

**INFUSING ENVIRONMENTAL EDUCATION
IN A GRADE THREE CLASSROOM IN NOVA SCOTIA**

A thesis submitted in partial fulfilment
of the requirements for the degree of
Master of Arts in Education

by
Janine Swales

Approved by

Advisor:

G. D. Perry

Reader:

Date:

April 29, 1994

Copyright by Janine Swales, 1994

Saint Mary's University
Halifax, Nova Scotia



National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your lib *Votre référence*

Our lib *Notre référence*

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-90970-6

Canada

Name P. Marina Surala

Dissertation Abstracts International is arranged by broad, general subject categories. Please select the one subject which most nearly describes the content of your dissertation. Enter the corresponding four-digit code in the spaces provided.

Education Elementary

SUBJECT TERM

0524

U·M·I

SUBJECT CODE

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS

Architecture 0729
 Art History 0377
 Cinema 0900
 Dance 0378
 Fine Arts 0357
 Information Science 0723
 Journalism 0391
 Library Science 0399
 Mass Communications 0708
 Music 0413
 Speech Communication 0459
 Theater 0465

EDUCATION

General 0515
 Administration 0514
 Adult and Continuing 0516
 Agricultural 0517
 Art 0273
 Bilingual and Multicultural 0282
 Business 0688
 Community College 0275
 Curriculum and Instruction 0727
 Early Childhood 0518
 Elementary 0524
 Finance 0277
 Guidance and Counseling 0519
 Health 0680
 Higher 0745
 History of 0520
 Home Economics 0278
 Industrial 0521
 Language and Literature 0279
 Mathematics 0280
 Music 0522
 Philosophy of 0998
 Physical 0523

Psychology 0525
 Reading 0535
 Religious 0527
 Sciences 0714
 Secondary 0533
 Social Sciences 0534
 Sociology of 0340
 Special 0529
 Teacher Training 0530
 Technology 0710
 Tests and Measurements 0288
 Vocational 0747

LANGUAGE, LITERATURE AND LINGUISTICS

Language
 General 0679
 Ancient 0289
 Linguistics 0290
 Modern 0291
 Literature
 General 0401
 Classical 0294
 Comparative 0295
 Medieval 0297
 Modern 0298
 African 0316
 American 0591
 Asian 0305
 Canadian (English) 0352
 Canadian (French) 0355
 English 0593
 Germanic 0311
 Latin American 0312
 Middle Eastern 0315
 Romance 0313
 Slavic and East European 0314

PHILOSOPHY, RELIGION AND THEOLOGY

Philosophy 0422
 Religion
 General 0318
 Biblical Studies 0321
 Clergy 0319
 History of 0320
 Philosophy of 0322
 Theology 0469

SOCIAL SCIENCES

American Studies 0323
 Anthropology
 Archaeology 0324
 Cultural 0326
 Physical 0327
 Business Administration
 General 0310
 Accounting 0272
 Banking 0770
 Management 0454
 Marketing 0338
 Canadian Studies 0385
 Economics
 General 0501
 Agricultural 0503
 Commerce-Business 0505
 Finance 0508
 History 0509
 Labor 0510
 Theory 0511
 Folklore 0358
 Geography 0366
 Gerontology 0351
 History
 General 0578

Ancient 0579
 Medieval 0581
 Modern 0582
 Black 0328
 African 0331
 Asia, Australia and Oceania 0332
 Canadian 0334
 European 0335
 Latin American 0336
 Middle Eastern 0333
 United States 0337
 History of Science 0585
 Law 0398
 Political Science
 General 0615
 International Law and
 Relations 0616
 Public Administration 0617
 Recreation 0814
 Social Work 0452
 Sociology
 General 0626
 Criminology and Penology 0627
 Demography 0938
 Ethnic and Racial Studies 0631
 Individual and Family
 Studies 0628
 Industrial and Labor
 Relations 0629
 Public and Social Welfare 0630
 Social Structure and
 Development 0700
 Theory and Methods 0344
 Transportation 0709
 Urban and Regional Planning 0999
 Women's Studies 0453

THE SCIENCES AND ENGINEERING

BIOLOGICAL SCIENCES

Agriculture
 General 0473
 Agronomy 0285
 Animal Culture and
 Nutrition 0475
 Animal Pathology 0476
 Food Science and
 Technology 0359
 Forestry and Wildlife 0478
 Plant Culture 0479
 Plant Pathology 0480
 Plant Physiology 0817
 Range Management 0777
 Wood Technology 0746

Biology

General 0306
 Anatomy 0287
 Biostatistics 0308
 Botany 0309
 Cell 0379
 Ecology 0329
 Entomology 0353
 Genetics 0369
 Immunology 0793
 Microbiology 0410
 Molecular 0307
 Neuroscience 0317
 Oceanography 0416
 Physiology 0433
 Radiation 0821
 Veterinary Science 0778
 Zoology 0472

Biophysics

General 0786
 Medical 0760

EARTH SCIENCES

Biogeochemistry 0425
 Geochemistry 0996

Geodesy 0370
 Geology 0372
 Geophysics 0373
 Hydrology 0388
 Mineralogy 0411
 Paleobotany 0345
 Paleocology 0426
 Paleontology 0418
 Paleozoology 0985
 Palynology 0427
 Physical Geography 0368
 Physical Oceanography 0415

HEALTH AND ENVIRONMENTAL SCIENCES

Environmental Sciences 0768
 Health Sciences
 General 0566
 Audiology 0300
 Chemotherapy 0992
 Dentistry 0567
 Education 0350
 Hospital Management 0769
 Human Development 0758
 Immunology 0982
 Medicine and Surgery 0564
 Mental Health 0347
 Nursing 0569
 Nutrition 0570
 Obstetrics and Gynecology 0380
 Occupational Health and
 Therapy 0354
 Ophthalmology 0381
 Pathology 0571
 Pharmacology 0419
 Pharmacy 0572
 Physical Therapy 0382
 Public Health 0573
 Radiology 0574
 Recreation 0575

Speech Pathology 0460
 Toxicology 0383
 Home Economics 0386

PHYSICAL SCIENCES

Pure Sciences

Chemistry
 General 0485
 Agricultural 0749
 Analytical 0486
 Biochemistry 0487
 Inorganic 0488
 Nuclear 0738
 Organic 0490
 Pharmaceutical 0491
 Physical 0494
 Polymer 0495
 Radiation 0754
 Mathematics 0405
 Physics
 General 0605
 Acoustics 0986
 Astronomy and
 Astrophysics 0606
 Atmospheric Science 0608
 Atomic 0748
 Electronics and Electricity 0607
 Elementary Particles and
 High Energy 0798
 Fluid and Plasma 0759
 Molecular 0609
 Nuclear 0610
 Optics 0752
 Radiation 0756
 Solid State 0611
 Statistics 0463

Mathematics

Physics
 General 0605
 Acoustics 0986
 Astronomy and
 Astrophysics 0606
 Atmospheric Science 0608
 Atomic 0748
 Electronics and Electricity 0607
 Elementary Particles and
 High Energy 0798
 Fluid and Plasma 0759
 Molecular 0609
 Nuclear 0610
 Optics 0752
 Radiation 0756
 Solid State 0611
 Statistics 0463

Applied Sciences

Applied Mechanics 0346
 Computer Science 0984

Engineering

General 0537
 Aerospace 0538
 Agricultural 0539
 Automotive 0540
 Biomedical 0541
 Chemical 0542
 Civil 0543
 Electronics and Electrical 0544
 Heat and Thermodynamics 0348
 Hydraulic 0545
 Industrial 0546
 Marine 0547
 Materials Science 0794
 Mechanical 0548
 Metallurgy 0743
 Mining 0551
 Nuclear 0552
 Packaging 0549
 Petroleum 0765
 Sanitary and Municipal 0554
 System Science 0790
 Geotechnology 0428
 Operations Research 0796
 Plastics Technology 0795
 Textile Technology 0994

PSYCHOLOGY

General 0621
 Behavioral 0384
 Clinical 0622
 Developmental 0620
 Experimental 0623
 Industrial 0624
 Personality 0625
 Physiological 0989
 Psychobiology 0349
 Psychometrics 0632
 Social 0451



TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
LIST OF TABLES.....	v
CHAPTER 1: INTRODUCTION.....	1
Research Purpose.....	1
Plan of Presentation.....	2
Literature Review of Environmental Education.....	3
Defining Environmental Education.....	6
Environmental Education Methodology.....	9
Environmental Education for Children.....	19
Barriers to Environmental Education.....	24
Environmental Education in Nova Scotia.....	31
Conclusion.....	39
CHAPTER 2: METHODOLOGY.....	41
Finding a Program, Finding a Teacher.....	41
Research Method.....	42
Setting.....	45
Management of the School.....	47
The Students, The Teacher, The Curriculum.....	48
Procedure.....	53
Limitations of the Study.....	55
CHAPTER 3: CASE STUDY.....	57
The Tree Unit.....	57
Summary.....	77
Interviews with Children.....	78
Tree Questions.....	79
Environment Questions.....	89
Summary.....	99
Environmental Initiatives in the School.....	100
Summary.....	104
CHAPTER 4: DISCUSSION.....	106
Infusing Environmental Education.....	107
Awareness.....	108
Knowledge.....	109
Attitude.....	113
Skills.....	115
Participation.....	116
Impact on the Children.....	118
Jane's Comments.....	119
What the Children Liked About the Tree Unit....	120
Where the Children Learn About the Environment.	122
Children's Perceptions of the Environment.....	123

Barriers to Environmental Education.....	130
The Teacher.....	130
The School.....	135
The Parents and Community.....	137
The Administration.....	138
Conclusion.....	140
CHAPTER 5: SUMMARY AND RECOMMENDATIONS.....	142
Summary.....	142
Recommendations.....	145
Commitment to Environmental Education.....	145
Training in Environmental Education.....	146
Environmental Education Resource Materials.....	146
Further Research in Environmental Education....	147
REFERENCES.....	148
APPENDICES.....	153
Appendix A: Guiding Principles for Environmental Education, from the Tbilisi Declaration, 1977..	153
Appendix B: Letter to Parents.....	154

ABSTRACT

INFUSING ENVIRONMENTAL EDUCATION IN A GRADE THREE CLASSROOM IN NOVA SCOTIA

By R. Janine Swales
April 1994

This case study investigates how a Grade three teacher in Nova Scotia infused environmental education into the elementary curriculum in the formal school system. The study was conducted at a large, mostly White, middle-class rural school. A qualitative, participatory research method was used to describe the activities that took place in the classroom and to present the teacher's perspective of implementing environmental education in her unit on trees. Interviews were conducted with the children to understand how the tree unit influenced them as well to understand their perceptions of the environment. It became apparent that the teacher was confronted with many barriers to teaching environmental education in the classroom. In order to overcome some of these barriers that classroom teachers face, and to ensure that effective environmental education is being implemented in the schools, a more collaborative effort is needed between the administration, the curriculum advisors, the school, the teachers, the students, the parents and the community. Some environmental initiatives that took place in the school are explained in this case.

