interesting to note that the correlation coefficients are positive for all gender and attitude correlations, indicating that females (females coded as 2, males coded as 1) in this study had a slightly higher attitude than males. This is consistent with the literature. When gender differences are found with environmental attitude they tend to be higher in females.

The independent variable Category was significant at the $p < .05$ level for two correlations, School based group pre-test and Control II (Table 3) and BBEEP group post-test and Control I (Table 7). Both correlation coefficients are negative which means the School based pre-test group have a slightly higher EA than the Control II group, and the BBEEP group post- test show slightly higher EA than the Control I group.

Summer Camps were significant for three correlation (Table 1, 4 and 8). None of these subjects had the BBEEP intervention. However, for those correlations with groups that contain an intervention group summer camps is no longer significant with attitude. This

indicates that children who have summer camps experience, (r is positive) have a higher EA than children who have never attended a summer camp but this effect is somehow diminished when the subjects have the BBEEP intervention.

The non-utilitarian variable was significant at the $p<.01$ and .001 level, with attitude for all but two of the correlations (Table 6 and 8). This indicates that those students who report participating in more non-utilitarian activities tend to have slightly higher attitude than students who don't.

The utilitarian independent variable was only significant at the $p<.05$ level with attitude for one correlation, the School Based pre-test and post-test group. This indicates that students who report high utilitarian activities, environmental attitudes are no different that students who do not do these activities.

The correlation of variable "Organizations" with attitude is significant for six of the tables (Tables 1, 2, 4, 5, 7 & 8) and the r values are also positive. This indicates that students with membership in organizations that have an environmental component tend to have a more positive and significant attitude than student who are not members.

The correlation of variable "Centres" with "Attitude" was significant for five of the results (Table 1, 3, 4, 5, & 8). This indicates that students who scored high in centres attendance have a small positive and significant increase in attitudes compared to those students who

scored low. It also appears that for those students who had the intervention the relationship between centres and attitudes appears to diminish.

In all of the regression analyses for environmental attitude, R-squared ranged from 0.06 to 0.13. This indicates that these independent variables together, can predict EA in only the 5% to 13% range. In other words there are other independent variables that account for most of EA than the ones used in this study. The variable that was significant on all EA regressions and was the best predictor, was gender. The beta weight were also positive indicating that females scored higher than males on the attitude survey. This is consistent with the literature.

For all the regressions the categories were not significant with attitude except for two. The BBEEP group pre-test and Control I, and the BBEEP group post-test and Control I. The beta weights are negative indicating in both cases that the BBEEP group scored higher on the attitude questionnaire. These results could indicate that the Control I group may have just been composed of subjects with just a less positive attitudes. Their counterparts from the same schools, who did not have the interventions (Control II), had a lower mean value for their attitude (mean = 86.3) than the mean for Control I (mean = 87.2).

Non-utilitarian and organization were the second or third predictor of attitude on all regressions where an intervention group was present (Tables 2, 4, 5, and 7), except Table 6 where the significant variable was gender. For the regressions analysis that contained no

intervention group the utilitarian activities were the second or third best predictor of attitude. There seem to be some indication that the intervention somehow influenced the effect of organization and non-utilitarian activities on attitude, and reduced the effect of utilitarian activities.

Sub-scale Belief Multiple regression analysis

Tables 9 to 16 in appendix D, deal with Belief regression analysis. How important is each variable when they are used to predict belief? Looking at the correlation coefficients (r) between belief and the seven independent variables on each table, we see that the relationship is non-existent to slight, ranging from r= 0.008 to 0.329.

Gender had a significant relationship with Belief for all correlations. Organization was significant with belief on five of the correlations (Tables 9,10,12,13,15,and 16). Centres was significant with belief for all correlations except in Table 22, Control I and Control II. Summer Camps, non-utilitarian and Utilitarian activities were rarely significant with belief in the correlations tables. The "Category" variable has no relationship with belief and was not significant for any of the correlations. This indicates that the intervention did not appear to have any effect on belief.

The regression analysis for Belief with the seven variables shows the R-squared ranged from 0.06 to 0.18. Again these variable only predict a small percentage of the Belief variable. The best predictor for belief for all regressions was gender, with the highest beta weights and a high level of significance on all regressions. The beta weights are also

positive which indicates that being female is a better predictor of scoring higher on a belief than being male.

The second best predictor varied from regression to regression. Tables 9,10, and 16 indicate Centres to be the second best predictor. In Tables 11 and 12 category was the second best predictor. In Tables 13, 14, and 15 non-utilitarian was the second best predictor for belief, but the results were not significant.

Behaviour Multiple Regression analysis

Tables 17 to 24 in Appendix D display the multiple regression analysis for Behaviour. Examining the correlations tables for behaviour and the seven independent variables, we see all correlations coefficients (r) are below 0.20 except for Gender and even here they are in the 0.20 range. This indicates that none of these variables have much of a relationship with Behaviour, except for gender where the relationship is slight. Gender is significant with behaviour in all correlations and is positive in direction which indicates that girls in the study have more positive reported behaviour than boys.

Regression analysis results for behaviour show very low R-squared values from 0.03 to 0.12, indicating that these seven independent variables only predict a small percentage (3% to 12%) of reported behaviour. The best predictor of behaviour was gender, which was significant for all regressions, except School Base pre-test with Control II where none of the independent variables were significant.

Environmental Sensitivity Multiple Regression Analysis

Tables 25 to 32 in Appendix D display the results for the multiple regression analysis of the dependent variable environmental sensitivity with the seven independent variables.

How important is each variable when it is used to predict environmental sensitivity? The correlation coefficients for the seven independent variables with Sensitivity show no to a slight relationship with sensitivity.

Non-utilitarian and utilitarian were significant with sensitivity in most correlations. Organization was significant with sensitivity for five of the eight correlations. Centres was significant for only two of the eight correlations done. What is interesting is the variable gender was only significant for three of the eight correlations and these were only significant at the $p<.05$ level. This is different from the other two sub-sales and the environmental attitude scale correlations where gender was very significant. The correlation coefficients for gender are positive in sign, indicating that girls scored higher on the environmental sensitivity scale which is consistent with the other attitude scales in this study.

Category was only significant at the $p<.05$ level with sensitivity for two correlations (Table 27 and 29).

Regression analysis results for the environmental sensitivity dependent variable shows all

R-squared values range from 0.04 to 0.12. This indicates that only a small percentage of the variable sensitivity is predicted by the seven independent variables.

The independent variable Gender was a significant predictor of Sensitivity in six of the eight regression analyses at $p<.01$ level. It was the first predictor of Sensitivity in Tables 26, 29, 31, 32 and the second best predictor in Tables 25 and 28. The variable Utilitarian was significant and the best indicator for Sensitivity in three regression analyses (Tables 25, 27, 28) and the second best indicator in two regression analyses (Table 29 and 32). Organization was the best predictor of Sensitivity for one regression (Table 26), and the third best predictor for three regressions (Tables 28, 31 and 33). Centres was the best predictor of Sensitivity in one regression (Table 30). Non-utilitarian significant and the second best predictor in only one regression (Table 31). Category was not significant for any of the Sensitivity regression analyses conducted, indicating the intervention had no apparent effect on that variable.

Ecological Knowledge Multiple Regression Analysis

A nineteen item ecological knowledge scale is regressed with seven independent variables. The results are in Tables 33 to 40 in Appendix D. How important is each variable when they are used to predict ecological knowledge? The correlation coefficients between knowledge and each variable range from no relationship to a slight relationship with all variables except category. The category variable ranges from no relationship to a moderate relationship ($r= 0.009$ to 0.560), depending on the categories used in the

analysis. The correlations between knowledge and category shows very clearly that the intervention had a positive effect on knowledge. Those correlations where a group in the category had the intervention were all found to be significant (Tables 35, 37, 38, 39, and 40), where the correlations with no group that had an intervention were found not significant (Tables 33, 34, and 36).

Note in Table 40 the negative and significant relationship with knowledge for category. This indicates that the BBEEP group that had the post-test compared with Control group I had a significantly more knowledge gain. This corresponds with Orion and Hofstein, (1994) study where they conclude that students whose "Novelty Space" was reduced gained significantly more on achievement. Again it appears that the pre-test instrument for the BBEEP group may have acted in reducing "cognitive novelty" in these students, thus increasing their knowledge gains significantly. The effect of test order, administration of the same questionnaire concurrently to the BBEEP group could explain the significant findings in this category. However the Solomon four design controls for this, as the school based group post-test and control II group correlation with knowledge is not significant and indicates a very small change in knowledge for the school based group which had the pre-test also. The same result of no significant difference is found in Table 34, where the school based group pre- and post-test make up the category variable. Therefore only with the intervention did the pre-test have such significant effects on ecological knowledge.

Gender correlations with knowledge were significant in three Tables 33, 37 and 40. In all tables the correlation coefficient was negative indicating that boys had slightly more ecological knowledge than girls. This is consistent with the literature.

Summer camps showed no significant relationship with knowledge. This is not surprising as it has been my experience that most summer camps concentrate on physical activities like swimming and canoeing. While staying at a resort near Gros Morne National Park, we were over-run by a group of Boy Scouts, for three days. While I sat and watched the whales and osprey, I could hear the boys playing baseball, basketball and swimming. Not once did their leaders take them to the beach, on a hike, or point out any of the features that surrounded them.

Non-utilitarian, Organization, and Centres were significant with ecological knowledge for almost all correlations. Utilitarian was significant with knowledge for only two of the correlations (Table 34 and 39) and in both cases they were at the $p<.05$ significant level.

Regression analysis for ecological knowledge show the R-squared values were much higher for those regression that included an intervention group, R-squared ranged from 0.10 to 0.37 for Tables 35, 37, 38, 39, and 40. For the regressions with no intervention group the R-squared values ranged from 0.05 to 0.12 for Tables 33, 34 and 36. This indicated that the intervention had more of an influence on ecological knowledge than any other independent variable.

Category was the first predictor of knowledge in all regressions that contained an intervention group in the category. Organization was the first predictor of knowledge in two of the regressions that didn't have an intervention group (Tables 33 and 36). Summer camp was the first predictor of knowledge in Table 34. Summer camps were significant for knowledge in four of the eight regressions. However it should be noted that the beta weights were negative for all regressions. This indicates that children who didn't attend summer camps had more ecological knowledge than those that did, which may seem very surprising. Nevertheless, as mentioned earlier, many summer camps tend to focus entirely on recreation and not natural history education.

Gender was significant for three regressions (Tables 33, 35 and 37). In all regressions the beta values were all negative, indicating that boys had higher ecological knowledge than girls. This corresponds with the literature, which found that males had higher environmental knowledge than girls when differences were found.

Chapter Six

Summary and Conclusions

"To love something, means you will take care of it,

to care for it, you have to understand it,

to understand it, you first have to know it."

Brother Brennan

6.1 Introduction

The above quote by Brother Brennan, a founding member of the Brother Brennan Environmental Education Centre, has a great deal of value for environmental education. In the introduction I stated that most children in Newfoundland did not know the name of the trees that surround them. In the pre-test subjects used in this study, only 19% of the children knew that Balsam fir is the most common evergreen tree in Newfoundland. Since this 19% was the raw score on a four item multiple choice question allowing for a guess factor of 25%, no children in this sample of Newfoundland children know the name of the trees that surround them. The children do not know the trees names because no one told them. Their parents and teachers probably do not know either. The appalling lack of "knowing" by Newfoundlander's and North Americans in general about their environment and the local species that share it with them, may be one reason why there is no real

commitment to sustainable development or a shift in lifestyles by the general population. North America's lifestyles uses more energy, causes the most pollution and produces more waste than any other population in the world.

The first step in educating our children in caring about their environment is natural history. Species are the building blocks for environmental education. Through natural history children will gain an appreciation of the natural environment and an understanding of ecological concepts. This environmental awareness will have strong implications for children daily lives, as they realize that education extends beyond the classroom to all living things. Developing an environmental awareness is just one step in an educational process aimed at transforming our relationship with the environment and the 50 million other species that share it with us.

This study has been concerned with grade seven children's development of environmental attitude and ecological knowledge. By investigating some of the factors involved in the development of environmental attitudes and ecological knowledge, the study was able to discover some of the educational influences that may lead to environmental "knowing" and sensitivity in children.

In the sections which follow the results of the study in relation to the hypotheses presented in Chapter Four are considered, and the implications of the study with respect to practice are examined. A number of areas remain to be investigated further. Some of these are

highlighted in the final section.

6.2 Major Findings

In chapter four a number of propositions were listed that would be investigated by this study. Most of the hypotheses can now be commented upon, if not affirmed or rejected, on the basis of the study results. Each is considered below.

There is no discernible relationship between environmental attitude and ecological knowledge.

This study showed mixed results for the relationship between environmental attitudes and ecological knowledge. Most correlation analysis showed a slight and a significant relationship between ecological knowledge and environmental attitudes. There were two exceptions. The sub-sample of the school based population taken a year later, showed no relationship. This may be due to the small number of subjects used in this sample. The other exception was the Control I group that had the Brother Brennan Environmental Program but no pre-test. This population had a slight negative relationship between EA and EK, which approached significant at the $p < .05$ level. As discussed in detail in Chapter five there is evidence that "Novelty Space" factors may account for the negative relationship for this population.

There is no sufficient evidence of a causal relationship, that is an increase in ecological knowledge leading to an increase in environmental attitude, or vice versa. For example,

the children who had the BBEEP increased their ecological knowledge but not their environmental attitudes. In fact, the children who had the BBEEP showed a decrease in the relationship between environmental attitude and ecological knowledge.

More research is needed on the relationship between environmental attitudes and ecological knowledge. The literature is full of mixed results when it comes to this relationship. Also it is possible that aging may affect the relationship between environmental attitudes and ecological knowledge which is another area that should be investigated.

Past informal and non-formal educational experiences with the natural environment does not affect the development of ecological knowledge or environmental attitudes (including environmental belief, reported behaviour and sensitivity).

