

BUILDING ON OUR NATURAL CURIOSITIES

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Dedication

To my son Graeme,
who with love and
understanding, gave up many
hours of quality time together
so I could complete
this endeavor.

Abstract

The traditional view of teaching environmental education has been for students to learn *about* the environment whereas the current trend is to provide learning opportunities that are experiential and *in* the environment. This research project is to explore the natural curiosities and attitudes that emerge from children when they are immersed in rich learning experiences that are experiential and cause children to pause, reflect, and ask questions, and that occur in an outdoor classroom.

According to the 1996 Alberta Program of Studies for Elementary Science “children have a natural curiosity about their surroundings – a desire to explore and investigate, see inside things, find out how things work and find answers to their questions” (p. A.1). By participating in a one week outdoor classroom situated in a natural river setting and a prairie foothills conservation area, students were given the opportunity to experience first-hand the richness and beauty of the natural environment. Through reflective journaling and a set of survey questions students shared their thoughts and feelings about the natural environment. When given the opportunity to explore, discover, and observe the world around them, the students asked wondrous questions, expressed delight, and identified serious issues of environmental concern. This small group of students built upon, broadened and enhanced their understanding of the world around them. They demonstrated a strong sense of caring about the environment and believed that they could make a difference in preserving the natural habitat for themselves and others. As cited in Pan-Canadian Framework (Council of Ministries, 1996, p. 11), Unesco states “there can be no greater contribution or more essential element to long-term environmental

strategies leading to sustainable development that respects the environment...than the education of future generations in matters relating to the environment.”

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Chapter 1: Research Question and Introduction

Research Question

When placed in an outdoor learning environment that encourages inquiry and an interactive approach to learning, will children express a positive attitude and natural curiosity about the natural environment?

Introduction

In my previous role as the Elementary Math/Science Specialist I was involved in many professional development initiatives for teachers. One such initiative was the implementation of GLOBE (Global Learning and Observations to Benefit the Environment), an international environmental monitoring program, K-12. In order to facilitate this initiative I was totally immersed into the world of environmental education with a focus on understanding the earth as a system, the systems of the earth and specific scientific protocols used to collect real time data in environmental monitoring. Upon completion of my learning experiences and training, I developed and implemented professional learning opportunities for teachers. As a result of this work I was able to observe the transfer of these learning opportunities in classrooms for students. It was then that I became curious about students' attitudes, understandings and curiosities about the natural world.

Goal

The goal of this study was to identify and compare the commonalities and differences in attitudes and curiosity of two distinct groups of students when placed in similar learning environments.

Definition of Terms

natural curiosity	an innate human desire to learn and make sense of one's world.
natural environment	the out of door surroundings that have been minimally impacted by humans.
Group 1	refers to the group of grade 3/4 students participating at Riveredge Nature School.
Group 2	refers to the group of grade 5/6 students participating at Cross Conservation Area.

Unit of Analysis

The unit of analysis is two groups of elementary students. The first group has 19 participants in the study while the second group has 26 participants.

Variables

The following variables may have affected the results of the data:

- varying ages of participants.
- small number of participants in the study groups.
- experiential background of individual students.
- location.
- student preparation.
- teacher interest and understanding of environmental education.

Background

The predominant view of teaching environmental education has been for students to learn about the environment in a formal classroom setting. The current focus is on inquiry based, interactive learning by being in the environment focusing on experiences that are for the environment, that promote “a sense of responsibility and active pupil participation” (Tilbury as cited in Haury, 1998, p. 2) in resolving environmental problems. Lucas (1979) stated that during the 60s and 70s, education would be considered “environmental” if it could fit into one of three broad categories:

- ...the content was *about* the environment,
- ...the aim of the course was *for* the (preservation of the environment),
- ...teaching was taking place *in* the environment. (p. 28)

The school children of Calgary and surrounding areas are fortunate enough to have access to many informal and non-traditional learning classrooms. The Campus Calgary/Chevron Open Minds program offers access to many such sites. Assistant program director, Cochrane (2001) states:

We know that real learning occurs when students

- are immersed for long periods of time in interesting experiences
- are provided with skills and expectations to make sense of those experiences
- have role models of curious adult learners, such as teachers, site staff and parents
- can make connections throughout the long term study (p. 2)

The two groups of students that participated in this study participated in a week-long residency in an outdoor classroom in the natural environment sponsored by Chevron Open Minds.

The first group was comprised of 19 grade 3/4 students from a school located in an upper to middle-class socio-economic area. They focused on an interdisciplinary study that explored the systems of the earth, environmental monitoring and citizenship at an urban outdoor classroom located on the Elbow River in the heart of Calgary. Known as Riveredge Park, there were no walls at this school, only a picnic shelter to protect the students from the elements. The study took place in the early spring when the weather was unpredictable.

The second group of 26 students was from a grade 5/6 class that attends a school that is located in a lower to middle-class socio-economic area. The interdisciplinary study for this group took place at the Ann and Sandy Cross Conservation Area. This 4800 acre natural area is located in the rolling foothills just south of the Calgary city limits. The focus of this group was to heighten student awareness of the natural environment and the many societal issues that threaten the very existence of natural areas. The study took place in the winter when the temperature and snow conditions influenced the student activities.

In both instances the students traveled daily to the outdoor classrooms by chartered bus for five consecutive days to be immersed in the natural environment.

The learning opportunities designed for the students had common goals in mind with an understanding that the purpose of the nature schools was to immerse the students

in the natural world to explore, investigate, and discover answers to their questions about how the world works, as well as to build upon their natural curiosities.

The common goals for these experiences were to enhance student awareness and learning by:

- placing learning in a context that is meaningful and purposeful.
- supporting quality learning environments that encourage students to be actively involved in approaching learning through inquiry.
- promoting knowledge as being socially constructed.
- supporting students in making the interdisciplinary connections among science, math, social studies, language arts and technology.
- modeling interactive, inquiry based instruction as an effective quality learning and teaching strategy.
- promoting and supporting scientific understanding of the earth, scientific research and environmental awareness.

My involvement in both these learning experiences was to support the teachers in the design of student inquiry for the week and to determine the effect this type of learning experience had on student attitudes and natural curiosities.

Rationale

As the movement in environmental education gains momentum and our understanding of how children best learn continues to grow, there is a need to examine the two within the context of each other. It is important to examine the underlying educational and social tenets of environmental education from the past and the present. Education merely mirrors the needs of society. The learning that occurs in a natural

environment is experiential and is best taught in a context of reality in relation to the child according to the Council of Ministers of Education, Canada, Common Framework of Science Learning Outcomes K-12 (1996). It is within the parameter of these understandings that the research study takes place.

Chapter 2: Literature Review

To undertake this research investigation, it is necessary to have an understanding of the research and current practice surrounding:

1. Current learning theories
2. Inquiry based learning
3. Environmental education

Current Learning Theories

“. . . a ditch somewhere – or a creek, meadow, woodlot, or meadow, or marsh. . .

These are the places of imitation, where borders between ourselves and other creatures breakdown, where the earth gets under our nails and a sense of place gets under our skin. . . . Everybody has a ditch, or ought to. For only the ditches and the fields, the woods, the rawness – can teach us to care enough for all the land.” (Pyle as cited by Nabhan & Trimble, p. viii)

By examining the current theories of learning, it becomes apparent that interaction with the natural environment has endless possibilities for engaging a child’s imagination, awareness, and appreciation.

Although influenced by many perspectives, the delivery of education today appears to be influenced by three philosophies with historical roots from as early as the 18th century. Hutchison (1998), in his book *Growing Up Green*, identifies the three philosophies as technocratic, progressive, and holistic. Hutchison described each philosophy:

Technocratic: a return to a basic program of instruction and a renewed commitment to higher standards of educational attainment.

Progressive: an inquiry based approach to learning which fosters an experiential temperament in students.

Holistic: the child's search for meaningfulness and purpose in the physical and cultural worlds which surround the child. (p. 26)

Despite the different emphasis or purpose each philosophy has, there remains a common understanding that the school has the responsibility to prepare the student for the challenges they will face as adults. Historically the role of education was to train young people in basic and job related skills. With roots from the 18th century, “technocratic” or commonly known today as back-to-the-basics education, as defined by Hutchison continues to be the predominant philosophy of education yet today. He states, “...the primary efforts of our educational system should be aimed at following the path laid out by shifts in demographic and employment trend indicators.... and “...the first obligation of schools is to ensure the future employability of all students...” (p. 34).

The progressive and holistic reform movements of the early 19th century were a reaction to what was viewed as a hierarchical and authoritarian form of education. Influenced by John Dewey (1859-1952) and William Hurd Kirkpatrick (1871-1965), educators began to recognize that education needed to develop within students the necessary knowledge, skills, and values that would allow them to be contributing members of a democratic society. This, Dewey believed, could only be done by fostering independent thinking and cooperative learning. The holistic vision of education went beyond progressive by focusing on the individual needs of the student. It encompassed the notion of spirituality – not in a particular religious sense, but rather “continuous for meaningfulness and purpose in the world” (Hutchison, 1998, p. 49). Holistic education is

often confused as a component of progressive education but it is separate and unique. It emphasizes a multi-faceted approach to learning and understanding. The underlying premise of the holistic philosophy is to balance the cognitive affective and spiritual domains of learning by building connections between them. The focus is on the development of the “whole child” and her/his relationship to the world. Fredrich Froebel, known as the founder of kindergarten in the 19th century, and Marie Montessori of the 20th century, were the most prominent leaders in this education movement.

All three of these philosophies exist in the majority of today’s schools.

Technocratic, progressive, and holistic philosophies are intertwined to provide education with a foundation on which to build a balanced program for students. In recent decades there has been a greater emphasis on developing a child’s ability to think independently, to solve problems. Jickling stated that, “Education is concerned with enabling people to think for themselves. The goal of education is the optimal development of people, with an emphasis on autonomy and critical thinking” (as cited in Sauve, 1996).