ACKNOWLEDGEMENTS

I would like to thank **Dr. George Perry**, my thesis advisor, who offered me his guidance and commitment. I also would like to thank **Dr. Ursula Kelly, Dr. John Haysom, Sue Conrad** and the rest of the staff and faculty of Education at Saint Mary's University.

Anne Camozzi, an environmental education consultant, was very helpful with my thesis format and analysis. I am grateful to her for her inspiration and friendship.

Jane Hart, Mary Meads, and the **Grade three students** were an absolute delight to work with. I thank them for being so accommodating and pleasant.

I am ever so grateful to the following people for their encouragement and support: **Stephen Jewkes**, my long-time companion, for his comfort, his sensitivity and his sense of adventure; **Sheila and Creighton Jewkes** for providing me with shelter during the storms; **Irma Lee and Larry Swales**, my parents, for their love and laughter; **John, Mary Lee, Brian and Julianne**, my siblings for their concern and encouragement; **Grace**, my dear friend, for her confidence in me.

LIST OF TABLES

Table 1: What have you been learning about trees?.....	80
Table 2: What did you like doing best, when you have been learning about trees?.....	82
Table 3: Why do you think trees are important?.....	84
Table 4: What do you think people can do to help trees?.....	86
Table 5: What do you think you can do to help trees?.....	87
Table 6: If you were going to learn about the environment, what things would you learn about?.....	90
Table 7: How do you learn things about the environment?.....	91
Table 8: Do you think we live in a good environment?.....	92
Table 9: How does that make you feel? Why?.....	94
Table 10: What do you think people can do to make a better environment?.....	96
Table 11: What can you do to make a better environment?..	98

CHAPTER ONE: INTRODUCTION

Research Purpose

This thesis is a case study investigating how a Grade three teacher in Nova Scotia infuses environmental education into the curriculum within the structure of the formal education system. The incentive for this research evolved from my own experience as a teacher trying to implement environmental education in an elementary classroom. Despite my efforts, I often felt I was proceeding provisionally. I wanted to know more about the methodology and potential impact of environmental education.

With this research, I sought to answer the following questions:

- 1. How is environmental education being infused into the elementary curriculum in Nova Scotia?**
- 2. What impact does environmental education have on the elementary students?**
- 3. What are the barriers to environmental education in the classroom and how can these barriers be overcome?**

The purpose of the study is to acknowledge the achievements and limitations of environmental education in the classroom, in order to support the efforts of the classroom teacher and to improve the effectiveness of environmental education in the formal education system in Nova Scotia in particular.

Plan of Presentation

Chapter One defines the purpose of my study and reviews environmental education literature. The major areas of focus are the definition and importance of environmental education, the infusion approach to environmental education, environmental education specific to young children and barriers to environmental education that classroom teachers experience. The present status of environmental education in Nova Scotia is provided at the end of the chapter.

Chapter Two explains how an elementary teacher, Jane Hart, was selected for the study and how a participatory research method was used to conduct this case study. This chapter elaborates upon the setting and management of the school, and upon specific details related to the students, the teacher and the curriculum. As well, the procedure and limitations of the study are outlined.

The third chapter is a description of how Jane Hart infused environmental education into her unit on trees. Two interviews were conducted with each of the students in her class and the children's responses are included here. The first interviews focused on what the children learned from the tree unit; the second interviews centered on the children's perceptions of the environment. Furthermore, this chapter includes a description of the environmental initiatives that took place in the school during my visits in the fall.

Chapter Four discusses the achievements, limitations and environmental possibilities of the tree unit. It discusses the responses of the children. The barriers to environmental education in the classroom are identified here and some possibilities of overcoming these barriers are presented. This chapter attempts to answer the three problem questions that were posed in Chapter One.

The final chapter summarizes the findings of this thesis and makes recommendations for improving elementary environmental education within the formal education system, and for further research in the field.

It is hoped that this thesis will be useful and encouraging for teachers and administrators who are designing and implementing environmental education programs in elementary schools.

Literature Review

The term environmental education was coined after the 1972 United Nations Conference on the Human Environment, which followed the public fervour of Earth Day 1970. Because environmental education is still a very young and emerging area of study, there has been relatively little research conducted in the field (Iozzi, 1989), and comparatively little research about environmental education within the formal education system. Elementary grades tend to be the most neglected in terms of environmental education

programs and research (Cohen, 1992; Jaus, 1982; Rejeski, 1982). Most of the studies have been conducted by environmental education researchers and the classroom teacher has been left out of the research process. However, I felt that the teacher's perspective on implementing environmental education was important in understanding how and if environmental education is being effectively infused into the curriculum. To the best of my knowledge, this thesis is a landmark because it is the first study conducted in Nova Scotia that examines how environmental education is infused into the elementary curriculum in the formal education system. In order to ensure the effectiveness of environmental education in schools, environmental education researchers, classroom teachers, administrators, curriculum advisors, environmentalists, parents and communities need to consolidate their efforts. (Greig, Graham & Selby, 1989; Nova Scotia Round Table on Environment and Economy, 1993; Randle, 1989).

Within a historical context, there is little doubt that the subject of the environment has been present in educational programs for as long as there have been schools. Wilke (1993) claims that many teachers used aspects of the environment to enhance their teaching. However, with recent escalating concerns about the effect of environmental quality on human health and welfare, many educators, as well as environmentalists, believe that the "environment" demands

significant, targeted attention in school curricula (Wilke, 1993).

Desinger and Monroe (1993) believe that the progressive education movement in the 1930's, which advocated a child-centred and holistic approach to learning contributed to the teaching methodology of environmental education.

Environmental education has been characterized as an holistic way of teaching which makes connections between science, technology, economics, politics, people and the environment (Nova Scotia Round Table on Environment and Economy, 1993). Hungerford and Peyton (1986) support this argument:

The investigation of issues from both an ecological as well as a socio-cultural perspective enables the learner (regardless of age or socio-economic status) to view the issues holistically and perceive the interrelationships that exist between the natural environment and people's cultural activities (p. 31).

Environmental education is fundamentally different from its predecessors, nature study and conservation education, because it addresses the interactive interrelationships between humans and the environment. It is also different from environment science - the scientific study of those interrelationships - because environmental education is concerned with values and skills as well as knowledge (Desinger & Monroe, 1993). Environmental problems like ozone depletion, acid rain and rapid deforestation are complex and cut across many socioeconomic, political,

scientific and technological boundaries. Consequently, environmental education, and how it is presented, is equally complex (Nova Scotia Round Table on the Environment and Economy, 1993).

Defining Environmental Education

In 1972, at the United Nations Conference on Human Environment, the establishment of an international environmental education program was recommended. In 1977, in Tbilisi, USSR, the world's first Intergovernmental Conference on Environmental Education, organized by UNESCO in cooperation with the United Nations Environment Programme, was convened (Hungerford & Volk, 1990; Desinger & Monroe, 1993). The conference endorsed the following "Goals for Environmental Education":

- 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 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.

(UNESCO, 1977)

As well, the declaration included the following "Objectives of Environmental Education" that have offered structure and guidance for environmental education programs around the world:

- Awareness- to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
- Knowledge- 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 individuals acquire a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvements and protection.

Skills- to help social groups and individuals acquire the skills for identifying and solving problems.

Participation- to help social and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

(UNESCO, 1977)

The "Twelve Guiding Principles of Environmental Education" from the Tbilisi Declaration, 1977, are included in Appendix A. Although these goals, objectives and principles are very broad and general, they do provide a structural example. Accordingly, individual programs, school boards, and schools can and have modified and adapted these aims to meet their specific needs and focus. If the objectives are clearly articulated, then environmental education programs certainly can and do have varying definitions and intentions. A comprehensive definition of environmental education includes mention of an awareness of the environment, knowledge about the environment, an examination of personal and societal values with respect for the environment, and individual and/or collective action in lessening human impact upon the earth.

As an example, the World Wide Fund for Nature (1988) defines environmental education as such:

Environmental education includes an understanding of ecological processes that govern life on earth; an

understanding of the geomorphic and climate patterns that influence living things and human activity; and understanding of the social and cultural influences that determine human values, perceptions and behaviour; and an awareness of an individual's own personal relationship with the environment as a consumer, producer and a sentient member of society (p. v)

Indeed, environmental education is far more than merely "educating about the environment". There has been a progression, over the past couple of decades, from learning **about** the environment, through learning **from** the environment, through learning **with** the environment, to learning **for** the environment (Desinger & Monroe, 1993; Randle, 1989; UNESCO, 1985).

Objectives are needed to offer guidance and unity, but with respect to the objectives of environmental education, it is sometimes questionable how and if these objectives are met. The development of environmentally literate citizens through formal education implies that knowledge and attitudes not only be **acquired** in the classroom, but also that these be **transferred** to the decision-making processes of the learners throughout their lives (Hungerford & Peyton, 1986). However, the extent to which this proactive involvement exists varies greatly amongst programs (Desinger & Monroe, 1993).

The difficulties in effectively implementing environmental education programs arise from the special characteristics which make environmental education differ from the traditional school subjects. The teaching

methodology in environmental education cannot be restricted to the mere transmission of knowledge; it involves development of certain desirable behaviours and attitudes. Even though the objectives of environmental education stress the importance of such attitudes and commitments, there is a danger that these may be lost sight of in view of the priority attached to cognitive aspects in most subject areas of the school curriculum (UNESCO, 1985). In my case study, I found that Jane Hart, in whose class my research was conducted, tended to focus more on knowledge acquisition than on developing responsible environmental behaviours and attitudes when she infused environmental education into her tree unit.