This study clearly shows that some past experiences with natural environments have slight positive and significant effects for both ecological knowledge and environmental attitudes. Being a member of an organization predicted slightly and significantly for ecological knowledge and environmental attitudes. For children that did not have the BBEEP, being a member of an organization was the best predictor of ecological knowledge. It was also a significant third and fourth predictor of environmental attitude and behaviour.

It is also important to note that being a member of an organization correlates low to moderately and highly significantly with going to summer camps, environmental centres

and doing non-utilitarian activities. Given this, it was surprising in this study that children who did not attend summer camps scored higher on the ecological knowledge scale. Many of these organizations invest a great deal of effort and funds in providing summer camps for their membership. If environmental awareness is one of their aims then more attention needs to be paid to the type and quality of summer camp experiences. Also I feel that local natural history workshops and activities designed specifically for leaders of these organizations may lead to a significant increase in ecological knowledge and good environmental attitudes of their members.

Non-formal educational activities seem to have a slight and significant relationship with environmental attitude. The two types of non-formal educational activities examined in this study, utilitarian activities (those activities that have an alternative purpose of being in nature, like hunting) and non-utilitarian activities (those activities that have an enjoyment of nature emphasis, like hiking in the woods), have a moderate and highly significant relationship with each other. Also, more boys reported participating in both types of activities than girls.

In regression analysis with no intervention group, utilitarian activities were the second and third best predictor of environmental attitude and the first predictor of environmental sensitivity, whereas in regression analysis with intervention groups, non-utilitarian activities were the second best predictor of environmental attitude and the best predictor of environmental sensitivity for two regressions. These results indicate that the

intervention somehow influences children's reporting of activities or their attitudes. Non-utilitarian activities were also the second and third best predictors of environmental reported behaviour and beliefs.

What is surprising in this study is that children who reported not doing utilitarian activities scored higher on the ecological knowledge scale than children who did these activities in all knowledge regression analysis. Although non-utilitarian activities showed a slight positive and significant relationship with knowledge it was not strong predictor of knowledge. It is possible that the students who did more utilitarian activities in this study may be a different social group. The children who reported being a member of an organization also reported low utilitarian activities and may indicate social grouping.

These findings indicate that children who report taking part in non-formal activities have higher environmental attitudes but the effect of these activities on ecological knowledge is minimal. One assumes that if you are out in nature, you will know it. These results indicate that, at least as measured on this test, this is not true. Maybe the people who accompany children on these informal activities do not impart their ecological knowledge to them, or they do not have much ecological knowledge to impart.

Visitation to environmental Centres were the third and fourth predictor of ecological knowledge in this study but the effect appears to diminish when children had the BBEEP. Centres role in forming positive environmental beliefs seem fairly significant and

important. In the non-intervention groups regression analysis centres were the first and second best predictor of beliefs. However the effect of centres on beliefs seem to diminish after the children had the BBEEP in favour of non-utilitarian activities.

A higher level of commitment from society is needed if today's youth are going to be adequately equipped to deal with environmental problems. It is clear from these results that organizations, environmental centres and non-formal activities all contribute to different aspects of environmental awareness of children. To enhance the effectiveness of these activities so that they have greater impact on children's ecological knowledge and environmental attitudes, the key is adult education. One obvious way to do this is the production of inventive "How to learn more about local natural history", books, pamphlets and television programs. Environmental centres could and do play an important role in the development of these products.

The gender of the child does not affect the development of environmental attitudes or ecological knowledge.

This hypothesis was falsified. There was a slight and significant difference between ecological knowledge of the boys and girls, in favour of boys. Gender was the first predictor of environmental attitude, reported behaviour and belief. Results favour girls in most analyses. Environmental sensitivity, an affective domain scale looking at emotional response to nature, was the only attitude scale where gender was not the first predictor, and there it was either the second or third predictor. It was argued that these differences

are grounded in socialization processes. The results in this study lend support for this argument as males reported participating more in non-formal activities, especially utilitarian ones, than females. This conclusion has important implications for societies which are concerned with eliminating sex biases. It is important that schools work to level the playing field and ensure that education that deals with environmental awareness does not contribute to the inequality of learning opportunities that socialization processes have already developed.

The BBEEP has no direct effect on the development and retention of environmental attitudes.

This hypothesis was accepted. On the surface the BBEEP did not significantly affect environmental attitude after the study or a year later. It should be noted that scores on the pre-test for environmental attitude were fairly high, which might indicate that the instrument used might not have been sophisticated enough for this age group.

However the sub-sample of the BBEEP group taken a year later shows significant differences in environmental attitudes with the original BBEEP group. The year later - sub-samples for the intervention and nonintervention populations each had a much lower environmental attitude. This may be explained by aging and socialization factors. Also, there appears to be a difference in attitude between the two intervention populations. In the intervention group that had no pre-test, environmental attitude was found to be lower and significantly different from the intervention group with the pre-test. As discussed in

Chapter Five, the pre-test may have acted in reducing "Novelty Space" factors, which may of helped to maintain this groups attitude.

Preparation of school groups to reduce "Novelty Space" effects during outdoor education programs is one area that need further investigation. The effect of aging on environmental attitudes of children as they go through adolescence is also another area that needs further attention.

The BBEEP has no direct effect on the development and retention of ecological knowledge.

This hypothesis was partly rejected. The BBEEP did significantly affect the development of ecological knowledge. However a year later the BBEEP groups ecological knowledge, although still higher than the School Based sub-sample, were not significantly different. The BBEEP students ecological knowledge did not return to pre-intervention levels.

One unexpected result was that the two populations that had the BBEEP were found to be significantly different in ecological knowledge. Again the population that had the pre-test scored significantly higher. "Novelty Space" effects may account for these differences. During the study, a new Junior High Science curriculum was introduced which resulted in the School science program not matching the BBEEP. If the school program had matched, some of the "Novelty Space" effects may have been reduced in this study. Also the school program would of reinforced the ecological concepts learned and may have

increased ecological knowledge attainment and retention.

The interaction of a school based ecology unit with the BBEEP is one area that should be further investigated. Also the effect of "Novelty Space" factors during an outdoor education program on ecological knowledge needs further attention.

6.3 Implications of Findings for Practice and Policy

If the school curriculum is to play a greater role in the development of ecological knowledge and environmental attitudes, the teaching approach and the structure of the curriculum need to be evaluated. Newfoundland Department of Education is either in the process or has already introduced a number of environmental curriculums integrated throughout the regular science and social studies curricula. Although they appear to do a relatively good and innovative job at looking at environmental problems and the possible development of students' environmental attitudes, the foundation for environmental literacy seem to be missing. A well structured, integrated curriculum which introduced our children to the local species that surround us, starting in Kindergarten, is needed. By the time children get to Junior High and especially High School, they should be familiar enough with the species that make up their natural environment that complex ecological concepts will actually make sense. Such a curriculum would entail high levels of student participation and would have direct contact with nature outside of their school windows.

The result of this study suggest that a school program designed to increase environmental

attitudes and ecological knowledge should include:

1) guided natural history learning experiences starting in kindergarten and continuing throughout children schooling,

2) outdoor environmental programs that start in primary and elementary schools in the surrounding neighbourhood.

3) outdoor environmental programs of longer duration and in wilderness settings that start in Junior high and continue through high school, and

4) the integration of school learning experiences with family and community experiences.

Policy could ensure that teaching of environmental education is sequential and cumulative. However, for environmental education to pervade the curriculum, more than policy statements are needed. Teacher training in local natural history is needed. I feel natural history will not be taught or learned by children if their teachers don't feel confident with the topic.

The goal of developing environmental awareness in children involves more than the formal school sector. The importance of family and community recreational activities and nature outings, and environmental centres, to the development of children environmental awareness has been demonstrated in this study. These experiences could increase the children's sense of relationship and familiarity to the natural environment. The formal school system can benefit if it works closely with environmental centres and organization

such as Scouts or Guides in the development of natural history activities for children.

6.4 Recommendations for Further Research

In addition to topics already commented on earlier, this study identified some areas which need to be better understood. Membership in children's organizations such as Scouts and Guides programs had a significant effect on ecological knowledge and a lesser but positive effect on environmental attitudes. A well structured study aimed at gaining a better understanding of the effect of these youth organizations on the development of environment awareness would be beneficial.

This study was conducted using grade seven students in Newfoundland. It would be useful to know whether the results obtain here are applicable to other regions, and how they would vary between age groups. These areas of study would help in the development of policy and theory aimed at increasing environmental awareness.

An area which has not received much attention but is critical to the success of educational programs aimed at developing environmental awareness is teacher and leader training. How much training do teachers need in this area? What skills need to be taught? And, how to implement teacher training programs, are all questions that need to be answered if we are going to be successful at developing environmental literacy in our children.

Bibliography

Ajzen, I., & Fishbein, M. (1970). The predictor of behaviour from attitudinal and normative variables. *Journal of Experimental Social Psychology* 6:466-487.

Alaimo, S.S., & Doran, R.L. (1980). Students' perception of environmental problems and sources of environmental information. *Journal of Environmental Education,* 24(4), 36-40.

Arcury, T.A., & Johnson, T.P. (1987). Public environmental knowledge: a Statewide survey. *Journal of Environmental Education* ,18, 31-32.

Armstrong, James B., & Impara, James C. (1991). The impact of an environmental education program on knowledge and attitude. *Journal of Environmental Education,* 22(4), 36-40

Asch, J., & Shore, B.M. (1975). Conservation behaviour as the outcome of environmental education. *Journal of Environmental Education*, 6(1), 25-33.

Backman, S., & Crompton, J. (1984). Education experiences contribute to cognitive development. *Journal of Environmental Education*, 15(3), 33-36.

Baron, R.A. & Byrne, D. (1991). *Social Psychology*, Boston: Allyn & Bacon

Barrow,L.H., & Morrisey, J.T. (1988-1989). Energy literacy of ninth-grade students: A comparison between Maine and New Brunswick. *Journal of Environmental Education*, 20(2), 22-25.

Bem, D.J. (1970). *Beliefs, Attitudes and Human Affairs*, Belmont California: Brooks/Cole.

Berke, R.L. (1990). Oratory of environmentalism becomes the sound of politics. *The New York Time*, 139, C18-C19.

Birch, S. K., & Schwaab, K.E. (1983). The effects of water conservation instruction on seventh-grade students. *Journal of Environmental Education*, 14(1), 26-31.

Bixler, R.D., Carlisle, C.L., Hammitt, W.E., & Floyd, M.F. (1994). Observed fear and discomforts among urban students on field trips of wildland areas. *Journal of Environmental Education*, 26(1), 24-33.

Bloom, B.S. (1956). *Taxonomy of Educational Objectives: Cognitive Domain*. New York: McKay

Blum, A. (1987). Students' knowledge and beliefs concerning environmental issues in four countries. *Journal of Environmental Education*, 18(3), 7-14.

Bogan, W.J., Jr. (1973). Environmental education redefined. *Journal of Environmental Education*, 4(4), 1-3.

Borden, R.J., & Schettino, A.P. (1979). Determinants of environmentally responsible behaviour. *Journal of Environmental Education*, 10(4), 35-39.

Borg,W., & Gall, M. (1989) *Educational Research an Introduction*, New York: Longman Inc.

Brody, M., Chipman, E., & Marion, S. (1988-1989). Student knowledge of scientific and natural resource concepts concerning acidic deposition. *Journal of Environmental Education*, 20, 32-42.

Bryant, C.K., & Hungerford, H.R. (1979). An analysis of strategies for teaching environmental concepts and values clarification in kindergarten. *Journal of Environmental Education*, 9, 44-49.

Campbell, D.T., & Stanley, J.C. (1966). *Experimental and Quasi-experimental Designs for Research.* Chicago: Rand McNally.

Canadian Education Association (1969). *Outdoor Education.* Information Division Canadian Education Association.

Catton, W.R., Jr., & Dunlap, R.E. (1978). Environmental sociology: A new paradigm. *American Sociologist*, 13, 41-49.

Carson, R.L. (1962). *Silent Spring*. New York: Fawcett World Library.

Childress, R.B. (1978). Public school environmental education curricula: A national profile. *Journal of Environmental Education*, 9(3), 2-12.

Columbia Broadcasting System (1992, June 10). *Eye on the Earth.* Author Chawla, L. (1988). Children's concerns for the natural environment. *Childrens' Environments Quarterly*, 5(13), 13-20.

Council on Environmental Quality (1981). *Global Future: Time to Act.* Washington D.C.: U. S. Government Printing Office

Crompton, J.L., & Sellar, C. (1981). Do outdoor education experiences contribute to positive development in the affective domain? *Journal of Environmental Education*, 12(4), 21-29.

Disinger, J.F. (1985-86). Current trends in environmental education. *Journal of Environmental Education*, 17(2), 1-3.

Disinger, J.F. (1986). Environmental education news. *The Environmentalist*, 6(2), 85-88.

Disinger, J.F. (1988). Environmental education research news. *The Environmentalist*, 8(2), 83-86.

Dunlap, R.E. (1980). paradigmatic change in social science. From humane exemptions to an ecological paradigm. *American Behavioral Scientist*, 24(September-October), 5-14.

Dunlap, R., & Van Liere,K. (1978). The new environmental paradigm. *Journal of Environmental Education*, 9(4), 10-19.

Ehrlich, P. (1968). *The Population Bomb*. New York: Ballantine Book Inc.

Fazio, R.H., & Zanna, M.P. (1978). On the predictive validity of attitudes: the roles of direct experience and confidence. *Journal of Personality*, 46:228-243.

Falk, J.H., & Balling, J.D. (1982). The field trip milieu: Learning and behaviour as a function of contextual events. *Journal of Education Research*, 76, 22-28.

Fennessey, G.M., Livington, S.A., Edwards, K.T., Kidder, S.J., & Nafziger, A.W. (1974). Simulation, gaming and conventional instruction in the teaching of ecology. *Journal of Environmental education*, 5:21-24.