This brief overview of the historical roots provides an awareness of learning theories influencing current classroom practices. Educators are beginning to understand that this process of taking what we have previously learned, applying it to new experiences and constructing new ideas is how we develop understanding. Brooks and Brooks (1993) describe that constructivism as a way of coming to know and understand one’s world.

Constructivism, according to work of Von Glasserfeld, is an ideology that is based on two principles as stated in Robertson (2002):

1. Knowledge is not passively received but actively built up by the cognizing subject.
2. The function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality (p. 3).

According to Sterling (1999), John Dewey, one of the most powerful writers on progressive education, described the fundamental foundation for learning as experience, which encourages social, moral and intellectual growth. Sterling also believed Charles Darwin influenced Dewey as evident in his educational theory of experience. "Learning like evolution is a changing, developing process that requires an ongoing reconstruction of experiences" (p. 23).

Jean Piaget believed "that knowledge is not out there somewhere waiting to be discovered but, rather, is acquired and constructed through a process of interaction with materials" (as cited in Llewellyn, 2002, p. 43). It is from Piaget's work in the development of knowledge and use of logical thinking that the term "schema" originates. Schemas are the cognitive representations, constructed by the child, based on their experiences. Llewellyn (2002) identifies the three basic assumptions in Piaget's work:

1. Knowledge is a result of the ever-changing interaction between individuals and their environments.
2. Intelligence is constantly being constructed from prior and new experiences.
3. Cognitive growth is self regulating within the individual and the interaction of the physical and social environment. (p. 43)

Olsen (2000) also believed that Piaget viewed the human mind as a dynamic set of cognitive structures that help us make sense of what we perceive. These structures

grow in intellectual complexity as we mature and as we interact with the world we come to know. As we gain experience through maturation and experience the foundation for new structures is being laid. Learning is not discovering more but interpreting through a different schema or structure.

Worth (2000) in the Foundations Monograph states that children draw their understanding from the messy world around them. "...It takes place within the context of the child: the child's frame of reference, his or her prior experience and developmental stage and the adults around that child" (p. 26).

Lev Vygotsky, a Russian theorist, also believed that children actively construct knowledge. According to Fraser (2000), Vygotsky's social development theory has four ideas about learning that are significantly important for educators of children:

1. Children actively construct knowledge.
2. Learning leads development, it is relevant to experience.
3. Learning cannot be separated from its social context.
4. Language plays a central role in intellectual development. (p. 22-23)

Fraser (2000) felt Vygotsky also believed that the child has two levels of performance: "the level that the child is capable of achieving independently," and "the level of performance that the child reaches with assistance" (p. 23). The distance between these two levels is known as the zone of proximal development. "If a child is to keep alive his unborn sense of wonder he needs the companionship of at least one adult who can share it, rediscovering with him the joy, the excitement and mystery of the world we live in" (Carson, 1956, p. 45). Through social interaction, adult guidance or peer collaboration allows the child to exceed beyond what can be attained alone. Carson

recognized children's innate curiosity and sense of wonder over the natural world but also understood that the sense of excitement often faded as children became adults.

Constructivism has had an impact on educational practice. Not only is it seen as a theory of learning, but as a method of teaching. The pedagogical implication for teaching, from a constructivist's perspective, is to help learners internalize and reshape new information. Twomey Fosnot prefaces the Brooks and Brooks (1993) book, *In Search of Understanding the Case for the Constructivist Classroom*, by identifying five encompassing principles of the constructivist pedagogy. These five principles are: "(1) posing problems of emerging relevance to learners; (2) structuring learning around big ideas or primary concepts; (3) seeking and valuing students' points of view; (4) adapting curriculum to address students' suppositions; (5) assessing student learning in the context of teaching" (p. viii). According to Perkins (1999), philosopher D. C. Phillips identifies three distinct roles of the learner in a constructivist classroom. They are:

1. The active learner: Knowledge and understanding is actively acquired. Instead of just listening, reading, and working through routine exercises, they discuss, debate, hypothesize investigate. . .
2. The social learner: Knowledge and understanding are socially constructed. We do not construct them individually; we construct them in dialogue with others.
3. The creative learner: Knowledge and understanding are created or recreated... learners need to create or recreate knowledge for themselves. It is not enough that they assume an active stance. (p. 7)

Perkins continues by pointing out that “an active role for the learner is basic; in practice, social and creative aspects often accompany this role. However, an active learner does not logically require the other two” (p. 7). The related learning environment should encourage creativity, exploration and the sharing of ideas. Transformation occurs through the creation of new understandings. Llewellyn (2002) summarizes the many views of constructivism:

In the constructivists sense, the child’s knowledge is the result of his or her prior experiences, and children learn to make observations to make sense of the world and draw inferences about cause and effect phenomena that they experience. These inferences allow the child to form models and store them as memories within various areas of the brain. Children continue to test their ideas, beliefs and models through ongoing observations. Children often test their theories and models through interaction with their peers, the experiences are assimilated and the model is reinforced. When their observations and experiences do not match their presently held theories, (a) the experience can either be discounted because they don’t align with their present understanding, or (b) their model can be accommodated by a conceptual change to include the new experience. (p. 49)

The learning environment should encourage creativity, exploration and the sharing of ideas. The work of Caine and Caine (1994) in the field of brain research focuses on how the mind constructs meaning and the many ways in which humans can express knowledge. They believe that learning is not sequential, but rather a messy and complex process. Jensen (1998) in his book *Teaching with the Brain in Mind*, states that “learning changes the brain because it can rewire itself with each new stimulation,

experience and behavior” (p. 13). It is still unclear to scientists how this happens but they are developing an understanding of what happens. Jensen outlines the process in the following way: “First, some kind of stimulus to the brain starts the process. It could be internal or a new experience. Then the stimulus is sorted and processed at several levels. Finally there’s the formation of a memory potential. . . . The pieces are in place so that the memory can be easily activated” (p. 13).

Knowing how the brain works is important to educators as it will help to understand the learning process. Gardner (1983) in his published work, *Frames of The Mind*, presents a much-expanded view of intelligence. His theory of multiple intelligences challenges the traditional belief that there is a single intelligence possessed by all humans. Gardner’s theory, supported by Haggarty (1995) and Lazear (1999), suggests that humans come to know and understand in different ways. Gardner has identified eight intelligences: visual/linguistic, logical/mathematical, visual/spatial, bodily/kinesthetic, musical/rhythmic, interpersonal, intrapersonal, and naturalist. All humans have these intelligences but not all of them are developed to the same extent as others. Kagan (1997) states that:

There are two fundamental propositions central to the multiple intelligence theory:

1. Intelligence is not fixed. We are not stuck with the intelligence level we are born with. We have the ability to develop the intellectual capacity of our students.
2. Intelligence is not unitary. There are many ways to be smart. Everyone has each intelligence and unique pattern of intelligences.” (p. 1)

The understanding and attention to these intelligences again impacts what educators need to know about how children learn. Lazear (1999) describes the four stages necessary to teach with multiple intelligences in mind:

Awaken: activate the senses and turn on the brain.

Amplify: exercise and strengthen awakened capacities.

Teach: structure lesson for multiple intelligences.

Transfer: take multiple ways of knowing beyond the classroom.

Embedded in this understanding of learning is children's innate ability and desire to make sense of their world. Other theorists (Cobb, 1977; Nabhan & Trimble, 1994; Scherer, 1999) believe that first hand experiences with nature in a natural environment from an early age play an important role in "promoting the healthy development into adulthood" (Hutchison, 1988, p. 3). Learning that takes place in a natural setting can make a unique difference in a child's life by keeping a child's innate love of learning alive. Children are actively engaged in questioning, exploring, investigating and observing how things work, and discovering new things. These are the natural processes a child uses to make his world meaningful and purposeful; the same processes a scientist uses to create new knowledge – the process of inquiry.

Inquiry Based Learning

"Curiosity is the centerpiece of inquiry, and curiosity is indicated by a question or questions. . . . To inquire is to seek, obtain and make meaning from answers to one's questions" (Dyasi as cited in Llewellyn, 2002, p. 4). Human beings are actively engaged in trying to construct meaning of their world from the moment they are born. It is a fundamental human trait. Infants begin to make sense of their world by inquiring through

the human senses of seeing, hearing, touching, tasting, and smelling. Experience after experience allows them to gather information, to know and understand their world. Levy (1999) states, "Making meaning has to do with finding the connections between our personal experience and the universal issues" (p. 72). They respond to a familiar face and/or voice, know when something hot is touched it causes pain, that certain foods are pleasing, and so on. Inquiry then is a natural human action and it is through this continual process that individuals construct much of their understanding of the natural and human constructed worlds. Brown (2003) describes inquiry as "a complex idea that has many meanings in many contexts" (p. 31) but most educators agree that "it is flexible and an active process of learning, characterized by questions, investigations, explorations, applications and synthesis" (Brown, 2003, p. 31). If inquiry is the art and science of asking questions about the world in which one lives and finding acceptable answers or partial answers, then what is inquiry based learning?

Inquiry based learning is the process of constructing understanding and new knowledge by actively engaging in the inquiry process. W. H. Kirkpatrick expanded Dewey's notions of inquiry and problem solving into a methodology for teaching and learning. Hutchison (1998) further noted that "with direction and guidance students had opportunities to explore, plan, and direct their own learning experiences based on their own interests" (p. 41). Students are no longer the passive recipients of "static knowledge" imposed upon them by others. Learners are given opportunities to ask their own questions about something they want or need to know about and reflect upon, or there may be a specific question about an idea or topic the teacher wants them to learn about. Either way students are expected to take ownership for their learning by exploring, investigating and

reflecting as they search out answers. Students are encouraged to ask and explore questions that will help them to better understand how the world works – Where does water come from? Why is the sky blue? Do fish sleep? What do worms eat? Experiences provide concrete active learning experiences that develop problem solving decision making and research strategies that can be applied throughout their life. In designing learning experiences it is necessary that they are active and engage the learner, take place in a social context that encourages creativity. “When they engage in learning activities characterized by inquiry, children provide a window through which we can ‘see’ their thinking...” (Dyasi, 2000, p. 10). By building upon this natural curiosity of the child and a basic human need to connect to the real world, teachers are given an extraordinary opportunity to help children explore and understand the natural world in which they live. The natural world is something all children have experienced in some capacity...from the daily weather, to seasonal changes, to the backyard environment. Llewellyn (2002), in his book *Inquire Within Implementing Inquiry-based Science Standards*, describes the stages in the inquiry cycle that can be used as a general format in planning inquiry-based investigations (see Figure 1) that are driven by curiosity and wonder.