Environmental Education Methodology

Teaching environmental education differs from traditional teaching in that environmental education stresses the interdisciplinary, problem-solving and decision-making skills (Aho, Permikangas & Lyyra, 1989). This integrated approach to environmental education allows teachers to teach about and deal with environmental problems, so as to impart knowledge, assess attitudes and take action in solving these problems. Environmental education encourages the use of group discussions and activities to focus on problem-solving, values analysis, action projects and outdoor experiences (UNESCO, 1977). These approaches will be discussed individually, in this

section, although in reality they are integrated and often take place simultaneously. As well, an overview of the literature on resource and media materials is included here. Unfortunately, many of the resource materials available to teachers do not always foster these interdisciplinary approaches, but instead, focus on knowledge acquisition and isolate environment issues (Hungerford & Volk, 1990).

Infusion Approach. Most scholars in environmental education promote an infusion or multidisciplinary approach across the grade levels in dealing with environmental issues (Cole, 1992; Greig et al., 1989; Hungerford & Volk, 1990; Iozzi, 1989; Nova Scotia Round Table on Environment and Economy, 1993; Randle, 1989; UNESCO, 1986; Williams, 1979), whereas only a few advocate that this subject should be added to an already overcrowded school curriculum. Ideally, multidisciplinary planning incorporates many subject areas into a thematic unit of study, facilitating learning through linked activities rather than in compartmentalized lessons (Cole, 1992). It is an integrated approach where subject areas closely related to environmental concepts are restructured to incorporate environmental content which is not normally found in such subjects (UNESCO, 1985). Each subject can be mobilized to help learners develop their own coherent insight into human behaviour and the effect of this on people and the environment (World Wide Fund for Nature, 1988). As an example, in this case study, language arts,

drama, art, arithmetic, science and social studies are used to teach the children about trees.

Although this multidisciplinary approach may be advisable in theory, Williams (1979) states that in reality, this approach "causes many organizational problems within the modern academic structures" (p. 4). Williams claims that when environmental education is integrated into many different disciplines, it often seems to be taught partially and incoherently, with virtually no thought to its organization, philosophy or design. Rejeski (1982) supports this argument by stating that, through curriculum infusion, environmental education is limited by the theoretical structures and presuppositions of existing educational practices without generating its own theoretical basis.

In some writings, there are distinctions made between a multidisciplinary and interdisciplinary approach (UNESCO Institute of Education, 1985), but in much of the environmental education research, the terms "infusion", "multidisciplinary" and "interdisciplinary" seem to be used interchangeably. Secondary education tends to be **multidisciplinary** in its approach to environmental education, because different teachers teach different subjects to the students. It can often be difficult to bring about a total systems approach across the different subject areas. However, an **interdisciplinary** approach to

environmental education is quite conducive to the elementary grades, because these teachers are usually responsible for teaching several subjects to the same students (UNESCO Institute of Education, 1985). In my study, it will become apparent that Jane used many different subject areas to teach the children about trees.

Problem Solving. One of the "Guiding Principles for Environmental Education" from the Tbilisi Declaration of 1977 is to "emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills" (Appendix A). It is imperative that students develop an understanding of the environment through critical and reasoned analysis (Nova Scotia Round Table on Environment and Economy, 1993). Environmental problems need be considered holistically, from an ecological, economic, social, historical and political point of view, as well as from local, national and international perspectives (Caduto, 1985; UNESCO, 1977). Through problem solving and group discussions, learners are able to share knowledge, values and skills that relate to the problems at hand. They are able to develop individual and collective abilities and possible solutions to the problems (UNESCO, 1985).

Van Matre (1990) argues that environmental education tends to "teach how to think, not what to think". He feels that it relies heavily upon conducting group discussions to achieve its instructional objectives. Jickling (1992)

disagrees with Van Matre, and argues that "education is about drawing out what is likely to be already there - not about inculcation and indoctrination". Teachers often use group discussions to challenge students to think critically. If pupils are enabled to analyze the values behind their present socially-learned behaviour patterns, through group discussions and problem-solving approaches, they will conclude for themselves that environmentally responsible behaviours require them to develop different values (Randle, 1989).

Values Clarification. Values relate to the way we judge the worth of things. Values and attitudes are thought to be so powerful that they have a pervading influence over our lives and guide our very actions (Bennet, 1989). By analysing personal and societal values as a group and as individuals, students can reflect upon their relationship with others, their self-acceptance and acceptance of others, their respect for nature, their consumption of energy and their conservation of the world's ecosystem (Bennet, 1989; Beringer, 1990; UNESCO, 1985). Environmental problems are largely social problems and, to a lesser degree, problems for science and technology (Iozzi, 1989; Caduto, 1985). Values of social groups are translated into action by their choices (UNESCO, 1985). Obstacles to improving environmental quality include existing societal attitudes, values and lifestyles. "Moreover, scientists and engineers

can tell us what can be done; society must determine what, among various alternatives, should be done" (Iozzi, 1989, p. 4).

Values-analysis activities are used to help students understand their own environmental values and to help them determine how to improve their awareness, analysis, modification and implementation of values (Iozzi, 1989). Teachers can provide a supportive environment through which students can explore their personal and groups insights, feelings, thoughts and creativity. The use of stories, drama, art and music often provide such an environment (Caduto, 1985). As will be seen in Chapter Three, Jane's students learned values about trees through art, drama, stories and creative writing. Jane, however, did not challenge the children to analyze societal environmental values or to examine and modify their personal environmental values. Because important attitudes are learned early in life, Iozzi (1989) advises that the greatest emphasis be placed on the affective, rather than the cognitive domain, during the elementary school years.

Action Projects. Action projects are an opportunity for students to individually or collectively become "involved in working towards resolutions of environmental problems" (UNESCO, 1977). "Whereas knowing how to improve environmental quality is important, possessing such knowledge certainly does not ensure that one will be

motivated to take action" (Iozzi, 1989, p. 4). Action projects are often a proactive movement against the passive acceptance of the status quo, aimed at improving the environment and life in the community (UNESCO, 1985). They entail analysing the problem, assessing values, seeking solutions and organizing and implementing a project (UNESCO, 1985). It is turning theory into practice. An action project may be planting a tree, or cleaning up a stream, or merely spending more time in the natural world. One of the intentions of any environmental "action" is to think globally and to act locally (Van Matre, 1990).

Outdoor Experiences. Hungerford and Volk (1990) reviewed the research studies that focused on environmental sensitivity. In this case, the authors understood "environmentally sensitive" to refer to individuals who possess a basic appreciation and concern for the natural environment (UNESCO, 1988). They found that environmentally sensitive people spent time doing outdoor activities over long periods of time. They found that some sensitive individuals reported the importance of teachers who acted as sensitive role models for them. Other individuals reported being raised in an environmentally sensitive social environment. Only a few reported the importance of educational courses or books. Hungerford and Volk concluded:

[I]t seems important that learners have environmentally positive experiences in non-formal

outdoor settings over long periods of time. And, in the formal classroom, we must look to teachers who are, themselves, sensitive and willing to act as positive role models for learners (p. 14).

Hungerford and Volk (1990) state that the variables associated with sensitivity are often not associated with formal education. In my opinion, Jane Hart is an ideal role model of environmental sensitivity. She believes that outdoor experiences are crucial to developing an understanding and concern for the environment. Because of safety regulations, because of location, because of an overcrowded curriculum, it is difficult for Jane to take her pupils outdoors. Hungerford and Volk agree that environmental sensitivity is a function of an individual's contact with the outdoors in relatively pristine environments either alone or with close personal relatives. Raffan (1990), defends Hungerford and Volk's conclusions with this comment:

Only in therapeutic outdoor settings - where science can in good conscience be left out - can the subjective and the emotional outcomes of learning be addressed and even celebrated.
(p. 48).

Cornell (1991) agrees that "children's personal experiences of nature's beauties and joys are the most effective channel for developing their sensitive respect for the earth" (p. 28).

Resource Materials. Interestingly enough, when I conducted a computer search on ERIC (Education Resources Information Centre), I was confronted with far more

environmental education resource materials than environmental education research. Hungerford and Volk (1990) warn that educators need be cautious about what materials are environmentally ethical. Raffan argues that, almost in spite of formal environmental education, change is occurring, driven by industry, television and other mass media. Hungerford and Volk (1990) are more sceptical and have found that there are relatively few efforts to try to change environmental behaviour through the media.

Hungerford and Volk (1990) claim that, typically, issue awareness does not lead to behaviour in the environmental dimension. Because many resource materials and media presentations tend to focus on specific issues, these authors found that learners who may act in an environmentally positive manner with relation to one issue (or set of issues), do not necessarily have the knowledge, skills or willingness to assume environmental responsibility in their day-to-day lives.

Hungerford and Volk (1990) found that many instructional materials utilized in formal educational settings are designed to provide information about the environment and do not include ownership, empowerment or values analysis. In my case study, Jane uses a rainforest video that could be classified under the previous statement; the video provides information about the animals of the rainforest, and shows that deforestation is taking place in

the rainforest, but it does not discuss the causes of deforestation, or how the viewers are connected to the deforestation problem. This video and other resource materials that are used in Jane's tree unit will be presented in Chapter Three and discussed in Chapter Four. Iozzi (1989) warns that sometimes the so-called free and available materials can be very costly in the way of the many hidden agendas and biases they contain that could easily elude the non-specialist.

Teachers need to and are expected to employ in the classroom, environmental education materials such as books, television, videotapes, computers, films and audiotapes. Bonneville, Camozzi, Wong and Harrison (1994) recommend that resource materials need to be developed with the realities of the classroom in mind. These authors found that in order for resource materials to be usable for teachers, materials need to be "curriculum fit", "Monday morning ready", credible, relevant to the learners, flexible and pedagogically and environmentally sound. These authors also state that resource materials will be most effective if teachers play a lead role in developing the programs.

Simmons (1989) raises a similar concern about resource materials. If environmental education is committed to a interdisciplinary approach, Simmons stresses that a greater variety of curriculum materials clearly needs to be developed or adapted for use within non-science subject

areas. She recommends that the environmental education community needs constantly to monitor their progress and make certain that their actions are consistent with what they declare to be important in the field.