Fortner, R.W., & Mayer, V.J. (1983). Ohio students' knowledge and attitude about the oceans and Great Lakes. *Ohio Journal of Science*, 83(5), 218-224.

Fortner, R.W., & Lyon, A.E. (1985). Effects of a Cousteau television program on viewer knowledge and attitudes. *Journal of Environmental Education*, 16(3), 12-20.

Fortner, R., & Mayer, V. (1992). Repeated measures of students' marine and Great Lakes awareness. *Journal of Environmental Education*, 23(1), 30-35.

Fuller, K.S. (1992). Windows on the wild - brings conservation message to children. *Focus*, 14(2), 2-6.

Gambro, J.S., & Harvey, S.N. (1996). A national survey of high school students' environmental knowledge. *Journal of Environmental Education*, 27(3), 28-33.

Geller, J.M., & Lasley, P. (1985). The new environmental paradigm scale: A reexamination. *Journal of Environmental Education*, 17(1), 9-12.

Gifford, R., Hay, R., & Boros, K. (1982). Individual differences in environmental attitudes. *Journal of Environmental Education*, 14(2), 19-23.

Gigliotti, L. (1990). Environmental education: What went wrong? What can be done? *Journal of Environmental Education*, 22(1), 9-12.

Gigliotti, M. L. (1992). Environmental attitudes: 20 years of change? *Journal of Environmental Education*, 24(1), 15-26.

Gillett, D., Thomas, P., Skok, R., & M^{c}Laughlin, T.K. (1991). The effects of wilderness camping and hiking on the self-concept and the environmental attitudes and knowledge of twelfth graders. *Journal of Environmental Education*, 22(3), .

Hammerman, D.R., & Hammerman, W. (1973). *Outdoor Education; a book of readings.* Minneapolis: Burgess Publishing Company.

Hart. E.P. (1978). Examination of BSCS biology and non-biology students' ecology comprehension, environmental information level and environmental attitude. *Journal of Research in Science Teaching*, 15(1), 73-78.

Hart, E.P. (1991). *Environmental Education in Canadian Elementary Schools.* Paper presented to International Training Seminar on Curriculum Development in Environmental Education for Primary School. Valletta, Malta.

Harvey, G.D. (1977). A conceptualization of environmental education. In J. L. Aldrich, et al (Eds), *The report of the North American regional seminar on environmental education.* Columbus, Ohio: ERIC/SMEAC.

Hausbeck, K.W., Milbrath, W., Milbrath, L.W., & Enright, S.M. (1992). Environmental knowledge, awareness, and concern among 11th-grade students: New York State. *Journal of Environmental Education*, 24(1), 27-34.

Hendee, J.C. (1972). Challenging the folklore of environmental education. *Journal of Environmental Education*, 3, 19-23.

Hine, J., Hungerford, H., & Tomera, A. (1986). Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis. *Journal of Environmental Education*, 18(2), 1-8.

Holden, C., & Barrow, L. (1984). Validation of the test of energy concepts and values for high school students. *Journal of Research in Science Teaching*, 21(2), 187-196.

Horsley, A.D. (1977). Effects of a social learning experiment on attitudes and behaviour towards environmental conservation. *Environment and Behaviour*, 9(3), 349-384.

Howie, T.R. (1974). Indoor or outdoor environmental education? *Journal of Environmental Education*, 6, 32-36.

Hungerford, H.R., Peyton, R.B., & Wike, R.J. (1980). Goals for curriculum development in environmental education. *Journal of Environmental Education*, 11(3), 42-47.

Hungerford, H.R., & Volk, T.L. (1990). Changing learning behaviour through environmental education. *Journal of Environmental Education*, 21(3), 8-21.

Huntley, R.G. (1979). extending the education through camping 1978: a study approximating L.B. Sharp's outdoor education research in 1947. Unpublished PhD dissertation, Southern Illinois University, Carbondale, Illinois. University Microfilms, Ann Arbor, MI 7926312. *Dissertations Abstracts International*, 40(6), 3086-A.

Ignatiuk, G.T. (1978). *Influences of time spent in field trip activities on the student attitude towards science and the environment.* A report for the Saskatchewan School Trustees Association, Regina, Saskatchewan.

Iozzi, L.A. (1981). *Research in environmental education.* Columbus, Ohio: ERIC/IRC.

Iozzi, L.A. (1989a). What research says to the educator. Part I: Environmental education and the effective domain. *Journal of Environmental Education*, 20(3), 3-9.

Iozzi, L.A. (1989b). What research says to the educator. Part II: Environmental education the affective domain. *Journal of Environmental Education* , 20(4), 6-13.

Jaus, H.H. (1978). The effect of environmental education instruction on teachers' attitudes towards teaching environmental education. *Science Education*, 62:79-84.

Jaus, H.H. (1982). The effect of environmental education instruction on childrens' attitudes toward the environment. *Science Education*, 66, 689-692.

Jaus, H.H. (1984). The development and retention of environmental attitudes in elementary school children. *Journal of Environmental Education*, 15, 33-36.

Jickling, R. (1990). Environmental education, problem solving, and some humility please. In D.A. Simmons, C. Knapp & C. Young (Eds), *Setting the EE Agenda for the 90's.* Proceedings of the 19th Annual Conference of the North American Association for Environmental Education (pp216-222). Tray, Ohio. North American Association for Environmental Education.

Jickling, R. (1991a). Environmental education and environmental advocacy: the need for proper distinction. *Canadian Issues* volume XIII, p 169-174.

Jickling, R.L. (1991b). *Thinking Environmentally: considerations for education and curriculum in the Yukon.* PhD. Diss., Simon Fraser University.

Jordan, J., Hungerford, H., & Tomera, A. (1986). Effects of two residential environmental workshops on high school students. *Journal of Environmental Education*, 18(1), 15-22.

Kahle, L.R. (1984). *Attitudes and Social Adaptation.* Ontario, Canada: Pergamon Press Ltd.

Kasterholz, H.G., & Erdmann, K.-H. (1994). Education for responsibility within the framework of UNESCO. *Journal of Environmental Education*, 25(2), 15-20.

Keen, M. (1991a). The effect of the Sunship Earth Program on knowledge and attitude development. *Journal of Environmental Education*, 22(3), 28-32.

Keen, M.R. (1991b). *Environmental learning among children: the development of environmental attitudes and ecological knowledge.* PhD. Diss. The Centre for Resource and Environmental Studies. The Australian National University.

Kellert, S.R. (1985). Attitudes towards animals: age-related development among children. *Journal of Environmental Education*, 16(3), 29-39.

Kinsey, T.G., & Wheatley, J.H. (1980). An instrument to inventory the defensibility of environmental attitudes. *Journal of Environmental Education*, 12, 29-35.

Kinsey, T.G., & Wheatley, J.H. (1984). The effects of an environmental studies course on the defensibility of environmental attitudes. *Journal of Research in Science Teaching*, 21,675-683.

Kohlberg, L. & Gilligan, C. (1971). The adolescent as a philosopher: The discovery of the self in a post-conventional world. *Daedalus*, 100, 1051-1086.

Kuhn, D, & Jackson, L. (1989). New environmental paradigm scale. *Journal of Environmental Education*, 20(3), 27-32.

Lawrenz, F & Dantchik, A. (1985). Attitudes toward energy among students in grades 4, 7, and high school. *School Science and Mathematics*, 8(3), 189-202.

Leeming, F., Dwyer,W., Porter, B., & Cobern, M. (1993). Outcome research in environmental education: A critical review. *Journal of Environmental Education*, 24(4), 8-21.

Leeming, F., Dwyer, W., & Bracken, B. (1995). Children's Environmental Attitude and Knowledge scale: Construction and Validation. *Journal of Environmental Education, 26(3), 22-31.*

Leopold, A. (1949). *A Sand County Almanac.* Oxford: Oxford University Press.

Lewis, G.E. (1982). A review of classroom methodologies for environmental education. *Journal of Environmental Education*, 13(2), 12-15.

Linke, R. (1981). Achievements and aspirations in Australian environmental education. *Journal of Environmental Education*, 12(2): 20-23.

Lisowski, M., & Disinger, J.F. (1991). The effect of field-based instruction on student understanding of ecological concepts. *Journal of Environmental Education*, 23, 19-23.

Lucko, B.J., Disinger, J.F. & Roth, R.E. (1982). Evaluation of environmental education programs at the elementary and secondary school levels. *Journal of Environmental Education*, 13(4): 7-12.

Marcinkowski, T. (1988-89). Commentary on "When Words Speak Louder Than Actions". *Journal of Environmental Education*, 20(2), 3-5.

Marcinkowski, T. (1990). *The relationship between environmental literacy and responsible environmental behaviour in environmental education.* Paper presented at the UNESCO Seminar on EE Evaluation, Bordeaux, France, March.

Martin, W.W., Falk, J.H., & Balling, J.D. (1981). Environmental effects on learning: the outdoor field trip. *Science Education*, 65, 301-309.

Miller, J. & Seller, W. (1985) *Curriculum perspectives and practise.* Longman Inc.

Millar, M.G., & Tesser, A. (1989). The effects of affective-cognitive consistency and thought on the attitude-behaviour relation. *Journal of Experimental Social Psychology*, 25, 189-202.

Moore, J.H. (1971). Defining and interpreting ecology. *Journal of Environmental Education*, 3(1), 54-57.

Morgan, J., & Gramann, J.H. (1988). A theoretical basis for predicting effectiveness in wildlife education programs. Paper presented at the *Second Symposium on Science in Resource Management Conference*, Urbana, Illinois, 6-10 June.

Musser,L.M., & Malkus, A.J.C. (1994). The children' attitudes toward the environment scale. *Journal of Environmental Education*, 25(3), 22-26.

Newhouse, N. (1990). Implications of attitude and behaviour research for environmental conservation. *Journal of Environmental Education*, 22(1), 26-32.

Noe, F., & Snow. (1990). The new environmental paradigm and further scale analysis. *Journal of Environmental Education*, 21(4), 20-26.

Odum, E.P. (1971). *Fundamentals of Ecology.* (3rd ed.). Philadelphia: W.B. Saunders.

Orion, N., & Hofstein, A. (1994). Factors that influence learning during a scientific field trip in a natural environment. *Journal of Research in Science Teaching*, 31(10), 1097-1119.

Passmore, J.H. (1972). *Outdoor Education in Canada - 1972; an overview of current developments.* Toronto: Canadian Education Association.

Passmore, J.H. (1974). *Man's responsibilities for Nature: Ecological Problems and Western Traditions*. New York: Charles Scribner's Sons.

Peled, A. (1989). The exploration of meaning in environmental education. *Journal of Environmental Education*, 21(1), 19-25.

Perez, J., & Roth, R. (1989). Twelfth grade students knowledge and attitude towards the environment in the Dominican Republic: An assessment. *Journal of Environmental Education*, 20(3), 10-14.

Petty, R.E., & Cacioppo, J.T. (1981). *Attitudes and Persuasion: Classical and contemporary approaches*. Dudugue, Iowa: Wm. C. Brown.

Piaget, J. (1963). *The Origins of Intelligence in Children*. New York: Norton.

Piaget, J., & Inhelder, B. (1969). *The Psychology of the Child*. New York: Basic Books Limited.

Rajecki, D.W. (1982). *Attitudes: Themes and Advances*. Sunderland, Mass.: Sinaver Associates.

Ramsey, C.E. & Rickson, R.M. (1976). Environmental knowledge and attitudes. *Journal of Environmental Education*, 8(1), 10-14.

Ramsey, J.M., Hungerford, H.R., &Tomera, A.N. (1981). The effects of environmental action and environmental case study instruction on the overt environmental behaviour of eight-grade students. *Journal of Environmental Education*, 13(1), 24-29.

Ramsey, J.M, & Hungerford, H.R. (1989). The effects of issue investigation and action training of environmental behaviour in seventh grade students. *Journal of Environmental Education*, 20(4), 29-34.

Ramsey, J.M., Hungerford, H.R., & Volk, T. (1992). Environmental education in the K-12 curriculum: Finding a niche. *Journal of Environmental Education*, 23(2), 35-45.

Roe, G. & Coombs, R. (1986). *Report on the Environmental Education Residential Field-Test.* (1986). Roman Catholic School Board for St. John's.

Roe, G., & Coombs, R. (1982). *A proposal for the development and implication of an environmental education program in junior and senior high school grades.* Roman Catholic School Board for St. John's. pp 35.

Runnalls, D. (1992). *Environmental Scan Summary.* Prepared for Canadian Council of Ministry of the Environment (CCME) by the Institute for Research on Public Policy and Resources Futures International And Synergistics Consulting.

Samova, L., Porter, R. & Nemic, J. (1992). *Understanding intercultural communication.* Belmont California: Wadsworth Publishing.

Shepard, C.L., & Speelman, L.R. (1985-86). Affecting Environmental attitudes through outdoor education. *Journal of Environmental Education*, 17(2): 20-23.

Shetzer, L., Slackman, R.W., & Moore, L.F. (1991). Business environment attitudes and the new environmental paradigm. *Journal of Environmental Education*, 22(4), 14-21.

Sia, A.P., Hungerford, H.R., & Tomera, A.N. (1985-86). Selected predictors of environmental behaviour: An analysis. *Journal of Environmental Education*, 17(2), 31-40.

Simmons, D.A. (1984). Community involvement in hazardous waste management. *Journal of Environmental Education*, 15, 25-32.

Simmons, D.A. (1991). Are we meeting the goal of responsible environmental behaviour? An examination of nature and environmental education centre goals. *Journal of Environmental Education*, 22(3), 16-21.

Simpson, S. (1985). Shot-term wilderness experiences and environmental ethics. *Journal of experiential education*, 8(3), 25-28.

Sivek, D. (1989). An analysis of selected predictors of environmental behaviour in members of three Wisconsin conservation organization. *Dissertation Abstracts International*, 49(11): 3322-A

Sivek, D., & Hungerford, H.R. (1990). Predictors or responsible behaviour in members of three Wisconsin conservation organization. *Journal of Environmental Education*, 21(2), 35-40.