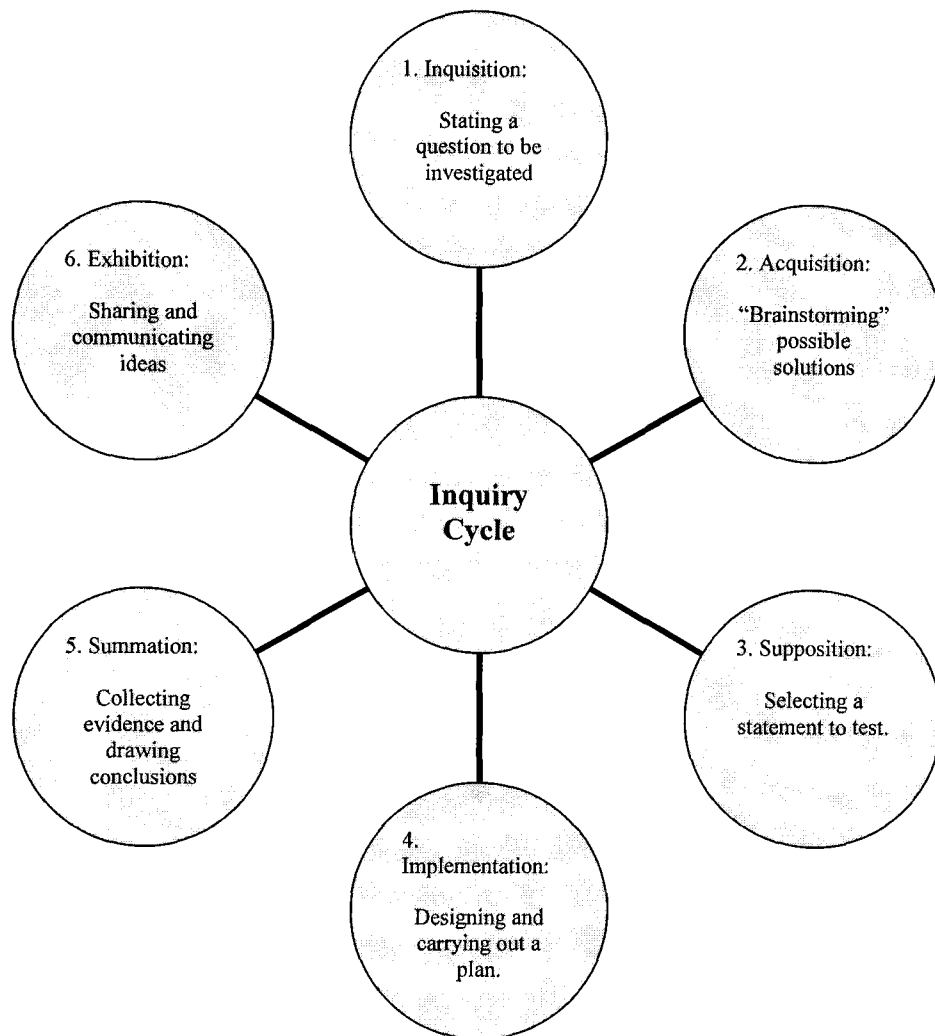


Figure 1. The Inquiry Cycle

The National Science Foundation monograph, *Inquiry, Thoughts, Views and Strategies for the K-5 Classroom* defines inquiry as:

An approach to learning that involves a process of exploring the natural or material world, and that leads to asking questions, making discoveries, and rigorously testing those discoveries in the search for new understanding.

The inquiry process is driven by one's own curiosity, wonder, interest, or passion to understand an observation or solve a problem.

The process begins when the learner notices something that intrigues, surprises, or stimulates a question – something that is new, or something that may not make sense in relationship to the learner’s previous experience or current understanding.

The next step is to take action – through continued observing, raising questions, making predictions, testing hypotheses, and creating theories and conceptual models.

The learner must find his or her own pathway through this process. It is rarely a linear progression, but rather more of a back-and-forth, or cyclical, series of events.

As the process unfolds more observations and questions emerge, giving occasion for deeper interaction with phenomena – and greater potential for further development of understanding.

Along the way, the inquirer collects and records data, makes representations of results and explanations, and draws upon other resources such as books, videos, and the expertise or insights of others.

Making meaning from the experience requires reflection, conversations, comparisons of findings with others, interpretation of data and observations, and the application of new conceptions to other contexts. All of this serves to help the learner construct a new mental framework of the world.

Environmental Education

The person who sees, discovers and explores a situation gets the most out of it.

This premise is the foundation of outdoor education. In fact, research shows that when students learn in outdoor settings as compared to staying in the classroom, they learn more quickly, appreciate the experience more and retain skills and knowledge longer. (Sharp as cited in Tanner, 2001, p. 64)

For many years many educators have seen the value of including environmental education as a core component of science education. According to Archie (2001), “Environmental education engages students’ minds and hands, often in real world investigations that are inquiry based, interdisciplinary and supportive of a standards-based curriculum” (p. 2). Environmental education is supported by the current educational reforms and by the likes of Dewey and others cited in this review. They have been advocating this approach to learning for decades. One of the first definitions of environmental education was proposed by William Stapp in 1969 who stated: “Environmental education is aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution” (as cited in Kemple, 2000, p. 31-32). It is only recently that the larger community has recognized environmental education as a discipline that brings added value and enhanced learning to children. “Teaching about the environment . . . has not historically received high priority because concern about the environment was not until recently a societal priority” (Disinger, 2001, p. 5). Environmental education may not have fit into the basic core subjects of yesteryear but it is considered to be of significant importance in today’s society. Deborah Simmons, Director of the North American Association for Environmental Education states that

“largely because of its focus on citizenship, environmental education is compatible with other learning approaches that are now coming into their own. . .” (as cited in Archie, 2001, p. 2). Learning must be relevant to students outside the traditional four walls of the classroom and must encompass feelings, beliefs and actions.

The Framework for Environmental Education, also known as the Belgrade Charter, defines environmental education as “. . . a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and the prevention of new ones” (as cited in Rasmussen, 2000, p. 4).

In 1977 at the Tbilisi Intergovernmental Conference on Environmental Education, objectives for the discipline were defined and included an intent to improve attitudes about the environment. “One objective specifically focused on helping individuals acquire a set of values, develop feelings of concern for the environment, and then actively participate in environmental improvement and protection” (Hungerford & Volk in Mittelstaedt, Sanker & Vander Veer, 1999, p. 138).

Today, many environmental education programs are focused on three dimensions of learning: knowledge, skills, and attitudes pertaining to the environment. The focus on the development of positive attitudes is essential if children “are to value the natural environment and understand their role in safeguarding it for future generations” (Mittelstaedt et al, 1999, p. 139). This involves educators guiding the development of attitudes that help children “gain an appreciation of, and a care and concern for, the natural environment and other living organisms” (Mittelstaedt et al, 1999, p. 139).

Russell (1999) believes that significant experiences with nature “lead to caring, which in turn may lead to environmental commitment and action” (p. 123) or “more broadly: However, studies to support this belief are inconclusive. A study in 1991 conducted by Purdue and Walker “found positive changes in environmental attitudes in the participants of a 17-day backpacking trip” (as cited in Haluza-Delay, 1999, p. 130). A similar study in 1991 by Gillet, Thomas, Skok, and McLaughlin concluded “that there were changes in ecological knowledge but not environmental attitudes” (as cited in Haluza-Delay, 1999, p. 130) after a six-day backpacking trip with teenagers. “Experience is always the beginning, but it is only the beginning. We do not learn from experience; we learn from reflecting on experience” (Levy, 1999, p. 73).

The emphasis on problem solving and decision making is to create responsible citizens and informed decision-makers in an ever-changing society. According to Brown (2001):

“EE’s (Environmental Education’s) primary goal is to promote environmentally responsible behavior. . . . To produce this outcome environmental educators have identified four major areas that should be part of the students’ learning experience. These include: Ecological foundations, Conceptual awareness-issues and values, Investigation and evaluation, and Environmental action skills-training and application. Without all these four areas clearly defined and integrated into student learning, the goal of students developing environmentally responsible behavior will not be met.” (p. 5)

Chawla (1999) poses the questions, “What motivates people to take action to protect the environment?” and “When people explain the sources of their commitment to

action, how much credit do they give to childhood learning?” (p. 15). Tanner, in a study in 1980, tried to answer by conducting a study of “significant life experiences: the formative influences recalled by people whose lives demonstrate environmental concern” (Chawla, 1999, p. 15). Tanner believed that if educators understood the type of experiences that motivate responsible environmental behaviour, they would be better able to foster the development of an informed and active citizenry.

The state of the environment affects the quality of life, locally and globally. As educators it is a goal to teach our students from a very early age to be informed decision makers and responsible citizens. It is important for children to know that they do not need to be adults to have an impact on their world. “Children have limited opportunities to make important decisions – especially those which are taken seriously by adults” (Dyasi, 2000, p. 11). Learning about the environment through an inquiry process “...continually provides children with the opportunity to make first hand decisions. They can decide which questions to raise at various points, which ones to follow in depth...” (Dyasi, 2000, p. 11). Environmental education supports this goal and will help to shape the attitudes and behaviors for a life time. “It is only in thoughtful reflection and in hopeful action that we will be able to pass on to our children’s children a world worth keeping” (Bateman, 2000).

Chapter 3: Methodology

The intent of this study was to identify and compare the similarities and differences of students' attitudes and natural curiosities when learning in the natural environment. Two instruments were used to collect data with each group of students – a survey and an analysis of student reflective journals. This chapter discusses the methodology of the study.