Environmental Education for Children

Elementary grades tend to be most neglected in terms of environmental education programs and research (Cohen, 1992; Jaus, 1982; Rejeski, 1982). Rejeski warns that there is a need for a coordination of a framework of organizing knowledge about the environment with a development framework for understanding how the child's knowledge of the environment changes, grows and is amended by experience. Rejeski has found that young children tend to be very egocentric and have difficulty displacing themselves perceptually (seeing the world from different points of view), affectively (developing an empathy), and temporally (perceiving time). Rejeski states that "educators need to take into consideration children's limited perceptual and cognitive abilities prior to developing an environmental education program" (p. 30). My study supports Rejeski's concern. Many of the Grade three children that I interviewed had somewhat limited perceptual and cognitive abilities in understanding ecological concepts and environmental problems and capacity to participate in solving environmental problems. Rejeski advises that there must be a consideration of the processes whereby children

assimilate dominant cultural values toward the natural environment and whether these values are in harmony or conflict with a valid ecological ethos.

Cohen (1992) studied young children, trying to understand their perceptions and awareness of ecological concepts. Understanding ecological concepts is an essential "knowledge" component of environmental education. Cohen summarizes the growing body of research on children and ecology in the three following statements. Children acquire knowledge best through **active** rather than passive learning experiences. Children learn best about ecology when they have **direct experiences with nature**. And children acquire ecological knowledge best in a context of free exploration and with adults who "**instill and model a respect for nature and all living things**" (Cohen, 1992, p. 260).

To understand how children perceive the natural world, Rejeski (1982) conducted a study using students in grades one and four. Each student was given a blank sheet of paper with the words "Nature is..." at the top. In the work of the Grade one students (ages 6-7), he found that the dominant symbolic element was the tree, and though the tree continued to be included with high frequency in the nature concepts of the older children, its significance as a focal element diminished rapidly. Rejeski thought that it may therefore be possible and practical, to use the tree as an accessible microcosm reflecting many aspects of larger, more

complex ecosystems, "for it is often the tree and its immediate surroundings which become a setting of endearing importance to the young children" (p. 32).

When Rejeski (1982) examined the work done by the children in fourth grade, he found that the children were able to do groupings, to classify and systematically reduce the complexity of the world. He concluded that this age group had a greater tendency to view humans as a passive participant in relationship to the natural world - humans do things **in** nature, not **to** nature. Rejeski found that in first grade the children were more inclined to see the relation of a thing to its properties, whereas by Grade four, the children could recognize relationships between different things.

Voelker and Horvat (1976) wanted to examine children's approaches to solving environmental problems. They conducted a study with older students in Grades five to eight. They provided the children with short stories to read, about specific environmental problems. In the children's written and oral responses to the question, "What do you think should be done about this problem?", most of the children suggested a pro-environment response, which Voelker and Horvat thought might indicate that the children see an "oversimplification" of the problem. Although the children I interviewed in my study were in Grade Three, they also tended to provide pro-environment and "oversimplified"

solutions to environmental problems. Voelker and Horvat found that few children acknowledged a compromise solution, between environment and people's needs. Some of the students, relied on technology as a solution to environmental problems. When the stories included a family component as well as an environmental problem, the students tended to focus on the family.

Voelker and Horvat believe that children as well as adults are often "under-informed", that the complexities of all perspectives of the problem are not explored. They feel that this may partially be attributed to the nature of the learner and society, but another factor may be short-sightedness. Too often, more attention is focused on environmental dysfunction rather than on a systematic knowledge of causation (Rejeski, 1982). Environmental educators need be aware of presenting environmental problems so as to make them comprehensible for children. Children need some understanding of the causation and complexities of environmental problems in order to decide how they can alter their behaviours to help the environment.

UNESCO (1986) provides an evaluation checklist for elementary teachers to recognize children's "behaviours which might act as indicators of an attitude of concern for the environment" (p. 124). Classroom behaviours are most evident, however, sometimes voluntary behaviours are better indicators of change.

Children who are learning an **awareness** of nature would become better observers of weather, seasons, plants, animals, and relationships between natural occurrences and living things. They might use the environment in creative work such as poetry, drama, stories, dance and painting. The children would act, as far as possible, harmoniously within groups.

Children who are developing an **understanding** of the environment would tend to ask questions of more informed people to learn about the environment. As well, they might make hypotheses about the nature of the environment, causes and effects within nature and test these ideas by means of questioning.

The assessment of **attitude** change is difficult to determine because a teacher cannot know how permanent and how deep the children's commitments might be. Assessing how children are involved in an **action** to help the environment is more apparent. Children might assist in the care of living organisms, and keep the environment free of garbage. The children might share their learnings about the environment with family and friends and encourage others to be concerned for the environment. These children might also make personal choices which reflect a definite consideration for the good of the total environment. I found that the children in Jane's class showed many of these same behaviours that UNESCO (1986) has identified as possible

indicators of a concern for the environment.

Children perceive the world in a very unique way, and it is important to design, implement and evaluate environmental education programs with children's specific learning styles and capabilities in mind.

Barriers to Environmental Education

The theory and reality of designing, implementing and evaluating environmental education programs in the schools do not often correspond. Classroom teachers are faced with many barriers to implementing effective environmental education programs. In 1987, Ham and Sewing conducted a survey asking elementary teachers about the barriers to teaching environmental education. They found that the primary barrier to teaching environmental education was time. First, there was near consensus that current curricular responsibilities made it difficult to find actual teaching time for environmental education. A second factor was a lack of preparation time. Lack of environmental education instructional materials and lack of funding were also contributing factors. There was an obvious emphasis on cognitive elements of environmental education but the affective aspects of environmental education, that is teaching students how to value and appreciate the environment and its importance, were largely overlooked. Most teachers were not comfortable enough with their training or preparation to teach environmental education.

Ham and Sewing concluded that the time actually spent teaching environmental education did not correspond to respondents' positive attitude towards environmental education.

Ham continued his research and used the same survey in schools throughout the world and discovered that teachers all over the world were confronted with similar barriers to teaching environmental education. In a second article (1992) he categorized the barriers as follows: conceptual barrier - lack of consensus among teachers as to the scope, purpose and content of EE; educational barrier - teachers' perceived incompetence to teach EE, and lack of science background; attitudinal barrier - teachers felt that EE was less important than other subjects; logistical barrier - teachers' perceived lack of time to prepare and to fit EE in, while meeting other curricular demands, and dealing with non-supportive administration. In Chapter Three, it will become apparent that Jane is confronted with many of these same barriers; however, during my visits to her school, initiatives were taken by the staff, students and parents of the school to break down some of these barriers and bring about change in the school.

In order to remove these barriers to environmental education faced by teachers, and in order to achieve effective change in people's attitudes and behaviours towards the environment, it is essential for the change

agent or change agents (possibly teachers, parents, students or curriculum advisors) to address the formal education system as a whole (Greig, Pike and Selby, 1989; Randle, 1989). Indeed, the education system itself is part of a greater societal and political structure. Students, teachers, parents, administrators, curriculum developers, researchers and the community members and organizations need be recognized and involved as contributors and initiators of change.

Randle (1989) states that the management of environmental education curriculum needs to start with a recognition of the school's structure and personnel, and their state of development and attitudes. Philosophies and ideologies can be explored in terms of education and environmental awareness, but if humans are to tread more lightly on the earth, these theories must be translated into school practice. Randle believes that in order to effectively implement environmental education programs in schools, it is important to note "the lessons taught via the hidden curriculum of how politics of the schools is conducted" (Randle, 1989, p. 60). For example, Mary Meads, the principal of Jane's school, tries to empower her staff to take the initiative in developing environmental practices in the school, expecting that the teachers will deal with the students in a similar empowering manner. Randle feels that many schools seem to work in isolation from the

community, but he stresses that schools need to realize that they are a part of a social and political system and as such are influenced by societal trends.

Randle (1989) refers to the values for Green Politics: ecological wisdom, grassroots democracy, personal and social responsibility, non-violence, decentralization, community-based economics, post-patriarchal values, respect for diversity, global responsibility, future focus and biocentrism as opposed to anthropocentrism. He states: "Green politics is about devolution of power, about openness and egalitarianism" (p. 16).

Greig et al. (1989), believe that the concept of biocentrism needs be reflected in politics, culture, societal values and education. Sessions (1993) defines biocentrism as:

an affirmation of the idea that all the wild species of the planet have an equal right, along with humans, to exist and flourish in their natural habits, in this respect no species is privileged (p. 5).

In Western society, anthropocentrism, or human superiority with respect to the earth's existence, tends to be the dominant ideology. Humans tend to control, manipulate and often exploit nature, for the benefit of humankind. However Greig et al. (1989) claim that in recent times a more holistic (biocentric) and interdependent way of seeing the world is being embraced by an increasing number of people within Western societies. There has been a

greater appreciation of the world as an interconnected global community. As a consequence, there has been a rejection of the values of the dominant worldviews of Western society (values such as competition, control, domination, exploitation and rampant materialism). Greig et al. (1989) claim that this concept of holism, a recognition of interconnectedness, has been particularly fostered by developments in ecological and feminist thinking and the worldviews of indigenous peoples (Greig et al., 1989; Johnson; 1992). With this notion of biocentrism, these authors, Greig et al. and Randle (1989), claim that holistic education should offer vision, and seek to liberate and empower the individual and promote active global citizenship and environmental responsibility.

Underpinning the curriculum would be a concern to develop personal, social and environmental responsibility; a respect for diversity within an acceptance of commonality; a concern for justice, equality and peace; an expression of solidarity with peoples across the globe; and a recognition that acting morally is acting in a way that future generations would ask us to act if they were here to ask (Greig et al., 1989, p. 20).

The overall ethos of the classroom would be cooperation, rather than competition, for it is through cooperation that "connectedness" is put into effect.

By involving teachers, students, parents, community and administration in the process of change, in the development of environmental and global curriculum, Greig et al. (1989) contend that it becomes **their** change. This sense of

ownership in affecting and sustaining whole-school change is as important as the development and nurturing of shared values and a shared vision across the staff and the entire school community. Furthermore, if initiative comes from the school (rather than the province or the school board) then the school is addressing perceived needs, rather than reacting to imposed needs (Greig et al, 1989). In my study I found that Mary Meads, the principal of Jane's school, has a similar vision of management. In Chapter Two of my study, I discuss Mary Meads' very open, inclusive and egalitarian approach to school-based management.