Smith, J.W., Carlson, R., Donaldson, G., & Masters, H. (1972). *Outdoor Education.* Englewood Cliffs, New Jersey: Prentice-Hall Inc.

Stapps, W.B. et al (1969). The concept of environmental education. *Journal of Environmental Education*, 1(1), 30-31.

Szagun, G., & Mesenholl, E. (1993). Environmental ethics: An empirical study of West German adolescents. *Journal of Environmental Education*, 25(1), 37-44.

Tanner, T. (1980). Significant life experiences: a new research area in environmental education. *Journal of Environmental Education*, 11(4), 20-24.

Thompson, J.C., & Gasteiger, E.L. (1985). Environmental attitude survey of university students: 1971 vs 1981. *Journal of Environmental Education*, 17(1), 13-22.

Triandis, H. (1971). *Attitude and Attitude Change.* New York: John Wiley and Sons, Inc.

Tourney, J.V. &Tesconi, C.A. (1977). Political socialization research and respect for ethnic diversity. In Melvin M. Tunin & Walter Plotch (eds.) *Pluralism in a Democratic Society.* New York: Praeger Publishers

Udall, S. (1963). *The Quiet Crisis.* New York: Holt, Rinehart and Winston.

Volk, G.L., Hungerford, H.R., & Tomera, A.N. (1984). A national survey of curriculum needs as perceived by professional environmental educators. *Journal of Environmental Education*, 16(1), 10-19.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (1977). *Education and the challenge of environmental problems.* (UNESCO/ENVED 4) Paris: UNESCO.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (1977). *Trends in environmental education.* Paris: UNESCO.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (1980). *Environmental education in light of the Tbilisi conference.* Paris: UNESCO.

United Nations Educational, Scientific and Cultural Organization-United Nations Environment Programme (UNESCO-UNEP). (1976). The Belgrade charter. *Connect*, 3(1),1-9.

United Nations Educational, Scientific and Cultural Organization-United nations Environment Programme (UNESCO-UNEP). (1978). The Tbilisi declaration. *Connect*, 3(1), 1-8.

Weilbacher, M. (1993). The Renaissance of the naturalist. *Journal of Environmental Education*, 25(1), 4-7

Wendling, R.C., Wuensch, K.L. & Christiano, B.L. (1989). Effects of an experimental education program on rural fifth-graders. *Journal of Rural and Small Schools*, 3, 43-47.

Wendling, R.C. & Wuensch, K.L. (1985). A fifth-grade outdoor education program: expectations and effects. *Journal of Interpretation*, 10, 11-20.

Wilson, E. (1992). *The Diversity of Life.* Cambridge: Harvard University Press

Appendix A

Brother Brennan Environmental Education Program's Sample Timetable

TIME	DAY 1	DAY 2	DAY 3
7:00 AM- 8:00 AM		BREAKFAST	BREAKFAST
8:00 AM 10.00 AM	LEAVE SCHOOL	DECOMPOSER/ FOOD CHAIN STUDY	ORIENTEERING
10:00 AM 11:00 AM	ARRIVE AT SITE	FARM VISIT	HIKING & MAN' IMPACT ON LOCAL AREA
11:00 AM 12:00 AM	ORIENTATION & GROUP ASSIGNMENT	FARM VISIT	LUNCH & PREPARE FOR HOME
12.00 NOON 1:00 PM	LUNCH	LUNCH	RETURN TO SCHOOL
1:00 PM 3:00 PM	POND/STREAM STUDY	HABITAT STUDY	WRAP UP AT SCHOOL
3:00 PM 5:00 PM	WOODLOT STUDY	HABITAT STUDY	
5:00 PM 6:30 PM	DINNER & RELAX	DINNER & RELAX	
6:30 PM 8:00 PM	MACRO/MICRO POND LIFE	HABITAT PLANT IDENTIFICATION & MOUNTING	
8:00 PM 9:30 PM	NIGHT WALK & STAR OBSERVATION	ENVIRONMENTL ISSUES SIMULATION	
9:30 PM 10:30 PM	JOURNAL ENTRY & FUN TIME	JOURNAL ENTRY& FUN TIME	

APPENDIX B
INSTRUMENT USED IN STUDENT SURVEYS

Tell Us About You!

1. My School is: _____

2. I am : a boy ____ a girl _____

3. Circle the number of times you have been to the following places: (a few times is two to five times)

National Parks	never	once	a few times	lots
Provincial Parks	never	once	a few times	lots
Salmonier Nature Park	never	once	a few times	lots
Freshwater Resource Center	never	once	a few times	lots
Botanical Gardens	never	once	a few times	lots
Zoos	never	once	a few times	lots

4. If you are presently or have been a member of the following organizations, tell us how long you were a member.

	For how long
Sparks or Beavers	_____
Brownies or Cubs	_____
Girl Guides or Scouts	_____
4 H Clubs	_____
Junior Forest Warden	_____

5. Circle the number of times this year you have been:

(a few times is two to five times)

camping	never	once	a few times	lots
skiing	never	once	a few times	lots
boating or sailing	never	once	a few times	lots
canoeing	never	once	a few times	lots
for a long walk in the woods	never	once	a few times	lots
to the beach	never	once	a few times	lots
to a cabin in the woods	never	once	a few times	lots
rode an ATV (ski-doo, 4x4)	never	once	a few times	lots
gone fishing	never	once	a few times	lots
gone hunting with an adult	never	once	a few times	lots

6. Have you ever been to summer camp? no _____ yes _____

If yes how many times? _____

What Do You Think?

Read each of the following statements. For each statement decide whether you are more like the kids described by the left or right statement. Then mark a check in the big box if you are a lot like the described person or mark a check in the small box if you are only a little like the person described in the statement.

1. Some kids like to leave water running when they brush their teeth.

   ☐ ☐

   But Other kids always turn the water off while brushing their teeth.

   ☐ ☐

2. Some kids use both sides of the paper when they draw or write.

   ☐ ☐

   But Other kids use only one side of the paper when they draw or write.

   ☐ ☐

3. Some kids think we should throw away things when we're done with them.

   ☐ ☐

   But Other kids think we should recycle things.

   ☐ ☐

4. Some kids think dams on rivers are bad because they hurt plants and animals

   ☐ ☐

   But Other kids think dams on rivers are good because they prevent floods.

   ☐ ☐

5. Some kids like to bring home plants or bugs they find outside.

   ☐ ☐

   But Other kids like to look at plants or bugs outside but they never bring them home.

   ☐ ☐

6. Some kids don't like to make bird feeders or bird houses.

   ☐ ☐

   But Other kids like to make bird feeders or bird houses.

   ☐ ☐

Turn

7. Some kids think that outdoor lights should be turned off at night because they use electricity.

But Other kids think outdoor lights should be left on at night because they keep us safer.

8. Some kids think that people are more important than animals.

But Other kids think people and animals are equally important.

9. Some kids are concerned about the rain forest.

But Other kids aren't concerned about the rain forest.

10. Some kids think we should build more landfills to hold our garbage.

But Other kids think we should find other ways deal with our garbage.

11. Some kids like visiting national parks.

But Other kids don't like to go to national parks.

12. Some kids don't worry about animals becoming extinct.

But Other kids worry about animals becoming extinct.

13. Some kids throw things away when they are done with them.

But Other kids reuse things or give then to other people to use.

14. Some kids think we should use chemicals and fertilizers in our gardens.

But Other kids think we should not use chemicals and fertilizers in our gardens.

15. Some kids pick up trash and throw it away.

But Other kids don't like to pick up smelly trash.

16. Some kids don't sort their trash. But Other kids sort their trash and recycle it.

17. Some kids like to live where there are lots of plants and animals. But Other kids like to live where there are lots of people.

18. Some kids touch or catch wild animals. But Other kids never touch or catch animals they find outside.

19. Some kids don't like to carpool because they don't like being crowded in the car. But Other kids like to carpool even if it is a little crowded.

20. Some kids are excited about solar energy. But Other kids don't care about solar energy.

21. Some kids believe people should be able to live wherever they want. But Other kids believe that people should be careful not to destroy animal's homes.

22. Some kids worry about air pollution. But Other kids don't worry about air pollution.

23. Some kids think we should be able to hunt all wild animals. But Other kids think that animals need protection.

24. Some kids turn off the light when they leave. But Other kids leave the lights on.

Turn

25. Some kids get their parents to drive them places they want to go.

But Other kids ride their bikes or walk when they can.

26. Some kids think bogs are interesting flower gardens to visit.

But Other kids think bogs are ugly and smelly.

27. Some kids like learning about plants.

But Other kids find learning about plants boring.

28. Some kids feel at ease and free in the wild.

But Other kids feel uneasy or frighted in the wild.

29. Some kids don't like to spend a lot of their time outdoors.

But Other kids like to spend most of their time outdoors.

30. Some kids find walking in the countryside boring.

But Other Kids like to walk in the countryside.

Think!

Tick the answer that best describes what you think.

1. A group of plants and animals living together is called a
   ___ community ___ habitat
   ___ ecosystem ___ don't know.

2. The one thing that does not cycle in nature is
   ___ soil ___ water
   ___ energy ___ don't know.

3. There is a place where lynx only have hare to eat. Do you think there would be
   ___ more lynx than hare
   ___ more hare than lynx
   ___ about the same number of lynx and hare
   ___ don't know.

4. Most insects like dragonflies and mosquitoes spend the greater portion of their lifecycle in the
   ___ air ___ water
   ___ trees ___ don't know.

5. 12,000 years ago Newfoundland
   ___ looks much like it is now
   ___ had a lot more trees
   ___ was covered by ice
   ___ was under water.

6. The most commonly found evergreen tree in Newfoundland is
   ___ Red maple ___ Black spruce
   ___ White birch ___ Balsam fir.

7. The most commonly found flowering deciduous tree in Newfoundland is
   ___ Red maple ___ Black spruce
   ___ White birch ___ Balsam fir.

8. The process where a pond turns into a bog and then a Black spruce forest is called
   ___ succession ___ development
   ___ cycling ___ don't know

9. The most important organisms for the recycling of nutrients and minerals in nature is
   ___ plants ___ bacteria
   ___ humans ___ don't know.

Turn

10. Plants make food from
___ light, sugar and water
___ light, oxygen and water
___ light, carbon dioxide and water
___ don't know.

11. After the last ice age the organism responsible for the growth of many plants on rock are called
___ moss ___ conifers
___ lichen ___ don't know

12. The reason trees don't grow really large on the Avalon peninsula is due to
___ not enough light
___ not enough soil
___ too much water
___ don't know.

13. Animals don't help plants to grow.
___ disagree ___ agree ___ don't know.

14. All evergreens are conifers (plants with needles and cones).
___ disagree ___ agree ___ don't know

15. Moose are native to Newfoundland.
___ disagree ___ agree ___ don't know

16. The pitcher plant leaf works like a mini-community.
___ disagree ___agree ___ don't know

18. Plants compete with each other for water and nutrients.
___ disagree ___ agree ___ don't know

19. Dead leaves are of no benefit to trees.
___ disagree ___ agree ___ don't know

20. The first link in most food chain is always the sun
___ disagree ___ agree ___ don't know

APPENDIX C
RELIABILITY TABLES

Table 1: Questions used in Attitudes Instruments.

1. Some kids like to leave water running when they brush their teeth.	But	Other kids always turn the water off while brushing their teeth.
2. Some kids use both side of the paper when they draw or write.	But	Other kids use only one side of the paper when draw or write.
3. Some kids think we should throw away things.	But	Other kids think we should recycle things.
4. Some kids think dams on rivers are bad because they hurt plants and animals	But	Other kids think dams on rivers are good because they prevent floods.
5. Some kids like to bring home plants or bugs they find outside.	But	Other kids like to look at plants or bugs outside but they never bring them home.
6. Some kids don't like to make bird feeders or bird houses	But	Other kids like to make bird feeders or bird houses.
7. Some kids think that outdoor lights should be turned off at night because they use electricity.	But	Other kids think outdoor lights should be left on at night because they keep us safe.
8. Some kids think that people are more important than animals.	But	Other kids think people and animals are equally important.
9. Some kids are concerned about the rain forest.	But	Other kids are not concerned about the rain forest.

10. Some kids think we should build more landfills to hold our garbage.	But	Other kids think we should find other ways to deal with our garbage.
11. Some kids like visiting National parks.	But	Other kids don't like to go to national parks.
12. Some kids don't worry about animals becoming extinct.	But	Other kids worry about animals becoming extinct.
13. Some kids throw things away when they are done with them.	But	Other kids reuse things or give them to other people to use.
14. Some kids think we should use chemicals and fertilizers in our gardens.	But	Other kids think we should not use chemicals and fertilizers in our gardens.
15. Some kids pick up trash and throw it away.	But	Other kids don't like to pick up smelly trash.
16. Some kids don't sort their trash.	But	Other kids sort their trash and recycle.
17. Some kids like to live where there are lots of plants and animals.	But	Other kids like to live where there are lots of people.
18. Some kids touch or catch wild animals.	But	Other kids never touch or catch animals they find outside.
19. Some kids don't like to car pool because they don't like being crowed in the car.	But	Other kids like to car pool even if it is a little crowded.
20. Some kids are excited about solar energy.	But	Other kids don't care about solar energy.
21. Some kids believe people should be able to live wherever they want.	But	Other kids believe that people should be careful not to destroy animal's homes.

22. Some kids worry about air pollution.	But	Other kids don't worry about air pollution.
23. Some kids think we should be able to hunt all wild animals.	But	Other kids think that animals need protection.
24. Some kids turn off the light when they leave.	But	Other kids leave the lights on.
25. Some kids get their parents to drive them places they want to go.	But	Other kids ride their bikes or walk when they can.
26. Some kids think bogs are interesting flower gardens to visit.	But	Other kids think bogs are ugly and smelly.
27. Some kids like learning about plants.	But	Other kids find learning about plants boring.
28. Some kids feel at ease and free in the wild.	But	Other kids feel uneasy or frightened in the wild.
29. Some kids don't like to spend a lot of time outdoors.	But	Other kids like to spend most of their time outdoors.
30. Some kids find walking in the countryside boring.	But	Other kids like to walk in the countryside.