Research Design

Participants. Two distinct groups of students participated in the data collection process. Group 1 consisted of 19 grade 3/4 students ranging in age from 8 to 10 years. Their learning site was Riveredge Nature School in the spring. The classroom focus of Group 1 was awareness and appreciation of the environment. Group 2 consisted of 26 grade 5/6 students ranging in age from 10 to 12 years. Their learning site was Cross Conservation Area in the winter. Likewise the classroom focus was awareness and appreciation but included looking at environmental issues and stewardship.

Instrumentation. Similar instruments for data collection were used by both student groups; a survey, and journal writing. The surveys that were used to determine student attitudes and interest regarding the environment were constructed by the classroom teachers and myself.

The survey developed for Group 1 was limited to five essential questions and the students had to agree or disagree on a three point response scale as in Figure 2.

	<u>Like it a lot</u>	<u>Like it a little</u>	<u>Do not like it</u>
How much do you like learning about the weather.	1	2	3

Figure 2. Sample scale item Group 1

The survey constructed for Group 2 had a greater scope and consisted of 17 statements that had a five point response scale as in Figure 3. The added number of questions provided addition data that could be categorized as they related to student attitudes about the environment – interest and enjoyment, environmentally responsible behavior, awareness of environmental issues.

	<u>Strongly agree</u>	<u>Agree</u>	<u>No opinion</u>	<u>Disagree</u>	<u>Strongly disagree</u>
I enjoy learning about the weather.	1	2	3	4	5

Figure 3. Sample scale item Group 2

It was decided that using a three point scale with five straight forward questions would be more readable for Group 1 to respond to. The responses in Group 1 were based on a scale ranging from “Like it a lot” to “Do not like it” (see Appendix A). Responses were coded from one to three with one being indicative of the most positive attitude. The responses for Group 2 were based on a scale ranging from “Strongly Agree” to “Strongly Disagree”. Responses were coded from one to five, again with one being indicative of the most positive attitude. The coding in both scales was with one being the most positive to reflect the same coding used in the report card of the Calgary Board of Education. All

survey participants are students in the Calgary Board of Education and are familiar with this coding.

The second instrument used by both groups was daily reflective journals. This type of writing was an expectation set by both teachers as a method of communicating with the students and capturing student perceptions and understandings of daily experiences.

Data Collection. The surveys were administered by the classroom teachers in my absence. The responses were tabulated and summarized by myself. The number of student responses for each stem were tallied and then converted into a percentage based on the total number of possible responses from each group. For Group 1 there was a possible total of 19 responses to each stem of the question. For Group 2 there was a possible total of 26 responses. Once tabulated, the data collected from these instruments provided an indication of student attitudes when learning about the environment.

The second instrument used to collect data in an attempt to gain further insight into the participants' attitudes and curiosities about the natural environment was from their daily journal entries. The students' entries were analyzed for inference statements or phrases that reflected or indicated attitude (feelings, hopes, actions, interest) and natural curiosities (questions, wondering, ideas, discoveries, fresh insights). Two other categories were also identified during the analysis – description of immediate surroundings and reference to environmental issues. Inferences to description of surroundings included basic ideas about objects, color or shapes. Inferences that referred to environmental issues included phrases that referred to pollution, urban sprawl, transportation, habitat loss, etc.

The journals were read daily by the classroom teachers and then given to me at the conclusion of the outdoor classroom experience.

Limitations. There are several limitations that are inherent this study.

Interpretation of student written responses, despite inference indicators, was subjective and influenced by the researcher's personal values and bias. Reliability of student responses on the survey and in the journals was also a limitation. Did students understand the intent of each statement on the survey? Were they able to clearly articulate their thoughts in their response journal?

The use of two different surveys limited the depth of comparison of the two groups' attitudes prior to the learning experience. A post-survey was not conducted after the field experiences to show any changes in attitudes that may have occurred.

Chapter 4: Findings

Data Analysis

The first four questions on both surveys for Group 1 and Group 2 (see Appendices A and C) were analyzed to answer the question “*What are the current attitudes of grade 3/4 students and grade 5/6 students toward learning about the environment?*”

The information gathered from the four possible responses in Questions 1 and 2 (see Tables 1 and 2 and Appendices A and C) were tallied for each group. The total number of positive responses was then converted to a percentage (see Figures 4 and 5).

Table 1

Distribution of Student Responses - Question 1

Group 1

I enjoy learning about:	Like it a lot	Like it a little	Do not like	Total positive responses
a) the weather.	7	11	1	18
b) water.	7	11	1	18
c) living things.	16	3	0	19
d) other parts of the world.	9	8	2	17

Group 2

I enjoy learning about:	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total positive responses
a) the weather.	3	16	5	1	1	19
b) water.	7	12	5	1	1	19
c) living things.	15	9	2	-	-	24
d) other parts of the world.	10	10	5	1	-	20

Table 2

Distribution of Student Responses – Question 2

Group 1

I enjoy:	Like it a lot	Like it a little	Do not like	Total positive responses
a) talking about environment.	3	12	4	15
b) taking measurements of the environment.	12	5	2	17
c) writing about the environment/nature.	10	2	7	12
d) reading about the environment/nature.	12	5	2	17

table continued

Group 2						
I enjoy:	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total positive responses
a) talking about environment.	8	11	4	1	2	19
b) taking measurements of the environment.	4	15	4	2	1	19
c) writing about the environment/nature.	3	10	6	1	2	13
d) reading about the environment/nature.	8	9	6	1	2	17

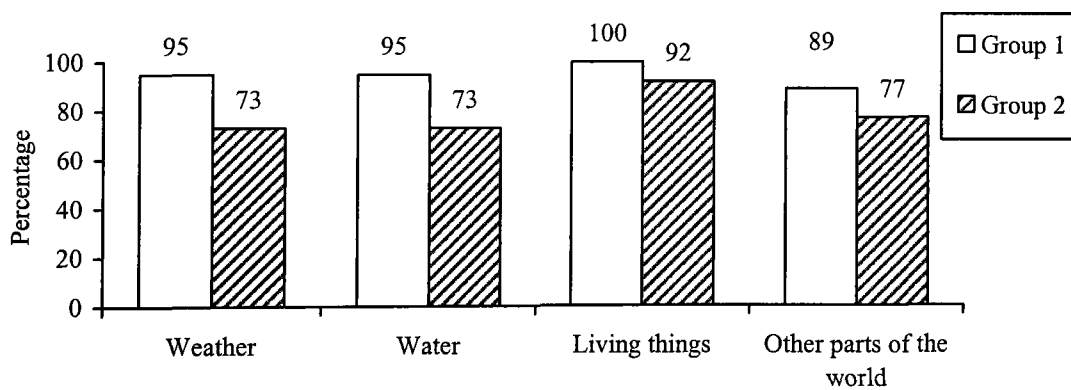


Figure 4. Topics and degree of enjoyment (Question 1)

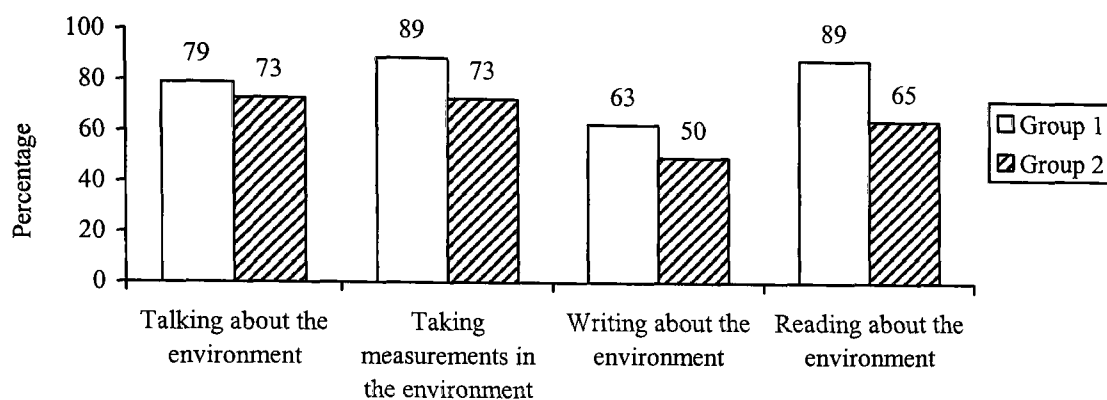


Figure 5. Type of activity and degree of enjoyment (Question 2).

By converting the number of responses to percentages it becomes clear that both groups of students enjoy learning about various aspects of the environment in a variety of ways. Students in both groups rated learning about living things as being the most positive. Only 50% or 13 students enjoyed the experience of writing about the environment or nature.

Question 3 (see Appendices A and C) was to determine the content or subject area in which students believed they learned about the most about the environment (see Table 3).

Table 3

Number of Positive Responses – Question 3

Group 1: When do you do activities or talk about the environment?

Group 2: I do activities or talk about the environment in the following subjects:

	Number of positive responses	
	Group 1	Group 2
Science	13	25
Math	4	13
Social Studies	17	21
Language Arts	16	23
Art	15	24

Note: Total number of responses was 19 for Group 1 and 26 for Group 2.

The participants in Group 1 felt that they did a considerable amount of environmental studies in all subject areas (see Figure 6) but they identified social studies (17 students – 89%) and language arts (16 students – 84%) with the highest content. This is interesting because Group 1 had been collecting data from environmental monitoring on a regular basis for several months at this point.

Group 2 participants identified science (25 students – 96%) as the subject area in which they studied the environment most with art as the second subject (24 students – 92%). Group 2 was a grade 5/6 class and many topics identified in Question 1 (see

Appendix C) are part of the Alberta Program of Studies for Elementary Science. Both groups identified math as the subject area with the least amount of environmental studies.