Greig et al. argue that changes in schools, if they are to be successful, must have meaning for teachers, for whom it is not simply a question of accepting a new product, but of embarking on a learning process. Practising teachers need to be involved in curriculum development (not just piloting), in order to ensure the understanding, and the success of such changes. Instead, Grieg et al. have found that curriculum advisors and administrators have often treated teachers in the same way as they have previously criticized teachers for treating students. These authors write, "it is perversely ironic when calls for teachers to be more sensitive to students' needs are made in a manner which is insensitive to teachers' needs" (p. 40). From my discussions with Jane, I found that she feels she receives very little direction and support from the curriculum

advisors at the school board and at the provincial department of education.

One of the best ways to meet teachers' needs is to provide in-service days (Greig et al. 1989; Ham & Sewing, 1987; UNESCO, 1986). Greig et al. state that in-service days on environmental education and related fields are "far more effective if they emerge as the natural outcome or extension of the informal, grassroots development" (p. 91). Such a "grassroots" in-service took place at Jane's school while I was there, the results of which will be discussed in Chapter Three of my thesis. Greig et al. recommend that a powerful in-service experience needs reinforcement through action at a variety of levels within the school.

An in-service needs to be **well planned** and **well executed**; there needs to be an effective aftercare **strategy**; its impetus needs to be **sustained** and those attending the course or influenced by development arising out of the course need to be **networked** (Greig et al, 1989, p. 117).

This environmental education networking needs be encouraged not only among the teachers and the schools, but also with the parents, community and the non-formal sectors of education.

Environmental education is a necessary means of addressing and solving present and future environmental problems. It demands a collective effort, whereby individuals, and society as a whole, are not only **promoting** active environmental responsibility, but also **adopting** environmentally responsible lifestyles. Perhaps because it

is a relatively new approach to education, there are still many necessary improvements that need to be made in order to ensure that environmental education is being effectively implemented within the framework of the formal education system. The purpose of this thesis is to investigate how environmental education is being infused into the formal curriculum in elementary schools in Nova Scotia so as to identify what improvements need to be made and how specific improvements can be made to ensure that environmental education is being effectively implemented.

Environmental Education in Nova Scotia

Environmental education is relatively new in Nova Scotia. In some provinces across Canada, environmental and outdoor educators and environmental groups have been organized and active for fifteen years or more (Morgan, 1992). However, it was not until 1991 that, the Nova Scotia Round Table on Environment and Economy, the Nova Scotia Department of Education and the Nova Scotia Teachers' Union have taken initiatives to promote "environment" in the formal education system. These initiatives will be reviewed in this section.

In 1991, Rousseau prepared a report entitled, "The Status of Environmental Education in Nova Scotia", for the Nova Scotia Round Table on Environment and Economy's Subcommittee on Environmental Education. Rousseau emphasized environmental education that could be and, is

presently, integrated into the existing curriculum. Rousseau found that as of 1991, there was no curriculum definition of environmental education, and the individual teacher's interpretation of the curriculum determined the amount and quality of environmental education in the elementary classroom. From my research, I discovered that this situation continues to persist. Jane is infusing environmental education into her tree unit because of her personal commitment to the natural environment, not because any curriculum has recommended that she do so. Rousseau writes:

There is a far greater number of study units which provide environmentally conscious teachers with opportunities to incorporate environmental issues than there are units which specifically focus on aspects of environmental education (p. 2).

Rousseau provides a list and definition of courses offered at the schools, colleges and universities in Nova Scotia, that are about or related to environmental education. There is no environmental education in the elementary schools listed; most of the environmental courses exist in post-secondary education. She then provides an extensive list and description of environmentally oriented programs and resources throughout the province noting their target clientele.

Two specific resources that Rousseau mentions are Earthkeepers and Sunship Earth, programs for Grade five and

six students. These programs were designed and copyrighted by the Institute of Earth Education (Van Matre, 1990). They are residential, outdoor programs, organized and taught by non-formal education organizations, The Association for Health, Learning and Leisure, and Halifax Recreation. I note these two Earth Education programs, because Van Weesen (1992), through Dalhousie University, completed a Master of Environmental Studies thesis about these two Earth Education programs. Van Weesen's thesis is the first formal study in the province that examined elementary environmental education provided by the non-formal education sector.

The Nova Scotia Teachers' Union began a Global Education Project in 1991 with the financial assistance of CIDA (Canadian International Development Agency). This project focuses on in-service training and decentralization in order to promote global education in the schools. One or two delegates from a school attend a global education training session and are then expected to return to their school and promote global education. Two teachers from Jane's school attended a school board global education in-service day. These same two teachers were the ones who organized the environmental education in-service session at Jane's school. It will become apparent in Chapter Three, that the staff and a parent at Jane's school developed goals to incorporate environmental practices into the school; however, they did not discuss environmental education

objectives or methodology.

Global education uses the same interdisciplinary, problem-solving, values-analysis approach as environmental education. Global education includes topic such as: environment, race and ethnicity, human rights, political issues, gender relations and international trade. Environmental issues receive more attention than other global issues and the environment appears to be more prominent in elementary than senior high schools (Perry, 1993).

Surveys have been conducted to assess the success of the Global Education Project. One survey addressed the needs of a teachers who wish to incorporate global education into their curriculum. The four greatest needs were, in order of importance: the need for "more and better resources"; the need for "more in-service and workshop training"; the need for "more time in the school day for preparation"; and the need for "changes in the curriculum" (Perry, 1993, p. 26). These barriers are quite similar to the barriers that face environmental education teachers, according to Ham and Sewing (1987). Indeed, global and environmental education are relatively new additions to the curriculum and much work still needs to be done in order to ensure that these programs are effectively implemented into the classroom curriculum.

In 1993, The Nova Scotia Round Table on Environment and

Economy, published a document entitled, Sustainable Development and the Environment: The Role of Formal Education. As defined by the World Commission on Environment and Development (1987), sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." From this definition, one can see how the environment and sustainable development are so intertwined. The report emphasizes that knowledge, attitudes and skills are the essential components of environmental and sustainable development education. It acknowledges the need for a comprehensive policy statement, as well as a systematic, sequenced and clearly articulated outline of environmental knowledge, attitudes and skills as they apply to all subjects. Within the report, there are several recommendations for implementing environmental and sustainable development education in the formal education system. These recommendations are in accordance with present research (Greig et al., 1989; Randle, 1989) on the subject:

1. Require environmental and sustainable development education be integrated in a variety of disciplines at all levels.
2. Require schools to implement and maintain practices which reflect the principles of environmental and sustainable development education.
3. Provide continuing education opportunities and intensive and sustained in-service training.
4. Identify and establish networks for teachers, administrators and students.
5. Identify or develop, and make available resources

that directly support the curriculum.

The report encourages schools to be the initiators of environmental programs and practices. The document provides a sound framework for schools to initiate and maintain environmental education programs and practices in the classroom, in the school and in the community.

One of the authors of this document, noted that the report fails to address how non-formal educational agencies, such as recreational and environmental organizations, can provide organized classroom programs for classroom use and/or outdoor programs. These agencies, which often have access to alternative funding not available to the school system could only support environmental education in the formal education system (Hungerford & Volk, 1990).

The Nova Scotia Department of Education recently completed a draft copy of a Proposed Framework for the Elementary Science Program (1992), designed to replace Science in Elementary School (No. 35, 1978). The purpose of this draft copy was to consult with and solicit feedback from school boards, teachers and community members regarding curriculum development.

The proposal introduces a constructivist learning model approach to teaching science, whereby students actively construct meaning and genuine understanding through physical involvement and personal reflection. The curriculum is designed to focus on interconnectedness between science,

environment and technology (SET). It states that "the success of the SET curriculum is in the skill of each teacher in providing a stimulating classroom which fosters inquiry and curiosity through student-centred learning" (p. 3).

In the appendix of this document is the "Conceptual Framework for Environmental and Sustainable Education", from the Sustainable Development and the Environment: The Role of Formal Education. It is a list of the knowledge, attitudes and skills that students should develop through environmental and sustainable education. However, this list is not integrated with the rest of the document.

"Environment" is presented as one of the five science topics. Each grade level is assigned a unifying concept; for Grade three, the unifying concept is "Structure and Function". Every grade level has the same five strands of study, but different topics. For Grade three the required topics are:

<u>STRAND</u>	<u>TOPIC</u>
Environmental Science	Plants and their environment
Earth/Space Science	Fossils and Dinosaurs or Dirt, Soil and Compost
Life Science	Living Things: Structure, Function, Habitat
Physical Science	Momentum and Motion
Technology Science	Instruments of Science and Technology

The document states that these "required topics" may not be replaced by optional topics nor may they be omitted. In-servicing for this new approach to elementary science is

arranged for September 1994.

When I spoke with one of the curriculum developers at the Nova Scotia Department of Education, he acknowledged the limitations of the proposal and said it was written for teachers and schools who were not already teaching about the environment. He said that in order to ensure that it was being taught, "environment" was included as part of the science curriculum as opposed to a separate subject. He felt that after "environment" was included in the curriculum, then the methodology of environmental education could be addressed. He recognized that many schools and teachers had already taken the initiative and were very active in environmental education and practices. To help these teachers and schools, he informed me that six elementary teachers had been assigned to write and organize materials that pertain to local environments and situations.

I share this advisors concern about getting "environment" into the curriculum, but I question the approach that the document is proposing. The proposal does not mention infusing "environment" throughout the whole curriculum, nor does it encourage any values-analysis or proactive involvement. I feel that environmental education cannot be relegated to science alone. And I fear that teachers could easily be misled by this document to think that environmental education is about science as opposed to recognizing that environmental education has specific

objectives and methodologies that include subjects other than and as well as science.