Table 2: Reliability of CATES Attitude Scale[1]

Group	Cronbach Alpha	Overall[2] Mean
School Base Pre-Test	0.81	74.11
School Base Post-Test	0.81	73.52
BBEEP Pre-Test	0.81	73.96
BBEEP Post-Test	0.84	74.37
Control I (post-test only)	0.80	71.60
Control II (post-test only)	0.82	71.54
Year Later Intervention	0.84	67.41
Year Later No Intervention	0.76	69.24

1: Based on questions 1 through 25 in Table 1
2:Based on a low of 25 through a high of 100

Table 3: Reliability of Attitude Scale[1]

Group	Cronbach Alpha	Overall[2] Mean
School Base Pre-Test	0.84	89.49
School Base Post-Test	0.84	88.62
BBEEP Pre-Test	0.84	89.42
BBEEP Post-Test	0.87	90.00
Control I (post-test only)	0.83	86.25
Control II (post-test only)	0.84	87.22
Year Later Intervention	0.85	81.95
Year Later No Intervention	0.80	83.62

1: Based on questions 1 through 30 in Table 1
2: Based on a low of 30 through a high of 120

Table 4: Reliability of Belief Scale[1]

Group	Cronbach Alpha	Overall[2] Mean
School Base Pre-Test	0.64	18.96
School Base Post-Test	0.70	18.55
BBEEP Pre-Test	0.67	19.14
BBEEP Post-Test	0.69	18.55
Control I (post-test only)	0.59	18.37
Control II (post-test only)	0.70	18.53
Year Later Intervention	0.75	16.74
Year Later No Intervention	0.38	17.52

1: Based on questions 3, 8, 10, 14, 21, 23 in Table 1
2: Based on a low of 6 through a high of 24

Table 5: Reliability of Behaviour Scale[1]

Group	Cronbach Alpha	Overall[2] Mean
School Base Pre-Test	0.54	22.60
School Base Post-Test	0.67	22.54
BBEEP Pre-Test	0.62	22.29
BBEEP Post-Test	0.68	23.00
Control I (post-test only)	0.58	21.61
Control II (post-test only)	0.64	21.41
Year Later Intervention	0.53	19.86
Year Later No Intervention	0.48	21.21

1: Based on questions 1, 2, 13, 15, 16, 18, 24, 25 in Table 1
2: Based on a low of 8 through a high of 32

Table 6: Reliability of Sensitivity Scale[1]

Group	Cronbach Alpha	Overall[2] Mean
School Base Pre-Test	0.73	37.67
School Base Post-Test	0.71	36.89
BBEEP Pre-Test	0.71	37.78
BBEEP Post-Test	0.77	38.09
Control I (post-test only)	0.72	36.28
Control II (post-test only)	0.72	37.28
Year Later Intervention	0.71	35.19
Year Later No Intervention	0.79	34.97

1: Based on questions 5, 9, 11, 12, 17, 20, 22, 26, 27, 28, 29, and 30 in Table 1
2: based on a low of 12 through a high of 48

APPENDIX D
REGRESSION ANALYSIS TABLES
1 TO 40

Table 1: Zero-order correlations between attitude and categories school based group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	-0.033	1.000						
Gender	0.209 ***	0.008	1.000					
Camping	0.006 **	0.033	0.063	1.000				
Nonutil	0.136 **	0.054	-0.195 ***	0.162 **	1.000			
Util	0.114 *	0.017	-0.460 ***	0.073	0.707 ***	1.000		
Organization	0.114 *	0.016	0.146 **	0.328 ***	0.177 **	0.076	1.000	
Centres	0.171 **	-0.025	0.054	0.350 ***	0.421 ***	0.323 ***	0.373 ***	1.000
Mean	89.050							
Standard Deviation	13.190							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Attitude and past experiences

		Dependant Variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.4664	0.7944	-0.0354	-0.587	0.5577
Gender	8.1347	1.8708	0.0389	4.348	0.0000
Camping	-2.0022	1.7650	-0.0748	-1.134	0.2577
Nonutil	0.0144	0.2950	0.0043	0.049	0.9612
Util	0.8278	0.3525	0.2277	2.348	0.0197
Organization	0.2944	0.4558	0.0433	0.646	0.5190
Centres	0.2641	0.2209	0.0877	1.195	0.2331
Multiple R =	0.334600				
R-squared =	0.111950				
F value =	4.430380				
Signif. of F =	0.000100				

Table 2: Zero-order correlations between attitude and categories BBEEP group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	0.021	1.000						
Gender	0.191 ***	0.008	1.000					
Camping	0.099	-0.016	0.033	1.000				
Nonutil	0.175 ***	0.182 ***	-0.235 ***	0.223 ***	1.000			
Util	0.030	0.093	-0.381 ***	0.035 *	0.606 ***	1.000		
Organization	0.226 ***	0.021	-0.025	0.480 ***	0.277 ***	0.056	1.000	
Centres	0.199 ***	-0.008	0.046	0.453 ***	0.312 ***	0.105 *	0.608 ***	1.000
Mean	89.694							
Standard Deviation	13.390							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis for attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.2409	0.7306	-0.0179	-0.333	0.7418
Gender	6.3467	1.5578	0.2373	4.074	0.0001
Camping	-1.5408	1.6898	-0.0573	-0.912	0.3626
Nonutil	0.6641	0.2640	0.1833	2.516	0.0124
Util	-0.0102	0.3048	-0.0023	-0.034	0.9732
Organization	1.0065	0.3968	0.1799	2.537	0.0117
Centres	0.1694	0.2521	0.0474	0.672	0.5021
Multiple R =	0.34822				
R-squared =	0.12126				
F value =	6.09118				
Signif. of F =	0.00000				

Table 3: Zero-order correlations between attitude and categories school based group pretest and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1							
Category	-0.12 *	1						
Gender	0.155 **	0.038	1					
Camping	-0.026	0.117 *	0.04	1				
Nonutil	0.001	-0.047	-0.198 ***	0.145 **	1			
Util	0.049	-0.143 **	-0.401 ***	0.067	0.542 ***	1		
Organization	0.001	0.253 ***	0.024	0.366 ***	0.166 **	-0.035	1	
Centres	0.029	0.166 **	0.066	0.354 ***	0.371 ***	0.124 *	0.373 ***	1
Mean	87.946							
Standard Deviati	13.536							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.8245	0.4526	-0.1219	-1.822	0.0698
Gender	5.5441	1.8985	0.2051	2.92	0.0038
Camping	-1.4232	1.9233	-0.5024	-0.74	0.4600
Nonutil	-0.2062	0.2897	-0.0582	-0.712	0.4773
Util	0.6076	0.3443	0.1457	1.765	0.0789
Organization	0.2759	0.4404	0.0459	0.626	0.5317
Centres	0.1356	0.2538	0.0407	0.535	0.5934
Multiple R =	0.23694				
R-squared =	0.05614				
F value =	1.97991				
Signif. of F =	0.0586				

Table4: Zero-order correlations between attitude and categories BBEEP group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	-0.083	1.000						
Gender	0.206 ***	0.036	1.000					
Camping	0.086 *	0.005	0.042	1.000				
Nonutil	0.151 **	0.232 ***	-0.159 **	0.206 ***	1.000			
Util	0.029	0.214 ***	-0.349 ***	0.055	0.617 ***	1.000		
Organization	0.171 ***	0.028	-0.006	0.430 ***	0.217 ***	0.069	1.000	
Centres	0.134 **	0.167 ***	0.082	0.314 ***	0.342 ***	0.135 ***	0.460 ***	1.000
Mean	88.330							
Standard Deviation	13.316							

Note: * P<.05, **P<.01,***P<.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.9675	0.3615	-0.1455	-2.676	0.0078
Gender	6.6300	1.4995	0.2493	4.421	0.0000
Camping	-0.7449	1.5643	-0.0279	-0.476	0.6342
Nonutil	0.6266	0.2512	0.1769	2.495	0.0131
Util	0.1140	0.2987	0.0269	0.382	0.7029
Organization	0.7975	0.3543	0.1404	2.251	0.0251
Centres	0.0635	0.2208	0.0179	0.288	0.7739
Multiple R =	0.33911				
R-squared =	0.11500				
F value =	6.08865				
Signif. of F =	0.00000				

Table 5: Zero-order correlations between attitude and categories school based group posttest and BBEEP posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	0.051	1.000						
Gender	0.224 ***	-0.007	1.000					
Camping	0.027	0.010	0.065	1.000				
Nonutil	0.162 **	0.044	-0.210 ***	0.240 ***	1.000			
Util	0.062	-0.018	-0.400 ***	0.084	0.700 ***	1.000		
Organization	0.164 **	0.153 **	0.027	0.403 ***	0.246 ***	0.081	1.000	
Centres	0.148 **	0.001	0.043	0.383	0.422 ***	0.278 ***	0.502 ***	1.000
Mean	89.362							
Standard Deviation	13.583							

Note: * P<.05, **P<.01, ***P.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.7051	1.5903	0.0259	0.443	0.6578
Gender	7.6134	1.7297	0.2807	4.401	0.0000
Camping	-2.6942	1.7790	-0.0985	-1.514	0.1311
Nonutil	0.5941	0.3080	0.1672	1.929	0.0548
Util	0.1990	0.3552	0.0489	0.560	0.5757
Organization	0.8239	0.4249	0.1364	1.939	0.0536
Centres	0.0714	0.2484	0.0210	0.288	0.7738
Multiple R =	0.34239				
R-squared =	0.11723				
F value =	5.08436				
Signif. of F =	0.00000				

Table 6: Zero-order correlations between attitude and categories Control I group and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	0.035	1.000						
Gender	0.204 ***	-0.009	1.000					
Camping	-0.001	-0.051	0.052	1.000				
Nonutil	0.046	0.203 ***	-0.133 **	0.201 ***	1.000			
Util	0.011	0.279 ***	-0.302 ***	0.100 *	0.549 ***	1.000		
Organization	0.034	-0.073	-0.049	0.370 ***	0.164 **	0.013	1.000	
Centres	-0.024	-0.035	0.087	0.221 ***	0.359 ***	0.055	0.332 ***	1.000
Mean	86.826							
Standard Deviation	13.656							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.2332	1.7167	0.0084	0.136	0.8920
Gender	6.6338	1.7099	0.2430	3.880	0.0001
Camping	-1.1771	1.7590	-0.0431	-0.669	0.5039
Nonutil	0.2959	0.2833	0.0805	1.045	0.2971
Util	0.2119	0.3466	0.0462	0.612	0.5413
Organization	0.4592	0.3803	0.0798	1.206	0.2289
Centres	-0.3557	0.2582	-0.0928	-1.377	0.1695
Multiple R =	0.24311				
R-squared =	0.05910				
F value =	2.45883				
Signif. of F =	0.01840				

Table 7: Zero-order correlations between attitude and categories BBEEP group posttest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	-0.101 *	1.000						
Gender	0.268 ***	0.028	1.000					
Camping	0.041	0.022	0.062	1.000				
Nonutil	0.140 ***	0.054 **	-0.153 ***	0.243 ***	1.000			
Util	0.022	0.127 **	-0.345 ***	0.116 *	0.650 ***	1.000		
Organization	0.112 *	0.007 ***	-0.045	0.408 ***	0.271 ***	0.124 **	1.000	
Centres	0.038	0.179 ***	0.052	0.281 ***	0.383 ***	0.208 ***	0.477 **	1.000
Mean	88.527							
Standard Deviation	13.760							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-1.5009	0.7532	-0.1090	-1.992	0.0472
Gender	8.9790	1.5869	0.3267	5.658	0.0000
Camping	-1.5651	1.6369	-0.0566	-0.956	0.3398
Nonutil	0.6753	0.2846	0.1792	2.373	0.0183
Util	0.1835	0.3449	0.0398	0.532	0.5951
Organization	0.8106	0.3788	0.1382	2.140	0.0332
Centres	-0.3248	0.2447	-0.0865	-1.327	0.1853
Multiple R =	0.36669				
R-squared =	0.13446				
F value =	6.81326				
Signif. of F =	0.00000				

Table 8: Zero-order correlations between attitude and categories school based group pretest and BBEEP pretest; gender, summer camp, non-utilarian experiences; utilarian experiences; organization and formal environmental centres.

	Attitude	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Attitude	1.000							
Category	-0.003	1.000						
Gender	0.174 ***	-0.007	1.000					
Camping	0.090 *	0.059	0.027	1.000				
Nonutil	0.153 **	-0.075	-0.226 ***	0.152 **	1.000			
Util	0.075	-0.085	-0.435 ***	0.021	0.615 ***	1.000		
Organization	0.202 ***	0.147 **	0.054	0.434 ***	0.209 ***	0.029	1.000	
Centres	0.219 ***	-0.019	0.057	0.419 ***	0.326 ***	0.167 **	0.482 ***	1.000
Mean	89.454							
Standard Deviation	13.041							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.0259	1.4998	-9.869E-04	-0.017	0.9862
Gender	5.8275	1.6334	0.2237	3.568	0.0004
Camping	-0.9253	1.6908	-0.0351	-0.547	0.5846
Nonutil	0.2841	0.2544	0.0832	1.117	0.2650
Util	0.3822	0.2982	0.0991	1.282	0.2010
Organization	0.7608	0.4009	0.1290	1.898	0.0588
Centres	0.3696	0.2505	0.1156	1.676	0.0948
Multiple R =	0.32776				
R-squared =	0.10742				
F value =	4.93445				
Signif. of F =	0.00000				

Table 9: Zero-order correlations between belief and categories school based group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	-0.054	1.000						
Gender	0.329 ***	0.008	1.000					
Camping	0.013	0.033	0.063	1.000				
Nonutil	0.038 *	0.054	-0.195 ***	0.162 **	1.000			
Util	-0.038	0.017	-0.460 ***	0.073	0.707 ***	1.000		
Organization	0.215 ***	0.016	0.146 **	0.328 ***	0.177 **	0.076	1.000	
Centres	0.240 ***	-0.025	0.054	0.350 ***	0.421 ***	0.323 ***	0.373 ***	1.000
Mean	18.752							
Standard Deviation	3.817							

Note: * P<.05, **P<.01, ***P<.001.