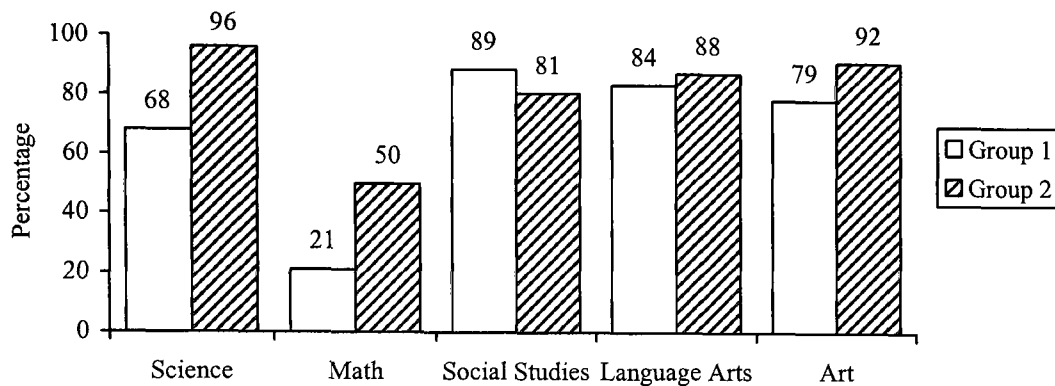


Figure 6. Degree to which students believe which subject provides the most environment activities (Question 3).

Question 4 (see Appendices A and C) was to determine if students were motivated to improve their home or school environments while learning about the environment. Group 1 answered positively 17 times out of a possible 19 times or 90% of the time (see Figure 7). Group 2 responded positively 21 times out of a possible 26 responses or 81% of the time (see Figure 7).

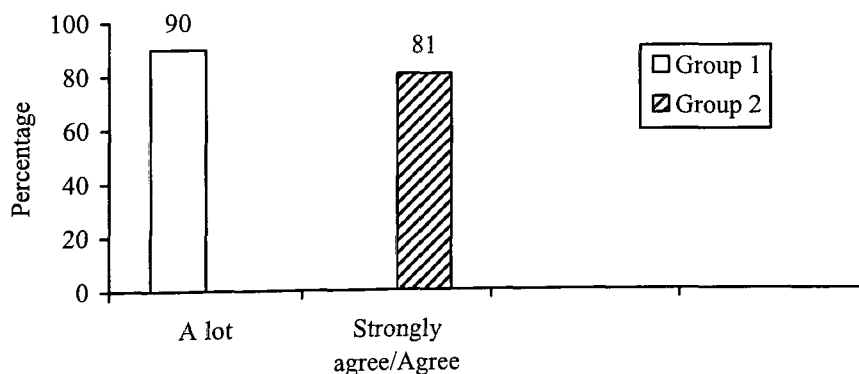


Figure 7. Degree to which student improve the environment (Question 4).

The more detailed survey using the five point response scale developed for Group 2 provided additional information that could be categorized in two subcategories as they relate to student attitudes about the environment:

- Environmentally responsible behavior.
- Awareness of environmental issues.

Questions 1, 2, 3, 5, 6, 7, and 8 (see Appendix C) relate to students' interest and enjoyment in learning about the environment and answer the question *Do students enjoy learning about the environment?* (see Figures 4, 5 and 8).

Do students want to learn more about the environment? The results from Questions 6, 7 and 8 indicate that the majority of students want to learn more about the environment but do not want to do it at home or school (see Table 4 and Figures 8, 9 and 10).

Table 4

Number of Positive Responses – Questions 6, 7, and 8

	Strongly agree	Agree	Number of positive responses	Total number of responses
6. I want to spend more time learning about the environment.	7	11	18	26
7. My school should spend more time teaching about the environment.	3	10	13	26
8. I would be interested in joining a club that teaches about and protects the environment.	5	7	12	26

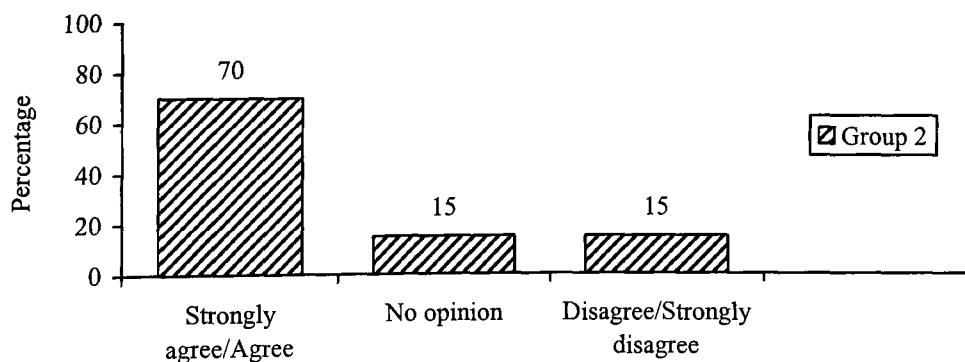


Figure 8. Percentage of students who want to spend more time learning about the environment (Question 6).

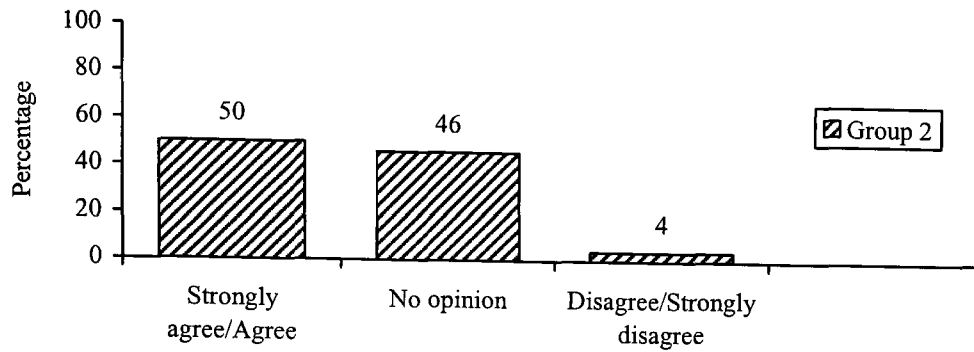


Figure 9. Percentage of students who believe in more teaching time (Question 7).

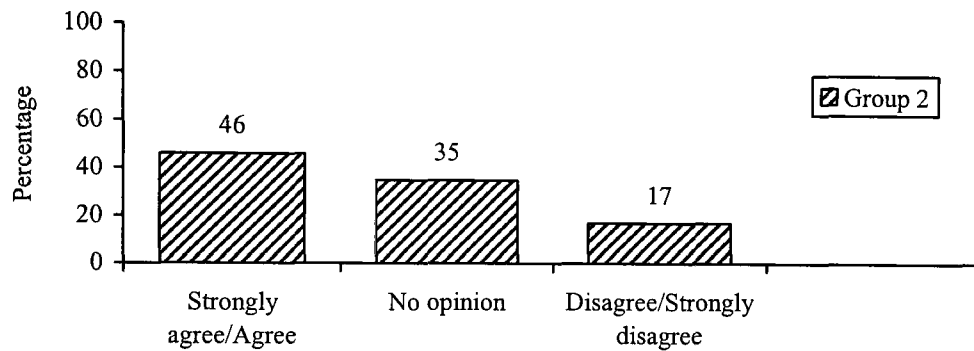


Figure 10. Percentage of students willing to join an Environmental Club (Question 8).

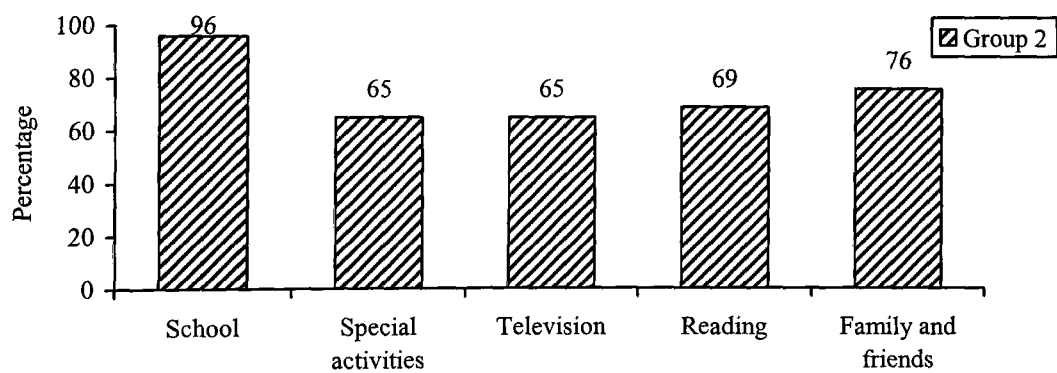
Question 5 (see Appendix C) answers the question *Where do students feel they are learning the most about the environment from?* The majority of students feel their primary source of knowledge is in school (see Table 5 and Figures 11 and 12).

Table 5

Distribution of Student Responses - Question 5

Group 2

I learn the most about the environment from:	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total possible responses
a) school	18	7	1	0	0	26
b) special activities	5	12	8	1	0	26
c) television	5	12	5	2	2	26
d) own reading	7	11	6	1	1	26
e) family/friends	4	16	4	0	2	26

Figure 11. Students' primary source of environmental education (Question 5).

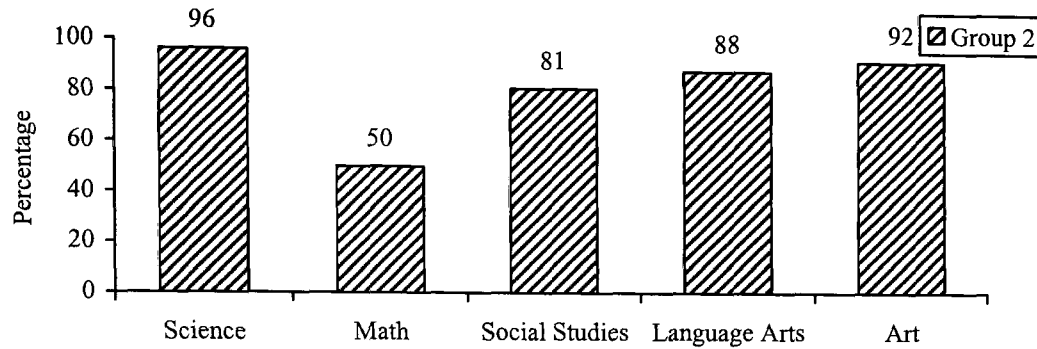


Figure 12. Subjects where environmental topics are taught (Question 3).