These three initiatives seem to be addressing similar concerns about incorporating environmental education into the formal curriculum. The Global Education Project includes "environment" as one of many global issues and uses similar teaching methods to environmental education. The Nova Scotia Round Table on Environment and Economy presents environment education as a whole-school approach to promoting and practising environmentally responsible lifestyles. And the Nova Scotia Department of Education promotes "environment" as one of five science topics in the elementary curriculum. All of these documents are important initiatives in environmental education in Nova Scotia. However, the process of change continues; these proposals and projects need be disseminated, implemented and evaluated within the classroom and within the schools.

Conclusion

A review of the literature in environmental education indicates that although the field of environmental education is relatively new, the theoretical aspects of environmental education methodology are seemingly well developed. The objectives of environmental education are to develop awareness, knowledge, attitudes, skills and participation in regards to understanding and appreciating the natural

environment as well as solving environmental problems (UNESCO, 1977). However, there has been comparatively little research on the application and outcomes of environmental education theories and particularly little research on the implementation and effectiveness of environmental education that is provided within the formal education system (UNESCO Institute of Education, 1985). This thesis will address these shortcomings in environmental education research.

There is clearly a need for more research on environmental education as it is taught within the schools, particularly in Nova Scotia. And there is a need for different methods of research. The following chapter will discuss the research approach for this thesis, as well as providing a description of the particular school, teacher, and students who were involved in this research.

CHAPTER TWO: METHODOLOGY

This chapter explains how I found an elementary teacher who was interested in environmental education and how a participatory approach to research was used to conduct this study. Descriptions of the school setting, the school management, the students, the teacher, and the curriculum are included. The procedure and the limitations of the study are provided at the end.

Finding a Program, Finding a Teacher

In looking for a teacher who taught environmental education, as well as a teacher who was interested and had time to do research with me, I spoke with several Grade Three teachers. Like Rousseau (1991) I found that individual teacher's interpretation of the curriculum and personal commitment to the environment determined how and if environmental education was being taught in the classroom. Some teachers were unfamiliar with environmental education. One teacher confined her environmental unit to the month of January. One teacher had started an egg carton and milk carton recycling program at his school, but otherwise had little time to incorporate environmental education into his curriculum. And he said he had limited time to spend with me doing research. Another prospective teacher taught in an environmentally active school but because of distance, I

could not arrange to work with her. Finally, a kindred spirit guided me to Jane Hart and her Grade three class.

The first day I met Jane, she was in the main stairwell of her school, putting up a four-metre high tree poster that her students had collectively painted. Along the other walls, were the children's stories and pictures about the big tree. I felt Jane had a keen interest in environmental education. She was also interested in doing participatory research with me. She was very open and accommodating. The principal and other staff members at the school were also very encouraging and enthusiastic about my research.

Research Method

Because environmental education is so multifaceted, I decided to use a qualitative, participatory method of research which would allow for a more holistic view of environmental education in the classroom. Maguire (1987), in her book, Doing Participatory Research: A Feminist Approach, provided me with an understanding of participatory research, what she refers to as an alternative research paradigm rather than the traditional means of research. According to Maguire, the alternative research paradigm tends to rely on subjectivity, rather than objectivity; it relies on close interpersonal interchanges rather than perceiving things from a distance; it appreciates uniqueness rather than imposing universality; it is qualitative rather

than quantitative; and it focuses on local self-determination rather than greater social controls. I felt that my concept of research was well within this alternative research paradigm.

I also attempted to be conscious of a feminist approach to research. "The ultimate goal of feminist research is the emancipation of women and the creation of a just society for everyone" (Maguire, 1987, p. 79). My ultimate goal was to research environmental education in the formal elementary education system; I did not specifically deal with gender issues, as most feminist research does. However, I did pay particular attention to removing the hierarchy of power between the researcher and the research participants. I used inclusive language. And I tried to be sensitive to gender issues, within the realm of my research.

I was inspired by the book, Experience Research and Social Change: Methods from the Margins, by Kirby and McKenna (1989). I too wanted to demystify and personalize research. I tried to be explicit about my values, choices and feelings, within this thesis and that is why I wrote in the first person. I liked the idea of doing research "with and for the participants, rather than on them" (Kirby & McKenna, p. 78).

When I first approached Jane, the teacher, we set the stage for the research. We discussed and agreed that this research would take place in an egalitarian setting; it

would involve a sharing of self; there would be a necessary investment made by all, and that the research would be of mutual benefit (Kirby & McKenna, p. 66). I wanted us to present the perspective and insights of the teacher in regards to designing and implementing environmental education programs for the classroom. I also wanted to present the voice of the children, both their reactions to Jane's program and their perceptions of the environment. The children's responses could provide a means for Jane and me to evaluate her program.

A case study of this one class would allow me to be actively involved, and to establish a rapport with the children and the teacher; I hoped to gain insights into the workings of an environmental education program that might not otherwise be noticed. Thomas (1989) in his article, "Evaluating Environmental Education Programs Using Case Studies", states that, "freed from the need to assess performance relative to predetermined goals or criteria, case studies show an ability to uncover fundamental aspects of a program" (p. 4). Thomas further claims that, "a case study is particularly good at shedding light on all aspects of a program" (p. 7). I wanted to appreciate the intrinsic value of the situation in Jane's classroom, and I also wanted to view it critically, to make recommendations based on its achievements and limitations. Therefore, I approached the situation hoping that Jane and the children

would take the initiative and reveal their experiences of environmental education.

Throughout the research and writing process of this study, I consulted with Jane, George Perry, my thesis advisor, and Anne Comozzi, an environmental education consultant. I maintained field notes and reflections from my observations and interviews. I recorded all the formal interviews and dialogues on tape and then transcribed the information so we could review and discuss them. The analysis and summaries within this thesis are a compilation of opinions.

Setting

Jane's elementary school is located in a rural community, several kilometres from Halifax. There are some old homes, but new homes and sub-divisions are being built daily. The school grounds are bordered on one side by a wooded area.

The school itself is only three years old. There are about 500 students in the school, primary to Grade five. The Grade six students have been shifted over to the junior high school which is just across the parking lot, because the elementary school could not accommodate the expanding student population. Almost all of the students are White; visible minorities represent only a small percentage of the student population. There are three or four classes for

each grade. Almost all of the children are bussed to school and stay for lunch. There are three different lunch periods, one after the other. The cafeteria is small, but has a good meal plan and relatively wholesome food.

When I spoke with Mary Meads, the principal of the school, she offered me the following descriptions of the school and community. The socio-economic status of the students is wide-ranging. There are many single-parent homes and some financially desperate families who receive support from local service clubs; some families have two parents and some families have two working parents. For the three years that the school has been open and that she has been principal there, only three parents have approached her with academic concerns. She felt that parents might have felt too intimidated by the previous school system, or that they are too busy attending to more immediate needs. She has noticed that parents are very gradually becoming more involved with their children's education.

The school and community are facing a problem with vandalism by youths. Windows in the school have been broken and the wooded area, which is community property, is filled with garbage, glass and remains from bonfires.

Last year a recycling program was started in the community. Community members can put glass, newspaper and plastic goods in a blue bag and put it out with their garbage once a month.

Management of the School

Mary Meads, the principal, has a very open and inclusive approach to administration. This empowering approach, she hopes, will infiltrate throughout the school and community, so that children and adults will feel they are an essential component in problem sharing and collective problem solving. In this way, Mary hopes to be developing "leaders for the future." Mary tries not to say a lot at staff meetings; instead she hopes that teachers will rely on their own initiatives and address the perceived needs of the teachers, students, school and community. She is developing "a climate in which staff are more likely to feel able to take a few risks." She hopes to have teachers, students and community members realize that they are important in the development of a shared and owned philosophy. Mary's approach to management facilitates individual and group initiatives to bring about changes in the school.

Mary explained that principals are trying to dissolve the traditional, "top down" style of management. Administrators are trying to decentralize by establishing school-based management. Instead of dictating the goals and agenda, principals are trying to offer the teachers and students and community members more ownership in the decision-making process. Mary admitted that as yet there are conflicts between the theory and the reality of school-based management.

With respect to the garbage in the wooded area near the school and the vandalism, Mary sent a news bulletin home with the children, asking for involvement and input from the parents and community members. The wooded area is community property. Mary believes that respect for self, personal property and the environment are all intertwined. She feels that the youth are striking out however they can, by vandalising the school and the woods. Ideally, Mary would like to have the school open to the community in the evenings for community programs, but as yet has to solicit the opinions and commitment from the community and the school board.

The Students, The Teacher and The Curriculum

Jane's Grade three class has twenty-five students in it, seventeen girls and eight boys. The class is representative of the school population. The children sit in groups of four, to facilitate cooperative learning. There are windows along one wall of the classroom. The windows look out onto the playground and the sun gleams in through the windows in the mornings. The children's work is displayed on all the other walls of the classroom and sometimes in the hallways. There is an infrequently used computer in the classroom. There are two big book racks; one has approximately seventy general interest books, the other has about thirty books on trees.

Jane has been teaching for seventeen years. She is about forty years old. She is married and has two children. Her experience and expertise in dealing with people and curriculum are obvious. Her enthusiasm and patience, as a learner and a teacher, are admirable. She has a wonderfully empathetic and supportive rapport with her students. The more I worked with her, the more I liked her ways of dealing with people and problems. She has an "in tune with nature" feeling about her, and she seemed very "in tune" with her students. She enjoys spending time in the natural world and she spoke often about her cottage and her garden.

Jane has a Bachelor of Arts in History and a Bachelor of Education. She said that with no science background, and no formal training in environmental education, she feels fairly inadequate teaching environmental education, especially when she has limited resources available to her for background information. She knows quite a bit about gardening and about the forest ecosystem from personal experience. Jane said she teaches about the environment because she is personally interested in the environment and because she has found some good materials. A school she taught at previously was environmentally active, with paper recycling and cooperative efforts to implement environmental projects and lessons. The school she is teaching at now, still has no collective environmental projects in the school, such as recycling paper or worm composting.

However, some initiatives were taken this fall by the staff to become more environmentally active. These initiatives will be discussed in chapter three. Jane felt the large size of the school was a major deterrent for such projects. She often does not see some teachers during the day because of different lunch breaks and recess breaks. Jane therefore can feel quite isolated at times in her efforts to teach environmental education.