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.1867	0.2202	-0.094	-0.848	0.3973
Gender	2.5518	0.5187	0.3349	4.919	0
Camping	-0.9340	0.4894	-0.1207	-1.909	0.0575
Nonutil	-0.0363	0.0818	-0.0383	-0.444	0.6577
Util	0.0810	0.0977	0.077	0.829	0.4079
Organization	0.2562	0.1264	0.1304	2.027	0.0437
Centres	0.1789	0.0612	0.2055	2.921	0.0038
Multiple R =	0.42943				
R-squared =	0.18441				
F value =	7.94620				
Signif. of F =	0.00000				

Table 10: Zero-order correlations between beleif and categories BBEEP group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	-0.080	1.000						
Gender	0.217 ***	0.008	1.000					
Camping	0.102 *	-0.016	0.033	1.000				
Nonutil	0.016	0.182 ***	-0.235 ***	0.223 ***	1.000			
Util	-0.114 *	0.093	-0.381 ***	0.035	0.606 ***	1.000		
Organization	0.131 **	0.021	-0.025	0.480 ***	0.277 ***	0.056	1.000	
Centres	0.179 ***	-0.008	0.046	0.453 ***	312.000 ***	0.105 *	0.608	1.000
Mean	18.871							
Standard Deviation	3.701							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.326493	0.205451	-0.088170	-1.589	0.1130
Gender	1.445141	0.438053	0.195513	3.299	0.0011
Camping	0.007143	0.475193	9.614E-04	0.015	0.9880
Nonutil	0.086828	0.074239	0.086749	1.170	0.2431
Util	-0.117209	0.085716	-0.099161	-1.367	0.1725
Organization	0.064545	0.111586	0.041743	0.578	0.5634
Centres	0.124720	0.070901	0.126437	1.759	0.0796
Multiple R =	0.30047				
R-squared =	0.09028				
F value =	4.38080				
Signif. of F =	0.00010				

Table 11: Zero-order correlations between belief and categories school based group pretest and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	-0.080	1.000						
Gender	0.238 ***	0.038	1.000					
Camping	0.023	0.117 **	0.040	1.000				
Nonutil	-0.022	-0.047	-0.198 ***	0.145 **	1.000			
Util	-0.028	-0.143 **	-0.401 ***	0.067	0.542 ***	1.000		
Organization	0.063	0.253 ***	0.024	0.366	0.166 **	-0.035	1.000	
Centres	0.104 *	0.166 **	0.066	0.354	0.371 ***	0.124 *	0.373 ***	1.000
Mean	18.676							
Standard Deviation	3.735							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.2100	0.1230	-0.1125	-1.707	0.0891
Gender	1.9116	0.5161	0.2563	3.704	0.0003
Camping	-0.2563	0.5228	-0.0342	-0.490	0.6245
Nonutil	-0.0702	0.0787	-0.0719	-0.892	0.3733
Util	0.1028	0.0936	0.0893	1.098	0.2732
Organization	0.1218	0.1197	0.0735	1.018	0.3098
Centres	0.0978	0.0690	0.1064	1.418	0.1575
Multiple R =	0.28980				
R-squared =	0.08398				
F value =	3.05174				
Signif. of F =	0.00430				

Table 12: Zero-order correlations between Belief and categories BBEEP group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	-0.080	1.000						
Gender	0.194 ***	0.036	1.000					
Camping	0.072	0.005	0.042	1.000				
Nonutil	0.046	0.232 ***	-0.159 **	0.206 ***	1.000			
Util	-0.048	0.214 ***	-0.349 ***	0.055	0.617 ***	1.000		
Organization	0.096 *	0.028	-0.006	0.430 ***	0.217 ***	0.069	1.000	
Centres	0.125 **	0.167 ***	0.082	0.314 ***	0.342 ***	0.135 **	0.460 ***	1.000
Mean	18.842							
Standard Deviation	3.833							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.2233	0.1068	-0.1167	-2.090	0.0374
Gender	1.5166	0.4432	0.1981	3.421	0.0007
Camping	0.0358	0.4624	0.0046	0.078	0.9383
Nonutil	0.0764	0.0742	0.0750	1.029	0.3040
Util	-0.0180	0.0883	-0.0148	-0.205	0.8377
Organization	0.0736	0.1047	0.0450	0.703	0.4825
Centres	0.0839	0.0652	0.0823	1.285	0.1995
Multiple R =	0.25861				
R-squared =	0.06688				
F value =	3.35851				
Signif. of F =	0.00180				

Table 13: Zero-order correlations between Belief and categories school based group posttest and BBEEP posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	0.001	1.000						
Gender	0.322 ***	-0.007	1.000					
Camping	-0.008	0.010	0.065	1.000				
Nonutil	0.041	0.044	-0.210 ***	0.240 ***	1.000			
Util	-0.108 *	-0.018	-0.400 ***	0.084 **	0.700 ***	1.000		
Organization	0.152 **	0.153 **	0.027	0.403 ***	0.246 ***	0.081	1.000	
Centres	0.157 **	0.001	0.043	0.383 ***	0.422 ***	0.278 ***	0.502 ***	1.000
Mean	18.551							
Standard Deviation	3.850							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.1799	0.4412	-0.0233	-0.408	0.6836
Gender	2.3597	0.4798	0.3070	4.917	0.0000
Camping	-1.1179	0.4935	-0.1442	-2.265	0.0243
Nonutil	0.1482	0.0854	0.1472	1.735	0.0839
Util	-0.1349	0.0985	-0.1170	-1.369	0.1721
Organization	0.2128	0.1178	0.1243	1.805	0.0722
Centres	0.1031	0.0689	0.1073	1.496	0.1357
Multiple R =	0.39277				
R-squared =	0.15427				
F value =	6.98364				
Signif. of F =	0.00000				

Table 14: Zero-order correlations between Belief and categories Control I and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	0.021	1.000						
Gender	0.214 ***	-0.009	1.000					
Camping	-0.017	-0.051	0.052	1.000				
Nonutil	0.028	0.203 ***	-0.133 **	0.201 ***	1.000			
Util	-0.026	0.279 ***	-0.302 ***	0.100 *	0.549 ***	1.000		
Organization	0.017	-0.073	-0.049	0.370 ***	0.164 **	0.013	1.000	
Centres	-0.008	-0.035	0.087	0.221 ***	0.359 ***	0.055	0.332 ***	1.000
Mean	18.465							
Standard Deviation	3.922							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.0313	0.4939	0.0039	0.064	0.9494
Gender	1.8737	0.4919	0.2390	3.809	0.0002
Camping	-0.4086	0.5061	-0.0521	-0.808	0.4201
Nonutil	0.0822	0.0815	0.0779	1.009	0.3139
Util	0.0132	0.0997	0.0100	0.133	0.8944
Organization	0.0938	0.1095	0.0568	0.857	0.3923
Centres	-0.0710	0.0743	-0.0645	-0.956	0.3399
Multiple R =	0.23585				
R-squared =	0.05562				
F value =	2.30554				
Signif. of F =	0.02680				

Table 15: Zero-order correlations between Belief and categories BBEEP group posttest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	-0.003	1.000						
Gender	0.293 ***	0.028	1.000					
Camping	0.019	0.022	0.062	1.000				
Nonutil	0.041	0.054	-0.153 **	0.243 ***	1.000			
Util	-0.078	0.127 **	-0.345 ***	0.116 *	0.650 ***	1.000		
Organization	0.031 *	0.007 **	-0.045 *	0.408 ***	0.271 ***	0.124 **	1.000	
Centres	0.004 **	0.179 ***	0.052 *	0.281 ***	0.383 ***	0.208 ***	0.477 ***	1.000
Mean	18.543							
Standard Deviation	3.916							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief Attitude and past experiences

		Dependent variable				
Indepen. Var.		**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category		0.0076	0.2186	0.0019	0.035	0.9719
Gender		2.3804	0.4605	0.3043	5.169	0.0000
Camping		-0.2509	0.4750	-0.0319	-0.528	0.5977
Nonutil		0.1528	0.0825	0.1425	1.851	0.0652
Util		-0.0711	0.1001	-0.0542	-0.711	0.4778
Organization		0.1048	0.1099	0.0628	0.954	0.3409
Centres		-0.0818	0.0710	-0.0765	-1.152	0.2502
Multiple R =	0.31645					
R-squared =	0.10014					
F value =	4.88067					
Signif. of F =	0.00000					

Table 16: Zero-order correlations between belief and categories school based group pretest and BBEEP pretest gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Belief	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Belief	1.000							
Category	0.026	1.000						
Gender	0.217 ***	-0.007	1.000					
Camping	0.133 **	0.059	0.027	1.000				
Nonutil	0.029	-0.075	-0.226 ***	0.152 **	1.000			
Util	-0.039	-0.085	-0.435 ***	0.021	0.615 ***	1.000		
Organization	0.179 ***	0.147 **	0.054	0.434 ***	0.209 ***	0.029	1.000	
Centres	0.257 ***	-0.019	0.057	0.419 ***	0.326 ***	0.167 **	0.482 ***	1.000
Mean	19.068							
Standard Deviation	3.642							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Belief and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.1630	0.4179	0.0221	0.390	0.6968
Gender	1.5224	0.4552	0.2092	3.344	0.0009
Camping	0.0951	0.4712	0.0129	0.202	0.8401
Nonutil	-0.0250	0.0709	-0.0262	-0.353	0.7244
Util	0.0346	0.0831	0.0321	0.416	0.6775
Organization	0.0989	0.1117	0.0600	0.886	0.3765
Centres	0.1913	0.0614	0.2143	3.113	0.0020
Multiple R =	0.33386				
R-squared =	0.11146				
F value =	5.14324				
Signif. of F =	0.00000				

Table 17: Zero-order correlations between behavior and categories school based group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	-0.006	1.000						
Gender	0.210 ***	0.008	1.000					
Camping	-0.018	0.033	0.063	1.000				
Nonutil	0.042	0.054	-0.195 ***	0.162	1.000			
Util	-0.031	0.017	-0.460 ***	0.073	0.707	1.000		
Organization	-0.005	0.016	0.146 **	0.328 ***	0.177	0.076	1.000	
Centres	0.040	-0.025	0.054	0.350 ***	0.421	0.323	0.373	1.000
Mean	22.575							
Standard Deviation	4.575							

Note: * P<.05, **P<.01, ***P<.001.

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.0473	0.2841	-0.0103	-0.167	0.8679
Gender	2.2601	0.6690	0.2474	3.378	0.0008
Camping	-0.3424	0.3612	-0.0369	-0.543	0.5879
Nonutil	0.0889	0.1055	0.0783	0.843	0.4003
Util	0.0370	0.1260	0.0294	0.294	0.7689
Organization	-0.1209	0.1630	-0.0531	-0.742	0.4588
Centres	0.0168	0.0790	0.0161	0.213	0.8312
Multiple R =	0.23653				
R-squared =	0.05594				
F value =	2.08257				
Signif. of F =	0.04600				

Table 18: Zero-order correlations between behavior and categories BBEEP group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	0.076	1.000						
Gender	0.170 ***	0.008	1.000					
Camping	0.076	-0.016	0.033	1.000				
Nonutil	0.157 **	0.182 ***	-0.235 ***	0.223 ***	1.000			
Util	0.013	0.093	-0.381 ***	0.035	0.606 ***	1.000		
Organization	0.169 ***	0.021	-0.025	0.480 ***	0.277 ***	0.056	1.000	
Centres	0.145 **	-0.008	0.046	0.453 ***	0.312 ***	0.105 *	0.608 ***	1.000
Mean	22.625							
Standard Deviation	4.616							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.188822	0.256499	0.040883	0.736	0.4622
Gender	1.880066	0.546896	0.203931	3.438	0.0007
Camping	-0.395742	0.593264	-0.042703	-0.667	0.5052
Nonutil	0.229737	0.092686	0.184026	2.479	0.0137
Util	-0.048947	0.107013	-0.033201	-0.457	0.6477
Organization	0.254344	0.139312	0.131884	1.826	0.0689
Centres	0.026386	0.088517	0.021447	0.298	0.7658
Multiple R =	0.29750				
R-squared =	0.08851				
F value =	4.28624				
Signif. of F =	0.00020				

Table 19: Zero-order correlations between behavior and categories school based group pretest and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1							
Category	-0.11 *	1						
Gender	0.111 *	0.038	1					
Camping	-0.072	0.117 *	0.04	1				
Nonutil	-0.014	-0.047	-0.198 ***	0.145 **	1			
Util	-0.028	-0.143 **	-0.401 ***	0.067	0.542 ***	1		
Organization	-0.026	0.253 ***	0.024	0.366 ***	0.166 **	-0.035	1	
Centres	-0.019	0.166 ***	0.066	0.354 ***	0.371 ***	0.124 *	0.373 ***	1
Mean	22.129							
Standard Deviation	4.508							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.2526	0.1527	-0.1122	-1.654	0.0995
Gender	1.0894	0.6408	0.121	1.7	0.0905
Camping	-0.6913	0.6492	-0.0764	-1.065	0.288
Nonutil	0.0059	0.0978	0.005	0.061	0.9512
Util	0.0094	0.1162	0.0067	0.081	0.9355
Organization	0.0487	0.1496	0.0243	0.328	0.7435
Centres	0.0074	0.0856	0.0067	0.087	0.9308
Multiple R =	0.17418				
R-squared =	0.03034				
F value =	1.04138				
Signif. of F =	0.4029				