Do students have an environmentally responsible attitude? The second category in the survey for Group 2 identifies environmentally responsible behaviors. The responses from Questions 12, 13, 15, and 17 (see Appendix C) indicate that they have a personal responsibility to protect the environment and their actions and behaviors make a difference (see Table 6 and Figures 13 and 14). Participants disagree with the statements that “recycling is not worth all the effort” and “there is nothing I can do (see Table 6 and Figures 15 and 16).

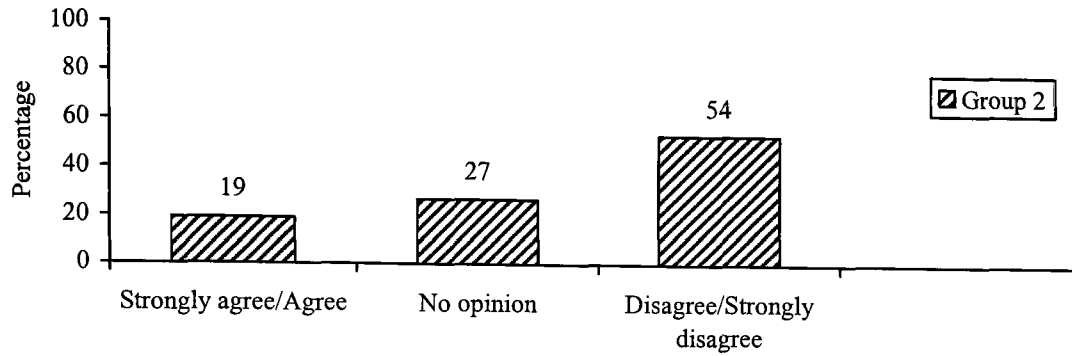


Figure 13. Degree to which students disagree there is nothing I can do to help (Question 12).

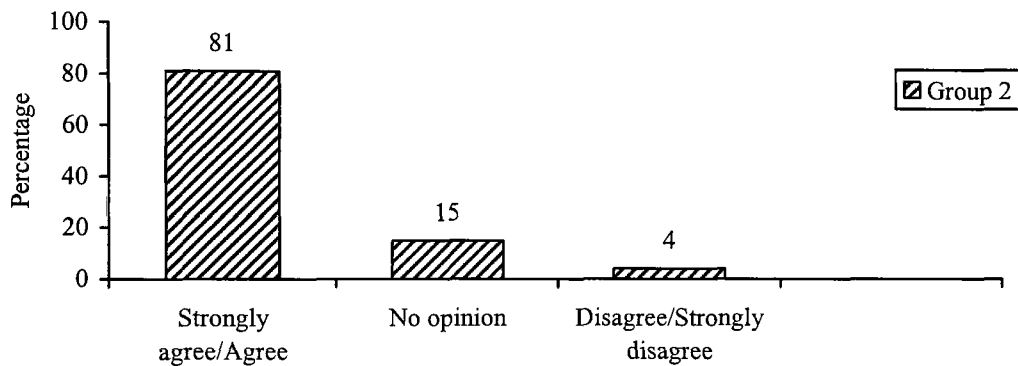


Figure 14. Percentage of students who believe their actions protect the environment (Question 13).

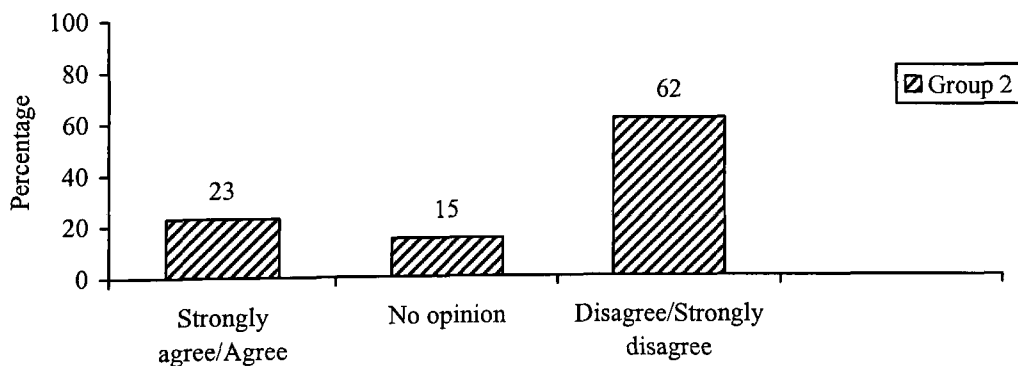


Figure 15. Recycling is too much effort (Question 15).

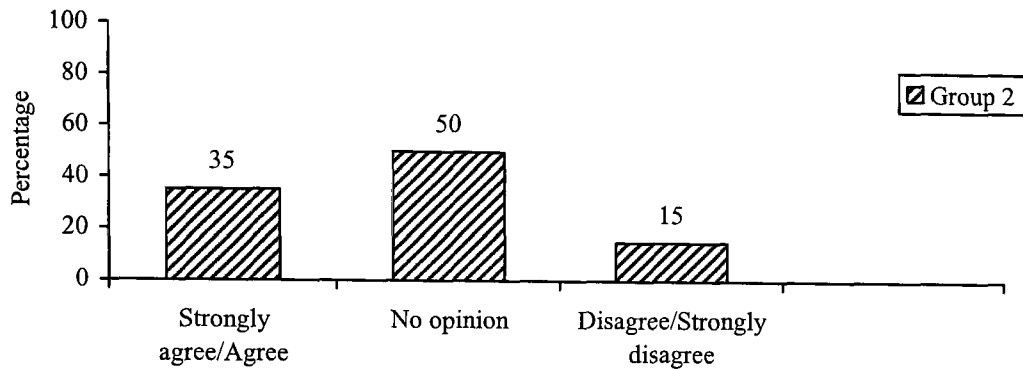


Figure 16. My responsibility to get school to be environmentally responsible (Question 17).

Are the students aware of environmental issues? The third Group 2 category survey identified was awareness of environmental issues. The results from Questions 9, 10, 11, 14 and 16 (see Appendix C) suggest that the students are aware of several environmental issues (see Table 7) including urban sprawl (Figure 17), habitat protection/green spaces (Figure 18), environmental protection laws (Figures 19 and 20), and are in agreement that more laws need to be in place to protect living things (Figure 21).

Table 6

Distribution of Student Responses – Questions 12, 13, 15 and 17

Group 2	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
12. There is nothing I can do to help protect and solve environmental problems.	1	4	7	6	8
13. I believe that I can help protect the environment by my actions.	11	10	4	1	0
15. I don't think recycling is worth all the effort it takes.	1	5	4	3	13
17. I think it's my responsibility to get my school to do environmentally responsible things.	3	6	13	2	2

Table 7

Distribution of Student Responses – Questions 9, 10, 11, 14, and 16

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
9. I am concerned about how fast the city is growing.	8	8	8	2	0
10. It is important for cities to have green spaces.	18	7	1	0	0
11. It is important for the government to protect large areas of the natural environment.	19	4	3	0	0
14. We have enough laws to protect the world's plants and animals. We have enough laws.	3	5	6	7	5
16. More land should be set aside for wildlife habitats.	15	6	4	1	0

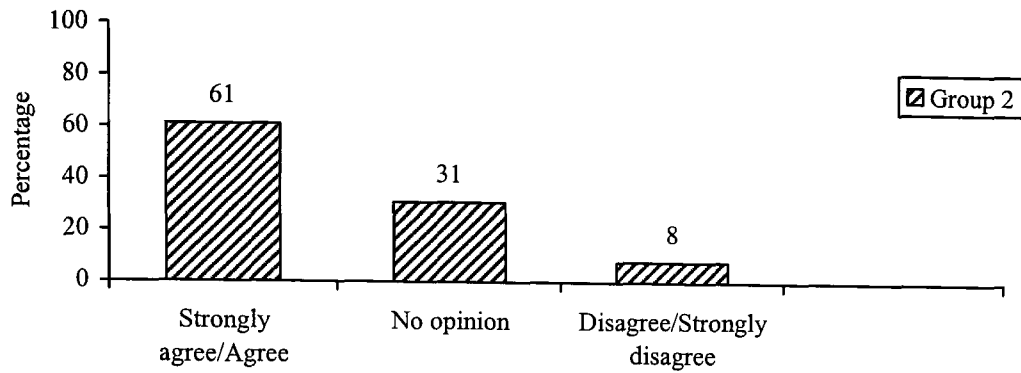


Figure 17. Degree of concern for city growth (Question 9).

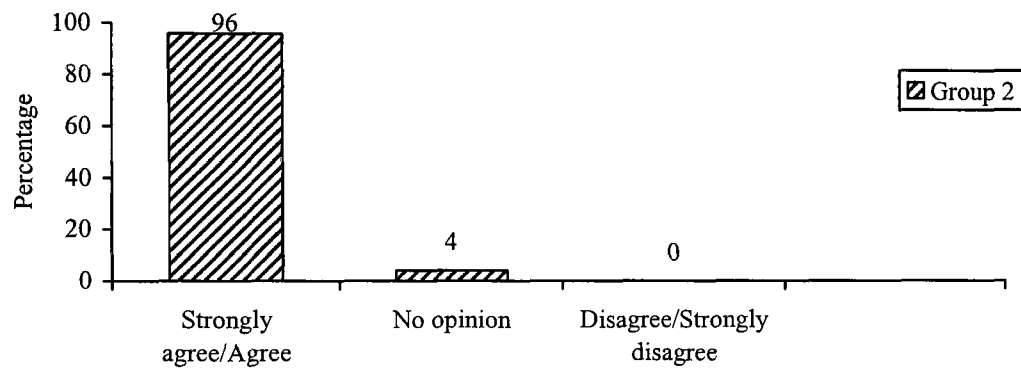


Figure 18. Degree of importance to have green spaces (Question 10).