Jane feels little direction and support from the school board and the provincial department of education. As this case study will demonstrate, Jane incorporates environmental education in her curriculum far more holistically and progressively than what is suggested in the provincial department's newly revised Proposed Framework for the Elementary Science Program (1992). Jane feels that curriculum advisors need to more aware of teacher's needs. She said that she has never been contacted or visited by a curriculum consultant.

This particular school runs on a six-day cycle. The Grade three students receive two forty-minute periods of physical education and two forty-minute periods of music within each cycle. They have a library period for a half hour and a fifty-minute period of art, when an art student is at the school for a teaching practicum. For the first few weeks of school, the principal took the children at this art time, and focused her lessons on the environment. She

was surprised how much Jane's students knew about the environment, relative to the other classes of Grade three students. Shortly thereafter, a student art teacher took over the time slot and maintained an environmental theme and practices in her art lessons with the children. In a six-day cycle, Jane has about forty minutes a day without the children, when she can plan and organize her curriculum.

Within this school board, the teachers are expected to do all their own planning for the curriculum, which can be very liberating and also very time consuming. In planning their curriculum, teachers are expected to follow the guidelines developed by the Nova Scotia Department of Education. Environmental education can easily be infused into subjects such as science and social studies. In the Public School Programs (1991-1993) booklet, the following topics are recommended for Grade three science: Plants, Mystery Powder, Measurement and Motion, Rocks and Soil, Living Things and Environments, Heat, Sound and Magnets. The recommended topics for the social studies program are communities and map skills.

Jane and the two other Grade three teachers have been provided with individual copies of Explorations in Science Level Three (Herridge & Moore, 1992), a new science curriculum book. This resource book provides numerous activities promoting group work, exploration, experiential discovery, observing and classifying. The book is organized

into different units of study, such as: Soil, Flight, Time, Plants, Motion, Water, Mirrors and Structures. Integrated activities are recommended to include scientific concepts into other aspects of the curriculum. The plant unit has activities about trees, seeds, paper making, a visit to a lumber yard, leaves, trunks, and roots. Jane finds that the book does not provide sufficient background information for some of the concepts. So although Jane uses this science resource book for some of her tree activities, she relies more on other resources that she has found.

There is a separate "environment" section, at the beginning of Explorations in Science. Here the authors provide a blank calendar for each of the school months, and a different endangered species for each month: Elephant, Peregrine Falcon, Mountain Gorilla, Whooping Crane, Giant Panda, Polar Bear, Tiger, Bison, Wolf and Whale. They do not include the piping plover or the blue bird, two endangered species in Nova Scotia. They recommend that the teachers conduct activities and facilitate discussions with the students to teach them about these endangered species throughout each month. This so-called "environment" section is not integrated into the other units of study, and it does not deal with environmental problem solving or values analysis. One of the other Grade three teachers uses this endangered species approach, to incorporate environment into her curriculum. The other Grade three teacher is not that

familiar with environmental education and therefore does not teach it.

Jane explained the objectives of her Grade three tree unit. It is important to note that Jane designed this tree unit, and infuses environmental content into the program. She did not specifically design an environmental education unit. First, she would like the children to become better observers of nature and the world around them. Through her tree unit, Jane hopes that the children will be encouraged to notice more about trees and will develop a greater respect for nature. She finds that the children at this age are very keen about facts. Jane would like the children to be able to read for information. The children read tree stories or tree facts and learn to retain information from reading the materials. As well, Jane feels that trees are big, "a bit like whales," so the children are naturally intrigued by them. And finally, the provincial department of education recommends a plant unit within the science curriculum, so she uses trees to teach the children about plant concepts.

Procedure

I spent two mornings every week (six hours) in the classroom, for seven weeks, October 5 to November 17, 1993. For these fall months, the children were involved in an environmental education program about trees, designed by

their teacher, Jane Hart. The students began most of their assignments in the mornings and completed projects in the afternoons.

For the first three weeks, I observed what was taking place in the class and collected field notes, paying particular attention to the tree activities and environmental education. For two weeks, I circulated amongst the children, informally asking questions and talking with them about their work and their ideas. I wanted the children to become familiar with me and to feel comfortable with my presence. Jane always made herself available for my questions and discussions.

Having established some rapport with the children, I began interviewing them individually, on October 20, and October 26. I asked each child five questions about trees, and sometimes asked for elaborations. I asked the following questions:

- 1- What have you been learning about trees?
- 2- What did you like doing best, when you have been learning about trees?
- 3- Why do you think trees are important?
- 4- What do you think people can do to help trees?
- 5- What do you think you can do to help trees?

I thought that the questions would provide a framework for a conversation about trees. Some of the children answered the questions directly, with an almost rote response. Some of the children entered into a dialogue and offered their personal opinions and experiences. These interviews lasted

between two to four minutes each.

Then on November 15 and November 17, I interviewed the children in pairs, asking them these five questions about the environment:

- 6- If you were going to learn about the environment, what things would you learn about?
- 7- How do you learn things about the environment?
- 8- Do you think we live in a good environment?
- 9- How does that make you feel? Why?
- 10- What do you think people can do to make a better environment?
- 11- What can you do to make a better environment?

Jane thought that in pairs, the children might feel more comfortable talking. These interviews were three to five minutes in length. With each set of five questions I tried to address the children's knowledge, their attitudes, and possible action strategies pertaining to trees and the environment.

At the end of my term in the classroom, I spoke formally with Jane, the principal, and the environmental education programmer at the Nova Scotia Department of Education. Jane recommended that I consult with a curriculum advisor at the school board, which I did. I was also invited to attend a school in-service on the environment.

Limitations of the Study

The study was limited by the lack of literature and the lack of research that dealt specifically with elementary

environmental education in the formal education system. As well, there were no "specialists" available who were familiar with elementary environmental education in schools. These limitations further demonstrate the need for this particular case study and the need for more research in the field of elementary environmental education. The chapter that follows is the case study of the tree unit and the children's response to the program.

CHAPTER THREE: THE CASE STUDY

This chapter is a chronological description of the lessons and activities that took place in Jane's classroom throughout the Tree unit. Some of the children's writings are included. This chapter also includes the children's responses to the interview questions about trees and about the environment. Throughout this chapter I include comments and reflections about how environmental education is being presented and how it is being experienced by the children. Also in this chapter there is a description of initiatives taken by parents and the staff to implement environmental practices in the school.

The Tree Unit

Jane's tree unit has altered over the past four years, depending on the abilities and personalities of her students, the availability of resources, the amount of time she has to plan and prepare for the activities as well as the interest and support she receives from other teachers, parents and administration.

In the past she has arranged for educators from the Department of Lands and Forests to take the children on a guided tour through a park. Another year, at her previous school, she and some other teachers made paper with the children to show the connection between paper production and

trees.

This year, Jane has found that her twenty-five students tend to be enthusiastic about the tree unit. Some are academically weak, some are strong. There is a large number of non-readers or weak readers. The children initially were very dependent on Jane for guidance, but gradually they are beginning to rely on their own initiative.

Each child has a homework book. Every afternoon the children write down from the blackboard their homework assignments and reminders. The book is signed each night by a parent or guardian and returned to school the next day to be checked by Jane. In this way, homework is completed, memos are returned, and Jane is able to maintain a regular correspondence with the parents.

Jane spends about ninety percent of the day on her tree unit. It is important to note that Jane does not teach an environment unit; instead, she infuses environmental education throughout her tree program. She uses a whole language approach, enabling the children to learn about trees through all aspects of the curriculum: art, stories, writing, reading, spelling, measuring, outdoor activities, science experiments and social studies.

Each morning the children gather together for a class meeting. At this time the children have an opportunity to share news with one another; the children take turns sharing, with one child speaking to the rest of the class.

Jane is the facilitator. This provides the children with an opportunity to learn and practice their communication and social skills. After shared news, Jane usually introduces the main activity for the day. It might be a story, an activity, an experiment, or a lesson. After the main activity, the children are assigned their work projects for the day. There were always numerous activities to do and complete.

The first day I visited with the class, October 3, 1994, I noticed a list that the students had collectively compiled. It was posted on the side bulletin board:

Trees are important because:

- 1-Trees give off oxygen.
- 2-Trees give animals homes.
- 3-Trees provide food: maple syrup, fruit, nuts, coffee, chocolate,
- 4-Trees stop erosions and floods.
- 5-Trees give off water. We need the rainforest to help make rain.
- 6-Trees give us paper, pencils.
- 7-Trees give us wood for houses and furniture.
- 8-Trees provide shade.
- 9-Trees give us medicine.
- 10-Trees make the world a beautiful place.

The children had been out on a tree trip in the wooded area near their school and had collected leaves to do leaf rubbings with chalk. The children had read two stories from the Birch Bark reader (Remick et al., 1984). One story was entitled, "Trees of Canada." The children had questions about the story to answer in writing. The other story was a version of a Native story, "The Legend of the Birch Tree." The children took turns acting out this story. These

activities were completed prior to my visits.

On the day of my first visit, after shared news, Jane read The People Who Hugged the Trees (Rose,1990), a story of the Chipko people in India. These peasant people saved their trees from being cut down by a wealthy prince, who wanted the trees to build a fortress. Amrita is the main character who as a young child developed a love for the trees. Throughout her life she lead her people in protecting and caring for the trees. When the prince's men came to cut down the trees, Amrita and her village people hugged the trees so the trees could not be cut. When the prince arrived at the village and demanded that the village people move away so trees could be cut, a huge wind storm blew sand from the desert into the village. But the big old trees provided shelter and protected the people from the vicious sandstorm. After the storm settled, the prince realized how very wise the people were to care for the trees, as the trees protected the village from the storms. He assured the village people that the trees would never be cut down.

The children discussed the story and shared what they would do if they were in Amrita's predicament. Jane mentioned about local trees being cut and clear cutting that takes place in parts of Canada. She told of the "tree huggers" in British Columbia who hugged trees like Amrita to protect them from the tree cutters. Many of the children

agreed that they would protect the trees from tree cutters, giving reasons why trees are important.

After their discussion about tree hugging, the children were then given a writing assignment. They could retell the story using their own words and illustrations; they could write a story about the future of Amrita's village, or they could write a story about how they would react to someone cutting down trees locally.