Table 20: Zero-order correlations between Behavior and categories BBEEP group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	-0.094	1.000						
Gender	0.212 ***	0.036	1.000					
Camping	0.071	0.005	0.042	1.000				
Nonutil	0.087	0.232	-0.159	0.206	1.000			
Util	-0.018	0.214 ***	-0.349 ***	0.055	0.617	1.000		
Organization	0.119 **	0.028	-0.006	0.430 ***	0.217 ***	0.069	1.000	
Centres	0.132 **	0.167 ***	0.082	0.314 ***	0.342 ***	0.135 **	0.460 ***	1.000
Mean	21.854							
Standard Deviation	4.725							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.3415	0.1300	-0.1447	-2.625	0.0091
Gender	2.2072	0.5395	0.2339	4.091	0.0001
Camping	-0.1428	0.5628	-0.0150	-0.254	0.7998
Nonutil	0.1471	0.0903	0.1171	1.628	0.1045
Util	0.0129	0.1075	0.0086	0.120	0.9043
Organization	0.1492	0.1275	0.0740	1.170	0.2428
Centres	0.0841	0.0794	0.0669	1.058	0.2907
Multiple R =	0.29965				
R-squared =	0.08979				
F value =	4.62247				
Signif. of F =	0.00010				

Table 21: Zero-order correlations between Behavior and categories school based group posttest and BBEEP posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	0.048	1.000						
Gender	0.217	-0.007	1.000					
Camping	0.011	0.010	0.065	1.000				
Nonutil	0.059	0.044	-0.210	0.240	1.000			
Util	-0.043	-0.018	-0.400	0.084	0.700	1.000		
Organization	0.086	0.153	0.027	0.403	0.246	0.081	1.000	
Centres	0.045	0.001	0.043	0.383	0.422	0.278	0.502	1.000
Mean	22.790							
Standard Deviation	4.718							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable				
Indepen. Var.		**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category		0.2866	0.5678	0.0303	0.505	0.6142
Gender		2.1917	0.6176	0.2326	3.548	0.0005
Camping		-0.5269	0.6352	-0.0554	-0.830	0.4076
Nonutil		0.1763	0.1099	0.1429	1.604	0.1100
Util		-0.0598	0.1268	-0.0423	-0.472	0.6372
Organization		0.1737	0.1517	0.0828	1.145	0.2532
Centres		-0.0395	0.0887	-0.0335	-0.446	0.6562
Multiple R	= 0.25901					
R-squared	= 0.06709					
F value	= 2.75310					
Signif. of F	= 0.00890					

Table 22: Zero-order correlations between Behavior and categories Control I group and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	-0.021	1.000						
Gender	0.192 ***	-0.009	1.000					
Camping	-0.020	-0.051	0.052	1.000				
Nonutil	-0.029	0.203 ***	-0.133 **	0.201 ***	1.000			
Util	-0.062	0.279 ***	-0.302 ***	0.100 *	0.549 ***	1.000		
Organization	0.037	-0.073	-0.049	0.370 ***	0.164 **	0.013	1.000	
Centres	0.024	-0.035	0.087	0.221 ***	0.359 ***	0.055	0.332 ***	1.000
Mean	21.489							
Standard Deviation	4.754							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.1872	0.6029	-0.0193	-0.311	0.7564
Gender	1.9149	0.6005	0.2015	3.188	0.0016
Camping	-0.5366	0.6178	-0.0565	-0.869	0.3858
Nonutil	-0.0021	0.0995	-0.0016	-0.022	0.9826
Util	0.0154	0.1217	0.0096	0.127	0.8990
Organization	0.1361	0.1337	0.0680	1.018	0.3096
Centres	-0.0055	0.0907	-0.0041	-0.061	0.9514
Multiple R =	0.20540				
R-squared =	0.04219				
F value =	1.72409				
Signif. of F =	0.10330				

Table 23: Zero-order correlations between Behavior and categories BBEEP group posttest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	-0.166 **	1.000						
Gender	0.267 ***	0.028	1.000					
Camping	0.024	0.022	0.062	1.000				
Nonutil	0.062	0.054	-0.153 **	0.243 ***	1.000			
Util	-0.035	0.127 **	-0.345	0.116 *	0.650 ***	1.000		
Organization	0.101 *	0.007	-0.045	0.408 ***	0.271 ***	0.124 **	1.000	
Centres	0.075	0.179 ***	0.052	0.281 ***	0.383 ***	0.208 ***	0.477 ***	1.000
Mean	22.156							
Standard Deviation	4.789							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable				
Indepen. Var.		**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category		-0.8955	0.2634	-0.1869	-3.400	0.0008
Gender		2.8969	0.5549	0.3029	5.220	0.0000
Camping		-0.6012	0.5724	-0.0625	-1.050	0.2944
Nonutil		0.0946	0.0995	0.0721	0.951	0.3423
Util		0.0570	0.1206	0.0355	0.473	0.6363
Organization		0.2152	0.1324	0.1054	1.625	0.1052
Centres		0.0328	0.0855	0.0251	0.383	0.7017
Multiple R	= 0.35531					
R-squared	= 0.12625					
F value	= 6.33684					
Signif. of F	= 0.00000					

Table 24: Zero-order correlations between Behavior and categories school based group pretest and BBEEP pretest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Behave	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Behave	1.000							
Category	-0.034	1.000						
Gender	0.159 **	-0.007	1.000					
Camping	0.058	0.059	0.027	1.000				
Nonutil	0.140 **	-0.075	-0.226 ***	0.152 **	1.000			
Util	0.021	-0.085	-0.435 ***	0.021	0.615 ***	1.000		
Organization	0.113 *	0.147 **	0.054	0.434 ***	0.209 ***	0.029	1.000	
Centres	0.143 **	-0.019	0.057	0.419 ***	0.326 ***	0.167 **	0.482 ***	1.000
Mean	22.427							
Standard Deviation	4.475							

Note: * P<.05, **P<.01, ***P<.001.

Regression analysis results for Behavior Attitude and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.2436	0.5265	-0.0269	-0.463	0.6440
Gender	1.6400	0.5734	0.1834	2.860	0.0045
Camping	-0.1731	0.5936	-0.0191	-0.292	0.7707
Nonutil	0.1824	0.0893	0.1557	2.043	0.0420
Util	-0.0125	0.1047	-0.0095	-0.120	0.9043
Organization	0.1028	0.1407	0.0508	0.731	0.4655
Centres	0.0734	0.0774	0.0669	0.949	0.3435
Multiple R =	0.25667				
R-squared =	0.06588				
F value =	2.89155				
Signif. of F =	0.00620				

Table 25: Zero-order correlations between Sensitivity and categories school based group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	-0.066	1.000						
Gender	0.041	0.008	1.000					
Camping	-0.041	0.033	0.063	1.000				
Nonutil	0.189 ***	0.054	-0.195 ***	0.162 **	1.000			
Util	0.266 ***	0.017	-0.460 ***	0.073	0.707 ***	1.000		
Organization	0.064	0.016	0.146 **	0.328 ***	0.177 **	0.076	1.000	
Centres	0.105	-0.025	0.054	0.350 ***	0.421 ***	0.323 ***	0.373 ***	1.000
Mean	37.280							
Standard Deviation	5.933							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.4179	0.3561	-0.0705	-1.173	0.2417
Gender	2.5810	0.8386	0.2179	3.077	0.0023
Camping	-1.0373	0.7912	-0.0862	-1.311	0.1911
Nonutil	-0.0557	0.1322	-0.0378	-0.421	0.6741
Util	0.6533	0.1580	0.3994	4.134	0.0000
Organization	0.1238	0.2043	0.0405	0.606	0.5452
Centres	-0.0095	0.0990	-0.0070	-0.096	0.9236
Multiple R =	0.34349				
R-squared =	0.11799				
F value =	4.70103				
Signif. of F =	0.00010				

Table 26: Zero-order correlations between sensitivity and categories BBEEP group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	0.026	1.000						
Gender	0.095 *	0.008	1.000					
Camping	0.048	-0.016	0.033	1.000				
Nonutil	0.171 ***	0.182	-0.235 ***	0.223 ***	1.000			
Util	0.107 *	0.093	-0.381 ***	0.035	0.606 ***	1.000		
Organization	0.193 ***	0.021	-0.025	0.480 ***	0.277 ***	0.056	1.000	
Centres	0.136 **	-0.008	0.046	0.453 ***	0.312 ***	0.105 *	0.608 ***	1.000
Mean	37.921							
Standard Deviation	6.010							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.0682	0.3355	-0.0113	-0.203	0.8390
Gender	1.9828	0.7153	0.1651	2.772	0.0059
Camping	-1.0024	0.7759	-0.0830	-1.292	0.1974
Nonutil	0.1977	0.1212	0.1216	1.631	0.1040
Util	0.1705	0.1399	0.0888	1.219	0.2240
Organization	0.5047	0.1822	0.2010	2.770	0.0059
Centres	-0.0052	0.1157	-0.0032	-0.045	0.9639
Multiple R =	0.28303				
R-squared =	0.08010				
F value =	3.84393				
Signif. of F =	0.00050				

Table 27: Zero-order correlations between Sensitivity and categories school based group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	-0.114 *	1.000						
Gender	0.034	0.038	1.000					
Camping	-0.039	0.117 *	0.040	1.000				
Nonutil	0.024	-0.047	-0.198 ***	0.145 **	1.000			
Util	0.144 **	-0.143 **	-0.401 ***	0.067	0.542 ***	1.000		
Organization	-0.022	0.253 ***	0.024	0.366 ***	0.166 ***	-0.035	1.000	
Centres	-0.031	0.166 **	0.066	0.354 ***	0.371 ***	0.124	0.373 ***	1.000
Mean	37.008							
Standard Deviation	6.158							

Note: * P<.05, **P<.01,***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.2800	0.2069	-0.0910	-1.353	0.1773
Gender	1.4192	0.8681	0.1154	1.635	0.1034
Camping	-0.5556	0.8794	-0.0450	-0.632	0.5281
Nonutil	-0.1127	0.1324	-0.0700	-0.851	0.3958
Util	0.4235	0.1574	0.2232	2.690	0.0077
Organization	0.1206	0.2014	0.0441	0.599	0.5496
Centres	-0.0389	0.1160	-0.0257	-0.336	0.7374
Multiple R =	0.21530				
R-squared =	0.04636				
F value =	1.61797				
Signif. of F =	0.13110				

Table 28: Zero-order correlations between Sensitivity and categories BBEEP group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Effective	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Effective	1.000							
Category	-0.042	1.000						
Gender	0.095 *	0.036	1.000					
Camping	0.045	0.005	0.042	1.000				
Nonutil	0.194 ***	0.232 ***	-0.159 **	0.206 ***	1.000			
Util	0.102 *	0.214 ***	-0.349 ***	0.055	0.617 ***	1.000		
Organization	0.152 **	0.028	-0.006	0.430 ***	0.217 ***	0.069	1.000	
Centres	0.071	0.167 ***	0.082	0.314 ***	0.342 ***	0.135 **	0.460 ***	1.000
Mean	37.527							
Standard Deviation	5.959							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	-0.3014	0.1647	-0.1013	-1.830	0.0682
Gender	1.8716	0.6833	0.1572	2.739	0.0065
Camping	-0.6753	0.7128	-0.0565	-0.947	0.3442
Nonutil	0.3334	0.1144	0.2104	2.913	0.0038
Util	0.0923	0.1361	0.0487	0.679	0.4978
Organization	0.4006	0.1614	0.1577	2.481	0.0136
Centres	-0.0930	0.1006	-0.0587	-0.925	0.3559
Multiple R =	0.28688				
R-squared =	0.08230				
F value =	4.20234				
Signif. of F =	0.00020				

Table29: Zero-order correlations between Sensitivity and categories school based group posttest and BBEEP posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	0.097 *	1.000						
Gender	0.052	-0.007	1.000					
Camping	0.001	0.010	0.065	1.000				
Nonutil	0.197 **	0.044	-0.210 ***	0.240 ***	1.000			
Util	0.199 ***	-0.018	-0.400 ***	0.084	0.700 ***	1.000		
Organization	0.128 **	0.153 **	0.027	0.403 ***	0.246 ***	0.081	1.000	
Centres	0.104 *	0.001	0.043	0.383 ***	0.422 ***	0.278 ***	0.502 ***	1.000
Mean	37.533							
Standard Deviation	6.136							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	0.9969	0.7307	0.0811	1.364	0.1736
Gender	1.9227	0.7948	0.1569	2.419	0.0162
Camping	-1.0659	0.8174	-0.0862	-1.304	0.1934
Nonutil	0.1258	0.1415	0.0784	0.889	0.3747
Util	0.3890	0.1632	0.2117	2.384	0.0178
Organization	0.3285	0.1952	0.1204	1.683	0.0936
Centres	-0.0338	0.1141	-0.0221	-0.297	0.7671
Multiple R =	0.29421				
R-squared =	0.08656				
F value =	3.62798				
Signif. of F =	0.00090				

Table 30: Zero-order correlations between Sensitivty and categories Control I group Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	0.079	1.000						
Gender	0.054	-0.009	1.000					
Camping	0.007	-0.051	0.052	1.000				
Nonutil	0.100	0.203 ***	-0.133 **	0.201 ***	1.000			
Util	0.092	0.279 ***	-0.302 ***	0.100 *	0.549 ***	1.000		
Organization	0.018	-0.073	-0.049	0.370 ***	0.164 **	0.013	1.000	
Centres	-0.073	-0.035	0.087	0.221 ***	0.359 ***	0.055	0.332 ***	1.000
Mean	36.869							
Standard Deviation	6.230							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.4855	0.7922	0.0383	0.613	0.5404
Gender	1.2881	0.7890	0.1034	1.632	0.1037
Camping	-0.2104	0.8117	-0.0169	-0.259	0.7957
Nonutil	0.2031	0.1307	0.1211	1.554	0.1214
Util	0.1150	0.1599	0.0549	0.719	0.4727
Organization	0.1555	0.1757	0.0592	0.885	0.3769
Centres	-0.2497	0.1191	-0.1428	-2.095	0.0370
Multiple R =	0.19291				
R-squared =	0.03721				
F value =	1.51298				
Signif. of F =	0.16270				