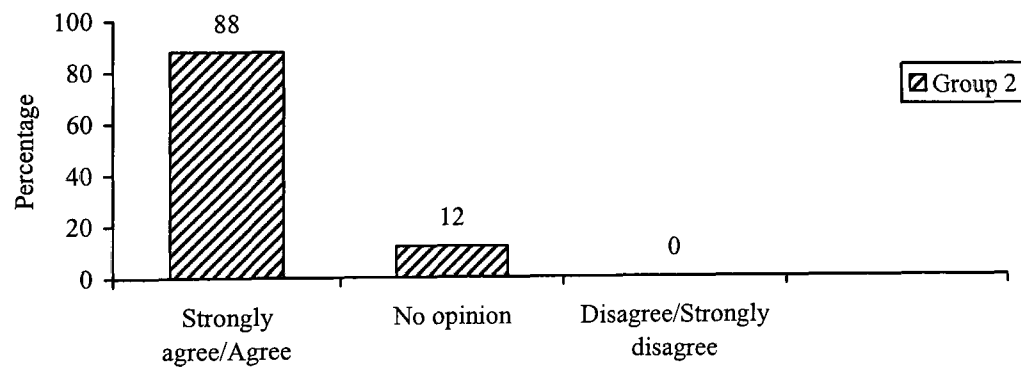


Figure 19. Degree of importance for government to protect land (Question 11).

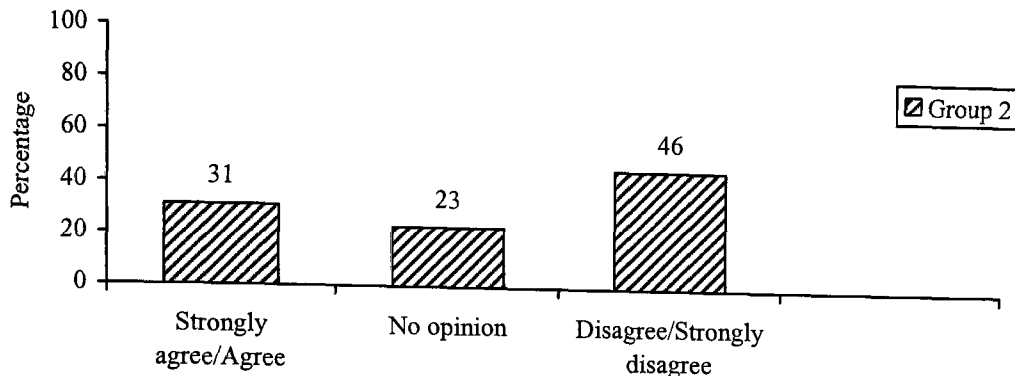


Figure 20. Degree of having enough laws (Question 14).

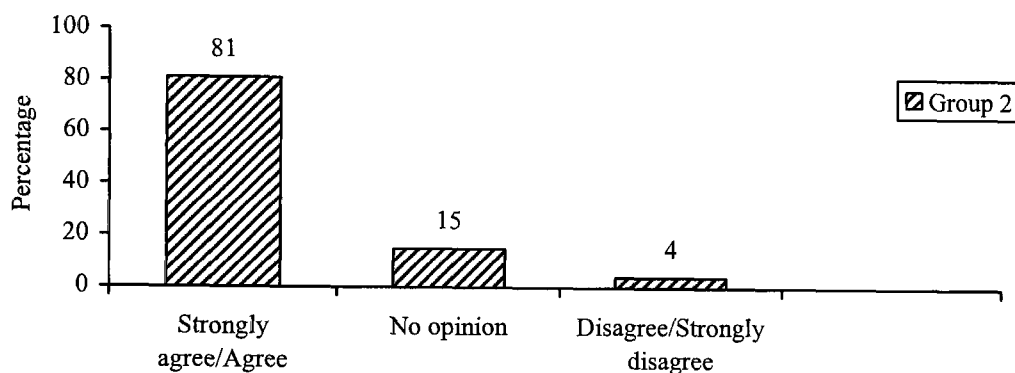


Figure 21. Degree of need to have more land protected (Question 16).

The survey results from both Group 1 and Group 2 indicate that students have a positive attitude towards learning about the environment.

It was interesting to note that both groups felt a great deal of environmental learning took place in the content area of art. Both schools have a curriculum focus of learning through the arts (Group 1 – 79%; Group 2 – 92%). This could have had a direct effect on the student response (see Figure 6). It was puzzling that Group 1 did not identify the content area of math as an area where many environmental activities took place. This particular group of students had been actively taking environmental measurements on a regular basis throughout the year.

The findings for Group 2 also indicate a positive attitude towards many aspects of the environment, in particular their sense of personal responsibility and an awareness of environmental issues. There were no specific questions that addressed personal behaviors and actions which would have provided another aspect of students' attitude.

The second instrument used in the data collection was the students' daily observation/reflection journals. The purpose of the journal entries was to access and assess the students' writing for phrases or statements that reflected students' attitudes and curiosities about the natural environment. As the entries were analyzed, two other prominent categories of responses emerged and were also tabulated – descriptions of the immediate natural surroundings and references to environmental issues. In total, 65 journal entries were analyzed for the type of inferences made (see Table 8). This was a relatively low number of entries to analyze. The entries were chosen by the classroom teachers based on readability, clarity of ideas, and content.

Table 8
Number of Inferences According To Category

	Total	Group 1	Group 2
Attitude	76	33	43
Curiosity	74	38	36
Environmental Issues	66	32	34
Description	40	28	12

After coding the responses, there was not a significant difference in the number of responses given by both groups with the exception of the descriptive category. Group 1 described the natural setting more often than Group 2. The focus of Group 1 prior to their outdoor experience had been on environmental awareness and appreciation. As a class they had talked about using their five senses to be aware of their surroundings and as a way of describing their surroundings – *“I can see lots of trees. I can hear cars and lots of bees. I can smell the daisies nearby”*. The students’ appreciation and attitudes towards the natural environment were often in a letter format addressed to Mother Earth. The children’s picture book, *Dear Children of the Earth* by Schim Schimmel (????) had been read and discussed prior to the time spent at Riveredge Nature School.

Dear Mother Earth,

I’m going to change the way I act in this world because I really care about the animals...of this world. If we all change the way we act and love and care for you Mother Earth, this world would be wonderful.

Group 2 had been exploring environmental issues before visiting the Cross Conservation area. Although the number of inferences for Group 1 (32) and Group 2 (34) were almost the same, the responses from Group 1 primarily focused on pollution (littering) and habitat loss. Responses from Group 2 included urban sprawl, human population, air pollution, water pollution, noise pollution, habitat loss, wildlife corridors, and urban green spaces. Group 2 also expressed their attitudes more often (43) than Group 1 (33). The attitudes from both groups were positive and often expressed as an action to help protect the natural world.

Group 2 did not write many descriptions of their surroundings. This could be due to the time of year that the students were at the Cross Conversation Area – winter.

Each group made inferences that reflected their wonderings and natural curiosities about what they were experiencing. This was often done in the form of a question.

The following are excerpts from the journals from each of the categories:

Attitude

Group 1 excerpts:

Riveredge Park has greatly affected me. Not in a harmful way but in a way that will change my perspective forever. Changed it so that I will treat the earth as it should be. Like a living, breathing creature.

One of my favorite things about Riveredge was being out in nature. It was amazing to be out there and learn.

Group 2 excerpts:

I think we should write a letter or send an email to the Mayor telling him to stop building so many houses.

I think it is sad that people want to take up green space that they don't need.



Today it feels good to see the land that isn't full of buildings. The animals are unique to watch and to sketch. Look at the land that is clear. It is very peaceful. There is nothing to block our eyes to see the land.

Curiosity

Group 1 excerpts:

Pop, pop, pop

Go the buds as they reproduce

The birds chirp

Maybe they are mating!?

I would like to know if the beaver that is building a dam on the opposite bank is a male or female. I would also like to know what beavers build their dams for and why they build their dams with sticks.

I wonder how deep the water would be in July. I think it would be taller than me.

I think they planted the fairy ring as a sign of beauty of nature.

Group 2 excerpts:

What if the population grows too large and we use too much earth and habitat and shelter and food?

Issues

Group 1 excerpts:

Recycling: if we recycle we are saving the rainforests and animals that live there.

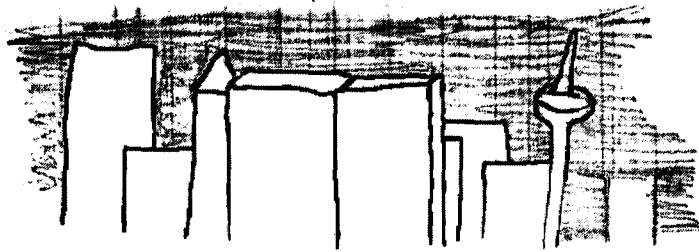
It helps me realize what has happened to society. Just think about it, almost all of Calgary was like Riveredge Park but look at it now!

Wildlife habitat loss is an issue because we need wildlife for food and to stay alive. This became an issue when people began inventing machines.

Group 2 excerpts:

There is too much urban sprawl. Calgary is going to be attached to Edmonton and Red Deer soon. If the city gets bigger then the animals will get lost in the city and die.

[The area around Fish Creek Provincial Park] and that's going to be covered by people that are trying to make the city grow and this is going to affect farming areas and also they're trying to get to at least 1,000,000 by 2008 but they have right now 913,000 people are in Calgary and it is still rapidly growing so the more people, the more houses and buildings and they have to destroy more wildlife habitat...



There's lots of pollution over
the city and we breathe
it in.

Descriptions

Group 1 excerpts:

I looked at the water's edge and the water was higher than yesterday.

Our place has a fire pit and some benches around it.