Table 31: Zero-order correlations between Sensitivity and categories BBEEP group posttest and Control II gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	-0.065	1.000						
Gender	0.100 *	0.028	1.000					
Camping	0.025	0.022	0.062	1.000				
Nonutil	0.177 ***	0.054	-0.153	0.243 ***	1.000			
Util	0.108	0.127 **	-0.345 ***	0.116 *	0.650 ***	1.000		
Organization	0.098	0.007	-0.045	0.408 ***	0.271 ***	0.124 **	1.000	
Centres	0.001	0.179 ***	0.052	0.281 ***	0.383 ***	0.208 ***	0.477 ***	1.000
Mean	37.657							
Standard Deviation	6.204							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.4092	0.3513	-0.0659	-1.165	0.2451
Gender	2.1197	0.7402	0.1710	2.864	0.0045
Camping	-0.6788	0.7635	-0.0545	-0.889	0.3747
Nonutil	0.3200	0.1327	0.1883	2.411	0.0165
Util	0.1458	0.1609	0.0702	0.906	0.3654
Organization	0.3454	0.1767	0.1306	1.955	0.0515
Centres	-0.2190	0.1141	-0.1294	-1.919	0.0559
Multiple R =	0.27136				
R-squared =	0.07363				
F value =	3.48612				
Signif. of F =	0.00130				

Table 32: Zero-order correlations between Sensitivity and categories school based group pretest and BBEEP Pretest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Sensitivity	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Sensitivity	1.000							
Category	0.009	1.000						
Gender	0.089	-0.007	1.000					
Camping	0.020	0.059	0.027	1.000				
Nonutil	0.165 **	-0.075	-0.226 ***	0.152 **	1.000			
Util	0.162 **	-0.085	-0.435 ***	0.021	0.615 ***	1.000		
Organization	0.170 **	0.147 **	0.054	0.434 ***	0.209 ***	0.029	1.000	
Centres	0.135 **	-0.019	0.057	0.419 ***	0.326 ***	0.167 ***	0.482 ***	1.000
Mean	37.732							
Standard Deviation	5.838							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Sensitivity and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	0.1453	0.6789	0.0123	0.214	0.8307
Gender	2.1040	0.7394	0.1804	2.845	0.0048
Camping	-0.9516	0.7654	-0.0808	-1.243	0.2148
Nonutil	0.0787	0.1151	0.0515	0.684	0.4945
Util	0.3482	0.1350	0.2016	2.579	0.0104
Organization	0.4279	0.1815	0.1620	2.358	0.0191
Centres	0.0432	0.0998	0.0302	0.434	0.6650
Multiple R =	0.29550				
R-squared =	0.08732				
F value =	3.92273				
Signif. of F =	0.00040				

Table 33: Zero-order correlations between knowledge and categories school based group pretest and BBEEP pretest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.051	1.000						
Gender	-0.134 **	-0.007	1.000					
Camping	0.044	0.059	0.027	1.000				
Nonutil	0.114 **	-0.075	-0.226 ***	0.152	1.000			
Util	-0.006	-0.085	-0.435 ***	0.021	0.615 ***	1.000		
Organization	0.252 ***	0.147 **	0.054	0.434 ***	0.209 ***	0.029	1.000	
Centres	0.199 ***	-0.019	0.057	0.419 ***	0.326 ***	0.167	0.482 ***	1.000
Mean	6.668							
Standard Deviation	2.699							

Note: * P<.05, **P<.01, ***P<.005

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.1036	0.3075	0.0190	0.337	0.7362
Gender	-1.1319	0.3349	-0.2100	-3.379	0.0008
Camping	-0.6794	0.3467	-0.1248	-1.960	0.0510
Nonutil	0.0774	0.0521	0.1096	1.485	0.1387
Util	-0.1538	0.0611	-0.1927	-2.516	0.0124
Organization	0.2731	0.0822	0.2237	3.322	0.0010
Centres	0.1003	0.0452	0.1516	2.219	0.0273
Multiple R =	0.35190				
R-squared =	0.12383				
F value =	5.79465				
Signif. of F =	0.00000				

Table 34: Zero-order correlations between Knowledge and categories school based group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.067	1.000						
Gender	-0.095	0.008	1.000					
Camping	-0.099	0.033	0.063	1.000				
Nonutil	0.146 **	0.054	-0.195 ***	0.162 **	1.000			
Util	0.113 *	0.017	-0.460 ***	0.072	0.707 ***	1.000		
Organization	0.150 **	0.016	0.146 **	0.328 ***	0.177 **	0.076	1.000	
Centres	0.142 **	-0.025	0.054	0.350 ***	0.421 ***	0.323 ***	0.373 ***	1.000
Mean	6.705							
Standard Deviation	2.905							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	0.2062	0.1770	0.0711	1.165	0.2453
Gender	-0.7057	0.4117	-0.1217	-1.693	0.0917
Camping	-1.2390	0.0657	-0.2104	-3.150	0.0018
Nonutil	0.0795	0.0785	0.1103	1.209	0.2278
Util	-0.0505	0.1015	-0.0630	-0.642	0.5213
Organization	0.3553	0.0492	0.1708	2.513	0.0126
Centres	6.2839	0.8937	0.1345	1.811	0.0714
Multiple R =	0.30149				
R-squared =	0.09090				
F value =	3.51370				
Signif. of F =	0.00130				

Table 35: Zero-order correlations between knowledge and categories BBEEP group pretest and posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.560 ***	1.000						
Gender	-0.081	0.008	1.000					
Camping	0.080	-0.016	0.033	1.000				
Nonutil	0.176 ***	0.182 ***	-0.235 ***	0.223 ***	1.000			
Util	0.027	0.093 *	-0.381 ***	0.035	0.606 ***	1.000		
Organization	0.225 ***	0.021	-0.025	0.480 ***	0.277 ***	0.056	1.000	
Centres	0.176 ***	-0.008	0.046	0.453 ***	0.312 ***	0.105 *	0.608 ***	1.000
Mean	8.565							
Standard Deviation	3.397							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	1.9032	0.1557	0.5599	12.222	0.0000
Gender	-0.8065	0.3320	-0.1188	-2.429	0.0157
Camping	-0.2478	0.3601	-0.0363	-0.688	0.4918
Nonutil	0.0467	0.0562	0.0508	0.830	0.4072
Util	-0.1301	0.0649	-0.1199	-2.003	0.0460
Organization	0.2232	0.0845	0.1573	2.640	0.0087
Centres	0.0937	0.0537	0.1035	1.744	0.0821
Multiple R =	0.61620				
R-squared =	0.37970				
F value =	27.02091				
Signif. of F =	0.00000				

Table 36: Zero-order correlations between Knowledge and categories school based group pretest and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	-0.009	1.000						
Gender	-0.080	0.038	1.000					
Camping	-0.048	0.117 *	0.040	1.000				
Nonutil	0.111 *	-0.047	-0.198 **	0.145 **	1.000			
Util	0.052	-0.143 **	-0.401 ***	0.067	0.542 ***	1.000		
Organization	0.156 **	0.253 ***	0.024	0.366 ***	0.166 ***	-0.035	1.000	
Centres	0.099	0.166 **	0.066	0.354 ***	0.371 ***	0.124 *	0.373 ***	1.000
Mean	6.485							
Standard Deviation	2.763							

Note: * P<.05, **P<.01, ***P<.001.

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.0640	0.0924	-0.0463	-0.693	0.4892
Gender	-0.4114	0.3876	-0.0746	-1.061	0.2896
Camping	-0.7783	0.3927	-0.1405	-1.982	0.0487
Nonutil	0.0470	0.0591	0.0651	0.795	0.4273
Util	-0.0113	0.0703	-0.0133	-0.161	0.8720
Organization	0.2252	0.0899	0.1837	2.505	0.0129
Centres	0.0478	0.0518	0.0703	0.924	0.3566
Multiple R =	0.23537				
R-squared =	0.05540				
F value =	1.95210				
Signif. of F =	0.06250				

Table 37: Zero-order correlations between knowledge and categories BBEEP group pretest and Control I; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.358 ***	1.000						
Gender	-0.104 *	0.036	1.000					
Camping	0.068	0.005	0.042	1.000				
Nonutil	0.185 ***	0.232 ***	-0.159 **	0.206 ***	1.000			
Util	0.034	0.214 ***	-0.349 ***	0.055	0.617 ***	1.000		
Organization	0.199 ***	0.028	-0.006	0.430 ***	0.217 ***	0.069	1.000	
Centres	0.242 ***	0.167 ***	0.082	0.314 ***	0.342 ***	0.135 **	0.460 ***	1.000
Mean	7.887							
Standard Deviation	3.094							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	0.5435	0.0789	0.3518	6.882	0.0000
Gender	-1.0940	0.3275	-0.1770	-3.340	0.0009
Camping	-0.2485	0.3416	-0.0400	-0.727	0.4676
Nonutil	0.1171	0.0548	0.1424	2.135	0.0335
Util	-0.2115	0.0652	-0.2148	-3.241	0.0013
Organization	0.1690	0.0774	0.1281	2.184	0.0297
Centres	0.1089	0.0482	0.1323	2.258	0.0246
Multiple R =	0.46702				
R-squared =	0.21811				
F value =	13.07083				
Signif. of F =	0.00000				

Table 38: Zero-order correlations between Knowledge and categories school based group posttest and BBEEP posttest; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.523 ***	1.000						
Gender	-0.061	-0.007	1.000					
Camping	-0.005	0.010	0.065	1.000				
Nonutil	0.119 *	0.044	-0.210 ***	0.240 ***	1.000			
Util	0.058	-0.018	-0.400 ***	0.084	0.700 ***	1.000		
Organization	0.232 ***	0.153 **	0.027	0.403 ***	0.246 ***	0.081	1.000	
Centres	0.141 **	0.001	0.043	0.383 ***	0.422 ***	0.278 ***	0.502 ***	1.000
Mean	8.880							
Standard Deviation	3.531							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	3.5285	0.3637	0.4992	9.700	0.0000
Gender	-0.3920	0.3956	-0.0556	-0.991	0.3226
Camping	-0.7954	0.4069	-0.1118	-1.955	0.0516
Nonutil	0.0450	0.0704	0.0487	0.639	0.5233
Util	-0.0198	0.0812	-0.0188	-0.245	0.8068
Organization	0.2234	0.0972	0.1422	2.299	0.0223
Centres	0.0868	0.0568	0.0985	1.527	0.1278
Multiple R =	0.56271				
R-squared =	0.31664				
F value =	17.74008				
Signif. of F =	0.00000				

Table 39: Zero-order correlations between knowledge and categories Control I group and Control II; gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	0.387 ***	1.000						
Gender	-0.079	-0.009	1.000					
Camping	-0.014	-0.051	0.052	1.000				
Nonutil	0.173 **	0.203 ***	-0.133 **	0.201 ***	1.000			
Util	0.099 *	0.279 ***	-0.302 ***	0.100 *	0.549 ***	1.000		
Organization	0.096 *	-0.073	-0.049	0.370 ***	0.164 **	0.013	1.000	
Centres	0.090	-0.035	0.087	0.221 ***	0.359 ***	0.055	0.332	1.000
Mean	7.965							
Standard Deviation	3.230							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	B	SE B	Beta	T	Sig. T
Category	2.6138	0.3777	0.3983	6.920	0.0000
Gender	-0.5604	0.3762	-0.0868	-1.490	0.1375
Camping	-0.3329	0.3870	-0.0515	-0.860	0.3905
Nonutil	0.0923	0.0623	0.1062	1.481	0.1397
Util	-0.1038	0.0762	-0.0957	-1.361	0.1746
Organization	0.1429	0.0838	0.1050	1.705	0.0892
Centres	0.0502	0.0568	0.0554	0.884	0.3772
Multiple R =	0.43086				
R-squared =	0.18564				
F value =	8.92300				
Signif. of F =	0.00000				

Table 40: Zero-order correlations between knowledge and categories BBEEP group posttest and Control I gender, summer camp, non-utilarian experiences; utilarian experiences; organizations; and formal environmental centres.

	Knowledge	Category	Gender	Camping	Nonutil	Util	Organization	Centres
Knowledge	1.000							
Category	-0.259 ***	1.000						
Gender	-0.097 *	0.028	1.000					
Camping	0.018	0.022	0.062	1.000				
Nonutil	0.072	0.054	-0.153 **	0.243 ***	1.000			
Util	-0.016	0.127 **	-0.345 ***	0.116 *	0.650 ***	1.000		
Organization	0.136 **	0.007	-0.045	0.408 ***	0.271	0.124 **	1.000	
Centres	0.058	0.179 ***	0.052	0.281 ***	0.383 ***	0.208 ***	0.477 ***	1.000
Mean	9.749							
Standard Deviation	3.081							

Note: * P<.05, **P<.01, ***P<.001

Regression analysis results for Knowledge and past experiences

		Dependent variable			
Indepen. Var.	**B**	**SE B**	**Beta**	**T**	**Sig. T**
Category	-0.7929	0.1718	-0.2573	-4.617	0.0000
Gender	-0.6470	0.3618	-0.1051	-1.788	0.0747
Camping	-0.2579	0.3732	-0.0417	-0.691	0.4901
Nonutil	0.0808	0.0649	0.0957	1.245	0.2140
Util	-0.1051	0.0787	-0.1019	-1.336	0.1824
Organization	0.1470	0.0864	0.1119	1.702	0.0898
Centres	0.0438	0.0558	0.0521	0.785	0.4331
Multiple R =	0.32051				
R-squared =	0.10273				
F value =	5.02118				
Signif. of F =	0.00000				