Group 2 excerpts:

We are up on a hill and it is fresh and clear and we can see the city and it looks polluted with dirt and smoke.

The woodpecker was looking for insects then it jumped from tree to tree.

The coding and interpretation of the journal entries captured the essence of the students' wonderment and awe of the natural world. It also brought forward the students' awareness of their natural environment and their knowledge of environmental issues.

Chapter 5: Discussion

Discussion

As removed from the natural world as many children in large urban centers are today, it is heartening to know that children in this study are positive in their thinking and their actions towards the environment.

Experiencing nature in a natural setting is a challenge for children of large urban centers. For many students these chance encounters with the environment consist of walking to and from school, playing on the playground or in the backyard, a visit to the zoo, a weekend camping trip or a visit to the mountains. Students (96%) reported that most of their learning about the environment occurs at school in a variety of subject areas except mathematics. Fifty percent of the students were not making the connection between data collection from the environment with mathematics or they were not taking environmental measurements such as temperature at this time. This could also be a reflection of the classroom teacher's use of mathematics as a means of teaching about the environment.

It was interesting that 92% of students identified art as a subject in which they studied the environment. In discussing this with the teachers they both attributed this to the fact that their schools had a strong fine arts focus. The majority of the students had worked with an artist in residence recently and both classroom teachers used sketch journals regularly in the classroom.

Science was seen as the subject area where students felt they spent the most time learning about the natural world. Throughout the Alberta Program of Studies for Elementary Science (1996) there are discrete units of study that relate to various aspects

of the environment (see Appendix E). Although there is a broad range of topics or units that students are exposed to in science, all of these units can be taught within the confines of the regular classroom. There is no component that requires students to have field experiences to promote understanding and appreciation of the world as it exists naturally. The focus of many classrooms when studying or integrating environmental awareness is on waste reduction and recycling. While admirable in their motivation, this falls short of what is necessary to develop a sustained relationship with nature. The emphasis of these units often becomes focused on the human influence in nature rather than on the interconnectedness and interdependency of earth's systems and seeing humans as part of it rather than separate from it.

The second most influential factor on student learning about the environment was family and friends (76%). It was not clear in what way these significant others influenced the students. Students had read books about plants and animals, had seen videos or television shows that talked about nature and the environment. Only 65% of the students felt that television had an impact on their learning. It appears that the knowledge children are acquiring about the environment is not from first hand personal experiences with nature. This makes it difficult for school programs to enhance and enrich student understanding when the students have little experience to build upon. The engaging learning experience of being outside for extended periods of time and other influences such as family and television may be why students were overwhelmingly positive about wanting to learn more about the environment and having more time spent in school studying it. The goal of learning about the world in which the students live is to create environmentally sensitive and responsible citizens.

Journal writing is seen as a powerful method of having students reflect upon what they are learning, the connections to what they already know and as a way of wondering about what they want to know. The students involved in this study wrote daily in their reflective journals. The classroom teachers read them nightly as a way of determining any changes in understanding and thinking. Responses in the journals by the teachers was a structure to promote the children's exploration of their own thinking, their own questions, their own findings. The journal entries provided by the classroom teachers illustrated that students are excited, are curious, and are interested in the world. They have questions, want to learn more. They have opinions and theories and want to do what is best for the environment. The use of journals provided a way of accessing student thinking and trying to capture their sense of wonder and awe about their experiences in the natural world. Several children wrote about their special place, the one they discovered and claimed as their own – a place to sit, to observe, smell, and listen as they reflected on their day.

Perhaps the week long experience was enough to affirm the students' positive attitudes toward the natural environment and enough to pique their natural curiosities and sense of awe to seek out the areas of wildness that surround them.

Must we always teach our children with books? Let them look at the mountains and the stars above. Let them look at the beauty of the waters and the trees and the flowers on earth. They will then begin to think, and to think is the beginning of a real education.

David Polis

What ongoing influence or impact will these experiences have on the students' attitudes and curiosities about the natural environment? Will their actions change? Will they become advocates for the natural environment?

In the end...

We conserve only what we love

We will love only what we understand

We will understand only what we are taught.

Baba Dioum, Senegal proverb

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Appendix A

Group 1 Nature School Student Survey

*Building On Our Natural Curiosities***Nature School Student Survey**

Date:

I want to know what students going to the Nature School are doing and what they like and don't like in learning about the environment.

Circle only one number for each statement.

1. How much do you like to learn about

	Like it a lot	Like it a little	Do not like it
a. the weather	1	2	3
b. water	1	2	3
c. living things	1	2	3
d. other parts of the world	1	2	3

2. How much do you like

	Like it a lot	Like it a little	Do not like it
a. talking about the environment	1	2	3
b. taking measurements for the environment	1	2	3
c. writing about the environment	1	2	3
d. reading about the environment	1	2	3

3. When do you do activities or talk about the environment?

	Most of the time Or Always	Fairly Often	Sometimes	Almost Never Or Never
a. science	1	2	3	4
b. math	1	2	3	4
c. social studies	1	2	3	4
d. language arts	1	2	3	4
e. art	1	2	3	4
f. at home	1	2	3	4

4. When learning about the environment, I

	Most of the time Or Always	Fairly Often	Sometimes	Almost Never Or Never
10. work in a group with others	1	2	3	4
11. write about what you've learned	1	2	3	4
12. use a computer	1	2	3	4
13. help others students learn	1	2	3	4
14. learn new words	1	2	3	4
15. get mixed up about what I'm supposed to do	1	2	3	4
16. use my head to figure things out	1	2	3	4
17. do some things to improve the environment at home or school	1	2	3	4

5. Circle a number for each statement to show whether it is true or false.

	True	False	Not Sure
a. I like learning about the environment	1	2	3
b. Working in a group makes learning more fun	1	2	3
c. I like to read books about animals and other living things	1	2	3
d. Lots of times you need to math to do science	1	2	3
e. I like to be outdoors	1	2	3
f. Learning about the earth is important	1	2	3

Appendix B

Group 1 Nature School Daily Reflections

Building On Our Natural Curiosities

Nature School

Daily Reflections

Information from the participants daily answering three primary questions

1. What are the most interesting things you learned today?
2. What else do you want to know about this?
3. How will you use this new knowledge at home and at school?

Appendix C

Group 2 Cross Conservation Area Student Survey

*Building On Our Natural Curiosities***Cross Conservation Area*****Student Survey***

Date:

These questions ask what you think. Be honest. Read each question carefully.
Circle only one letter for each statement.

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1. I enjoy learning about					
a. the weather	1	2	3	4	5
b. water	1	2	3	4	5
c. living things	1	2	3	4	5
d. other parts of the world	1	2	3	4	5
2. I enjoy					
a. talking about the environment/nature	1	2	3	4	5
b. taking measurements for the environment/nature	1	2	3	4	5
c. writing about the environment/nature	1	2	3	4	5
d. reading about the environment/nature	1	2	3	4	5
e. hearing the sounds of the environment/ nature	1	2	3	4	5
3. I do activities or talk about the environment in the following subjects					
a. science	1	2	3	4	5
b. math	1	2	3	4	5
c. social studies	1	2	3	4	5
d. language arts	1	2	3	4	5
e. art	1	2	3	4	5

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
4. When learning about the environment, I					
a. learn more in a group with others	1	2	3	4	5
b. write about what I've learned	1	2	3	4	5
c. use a computer	1	2	3	4	5
d. help others students learn	1	2	3	4	5
e. learn new words	1	2	3	4	5
f. get mixed up about what I'm supposed to do	1	2	3	4	5
g. use my head to figure things out	1	2	3	4	5
h. do some things to improve the environment at home or school	1	2	3	4	5
5. I learn the most about the environment from					
a. school	1	2	3	4	5
b. special activities	1	2	3	4	5
c. television	1	2	3	4	5
d. own reading	1	2	3	4	5
e. family /friends	1	2	3	4	5
6. I want to spend more time learning about the environment.	1	2	3	4	5
7. My school should spend more teaching about the environment.	1	2	3	4	5
8. I would be interested in joining a club that teaches about and protects the environment.	1	2	3	4	5
9. I am concerned about how fast the city is growing.	1	2	3	4	5
10. It is important for cities to have green spaces	1	2	3	4	5
11. It is important for the government to protect large areas of the natural environment.	1	2	3	4	5
12. There is nothing I can do to help protect and solve environmental problems.	1	2	3	4	5

	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
13. I believe that I can help protect the environment by my actions.	1	2	3	4	5
14. We have enough laws to protect the world's plants and animals. We have enough laws.	1	2	3	4	5
15. I don't think recycling is worth all the effort it takes	1	2	3	4	5
16. More land should be set aside for wildlife habitats.	1	2	3	4	5
17. I think it's my responsibility to get my school to do environmentally responsible things.	1	2	3	4	5

Appendix D

Group 2 Cross Conservation Area Daily Reflections

Building On Our Natural Curiosities

Cross Conservation Area

Information from the participants' daily journaling answering three primary questions

1. What are the most interesting things you learned today?
2. What else do you want to know about this?
3. How will you use this new knowledge at home and at school?

Appendix E

Alberta Program of Studies

Elementary Science

Grade	Topic
1	A. Creating Colour B. Seasonal Changes C. Building Things D. Senses E. Needs of Animals and Plants
2	A. Exploring Liquids B. Buoyancy and Boats C. Magnetism D. Hot and Cold Temperature E. Small Crawling and Flying Animals
3	A. Rocks and Minerals B. Building with a Variety of Materials C. Testing Materials and Designs D. Hearing and Sound E. Animal Life Cycles
4	A. Waste and Our World B. Wheels and Levers C. Building Devices and Vehicles that Move D. Light and Shadows E. Plant Growth and Changes
5	A. Electricity and Magnetism B. Mechanisms Using Electricity C. Classroom Chemistry D. Weather Watch E. Wetland Ecosystems
6	A. Air and Aerodynamics B. Flight C. Sky Science D. Evidence and Investigation E. Trees and Forests

Science (Elementary) A.4

(1996)