The children set about writing their stories quietly and independently. Some of the children did not understand the assignment and needed extra guidance. Before lunch time, a few of the children had an opportunity to read their stories to the rest of the class. Most of the children described the story about The People Who Hugged the Trees. One boy wrote a story about the trucks and bulldozers that were cutting trees in his neighbourhood. In retaliation, he took a gun and shot holes in the tires to stop the bulldozers and trucks from cutting. The children all laughed. I think the story was meant to be funny because of its sensationalism.

This story writing provides an opportunity for the children to express their reactions to the story and to the tree-cutting issue. It provides a safe atmosphere where they can analyze human behaviour and reflect upon their own behaviour in relation to trees, without themselves feeling accused or judged. I thought the story and illustrations in

this book were beautiful, as many children's literature books can be. However, I think the story could have been presented in the context of the tree cutting problem. Some trees need to be protected, but there are also trees that need to be cut in order to satisfy human needs and desires. This particular tree-cutting situation in India is similar to other tree-cutting situations around the world, but it is also very different from many situations in which trees are cut. Foresters, paper companies, lumber businesses and Christmas tree farmers cut trees and usually plant new trees to satisfy people's needs for paper, furniture, homes and many other things. I think a distinction between tree cutting situations needs to be made in order for the children to understand the complexity of the problem and to help them recognize that they too are consumers of tree products. In this way, I feel that the children would be more apt to discover ways in which they can reduce their use of tree products and could help preserve trees.

The children wrote a good copy of their Amrita story, and included it as the third story in their Tree Book. Every child has a Tree Book in which to collect their stories, group experiments and facts about trees. The front cover of the Tree Book was personally designed by each student. And each book had a table of contents, to be completed as the book was written, and a number of blank lined pages. The second story in the Tree Book was a

personal perspective on the importance of trees. Many of the children used the information from the "Trees are Important" chart for their story. The majority of the entries in the Tree Book were the children's personal creations.

The first story in the Tree Books was entitled, "My Favourite Tree." For a homework assignment, at the very beginning of the tree unit, the children were asked to find a tree near their home that they liked, and make notes to describe their tree. The next day they wrote a story about their favourite tree and shared it with the class. Throughout the course of the tree unit, many of the children often shared stories about their favourite tree during class meetings. They talked about the time they spent with their favourite tree and things that they noticed about the tree. With some of the students, there was an obvious bonding between the child and the tree. One girl wrote:

My Favorite Tree

My tree. My favorite tree. My tree is 25 years old. My tree is taller than my house. My tree is a very special tree for my family. My Aunt Suezie planted it when she was eight. It is a silver maple tree. I can name a few different kinds of birds. My tree has a woodpecker feeder and my bird feeder. There is a squirrel in my tree.

This activity is an excellent means whereby the children can incorporate environmental practices into their personal lifestyles and spend time in the natural world. Jane put this activity at the beginning of the tree unit because she feels that it is important for children and

parents to recognize that what the children do at school has a connection with their life at home. Jane hoped that, this activity would encourage the parents to become involved with other tree activities that take place throughout the tree unit. In class the children often commented on their activities and discussions that they had shared with their parents. As will be seen later in this chapter, the parents help the children measure their favourite tree and the children shared their tree book with their parents at the end of the tree unit.

On October 6, the children had a discussion about roots. Jane then wrote a definition of roots on a flip chart. The children copied this description into their Tree Book. The entry is as follows:

Roots

Roots hold a plant in place. Roots take water and minerals from the soil up to the rest of the plant. Some plants store food in the roots. Name three roots that we eat.

The children named onions, carrots, peanuts, potatoes and many other edible roots. The next day the students learned about stems and tree trunks in a similar format.

Stems

Stems hold up the leaves and flowers of a plant. Stems have little tubes that take water and food to the rest of the plant. Grass and flowers have soft stems. Trees have one hard, woody stem called a trunk.

A week later, October 13, at the class meeting, a girl brought in acorns and chestnuts that she had collected at a park nearby. The nuts were put on display. Another girl

brought in leaves that she had found in the school yard. After the meeting she pressed them under heavy books.

This day, Jane had some experiments planned for the children to show how the roots and stems of a plant function. Jane found these experiments in David Suzuki's book, Looking at Plants (1985). She brought carrots and celery from her garden, which helped the children to visualize and understand the connection between the carrot and the earth. Several experiments were done. Jane cut the tip of a carrot off so the children could see the interior of the carrot. This carrot was then placed in a jar that contained water and blue food colouring. Then Jane cut the base off a celery stalk so the children could see the little holes (xylem and phloem) where the water is sucked up. This celery stalk was placed in a jar with red food colouring in it. Another celery stalk was cut at the base and left out on the table, while the remaining celery stalks were placed in a jar of water. The children were asked to speculate what might happen with each experiment. Few of the children were very sure about what might occur. The class agreed that the following day they would examine the experiments together to notice if any changes had come about. The children drew pictures in their Tree Books to show the first phases of the experiments. They collectively agreed that the title for these experiments would be "How Plants Drink."

For homework, the children were asked to measure their

favourite tree with the help of an adult. Jane took time with the class to teach about measuring height, width or circumference, and about estimating. The children were asked to make a diagram to illustrate their measurement techniques. They were given the freedom to chose what part of the tree they would like to measure.

On October 14, the children gathered together to share their measurement diagrams. It was interesting to hear the children's interactions, both with the tree and with the adult. They seemed to enjoy the activity. After shared news, the children focused their attention on their plant experiments. Though they had been noticing the gradual changes that were taking place the day before, the changes were very obvious today. The green leaves of the carrot had turned blue from the water and dye being sucked up, and the celery leaves had turned red from the red dye. Jane showed the children "straw like" tubes in the celery and the carrot by cutting off the tips. The children also noticed that the celery stalk that they had left out was "flimsy" and "floppy," so they decided to put this stalk back in the water to see if it would revive.

Together they brainstormed about words that they might use to describe the experiment. Jane wrote the words on a flip chart, so the children could use them and spell them correctly in their story about the experiment. The children spent some time completing their write up in their Tree

Book, about "How Plants Drink."

These science experiments help the children learn science skills such as: questioning, hypothesizing, observing and evaluating. The children learn about how trees/plants function, but in my opinion, in order for these experiments to be more environmentally focused, they could also provide a more holistic understanding of how trees function within an ecosystem and how people interact with these ecosystems.

After morning recess, Jane arranged to take the children outside to measure trees in the woods. The children were divided into two groups, Jane and myself each having twelve students. Each group had a measuring stick, rulers and one person was assigned to be a recorder. The objective was to identify and to measure many different aspects of four different trees. Prior to going outside, the children were cautioned about the broken glass and garbage in the woods.

The children in my group were excited and rambunctious. It was difficult to keep everyone involved. I was still a stranger to the children, and they knew they could get away with a lot. Each one seemed busy exploring and doing their own thing. Oddly enough they were busy hitting trees with sticks, breaking branches, and stomping on dead fallen trees. I was flustered by their excitement and was trying to involve them in the measuring activity. I missed this

"teachable moment" to have them reflect on their destructive actions. I noticed that Jane's group was much more settled and focused. We spent half an hour measuring two trees.

We gathered together as a large group and briefly discussed our findings. The children commented on the litter and glass in the woods and possible solutions. The children knew it was the big kids who made this mess. Some of the children wanted to clean up the garbage, though they would have to be careful not to cut themselves on the glass.

We then went over to the other side of the playground, where there was a small treed border separating the school property from private backyards. There was no garbage on this side. The children had a chance to collect things from trees. They were asked to take things that were on the ground, things that were dead, and things that would not hurt the tree in the taking. The children found leaves, twigs, cones, bark, acorns, needles and moss. After collecting for ten minutes, we went back into the classroom.

At their desks, in groups of four, Jane guided the children in classifying and organizing what the children had collected. All the leaves were put together with needles, barks were put together, seeds were put together. They organized items according to colours, and then they organized things according to different types of trees. In the afternoon the children were given classifying sheets. On one side they had to classify their findings according to

tree parts (leaves, bark, seeds), and on the other side, they had to classify the items according to different types of trees (maple leaf and willow leaf, pine needles and spruce needles). Over the next few days the children completed the classifying sheet, drawing pictures of the items in the proper boxes and included this classifying sheet in their Tree Book.

To document the measuring activity, Jane and the children discussed the results of the measurements. Jane wrote the results of their findings on the flip chart and the children copied them into their Tree Book and included an illustration of the tree and the measurement.

A few days later, the children watched a sixty-minute video about the rainforest in Costa Rica. This video was produced by the National Geographic and sponsored by Chevron, the oil company. The video was fascinating and filled with colourful and exotic animals and plants. There were pictures of a coral snake losing its skin, a basilisk lizard running on water, poison arrow frogs and leaf-cutting ants. The video concentrated more on the animals than on the trees of the rainforest, but the interdependency of the animals and the trees was evident. The video ended on a sombre note, stating that the animals and the plants of the rainforest are nearing extinction because of the rapid deforestation taking place in Costa Rica.

This rainforest video focuses on the animals of the

rainforest and at the end shows deforestation taking place, but it does not address the causes of deforestation. This issue of resource materials and how they are used will be discussed in Chapter Four of this study.

The children were obviously thrilled with the video. After they had seen the video, they talked together about the things they liked best about it. Then they were given a chance to write about it. Jane provided fact sheets that she made from the video, to help the children write their stories. This writing would be written in draft, corrected by Jane, and then written in good copy. These stories were not included in the Tree Books.

The children spent the whole morning writing their rainforest stories. Most of the children wrote about the animals. Many children mentioned that they would like to go to the rainforest, and that they would like to stop people from cutting down trees. Here are excerpts from two girls' stories:

Some day I wish to help the rainforest. I also would like to lurn a lot more about the rainforest...

One girl seemed to have an almost romantic vision of the tropical rainforest. She talks about the rainforest as though it was a vacation resort. She wrote:

If I tack my kids to a tropical rainforest I am going to tall people not to cut down trees so my children can play and have fun on their trip to the tropical reinforest and so I can have a good time and have fun with my children.

The children definitely wanted to help the rainforest. However, the children's responses, both in their writings and in the interviews, show that the children tend to "oversimplify" the rainforest deforestation problem. The children's perceptions will be presented in the next section and discussed further in Chapter Four.

Two days later, October 26, the children embarked on a rainforest art project. The students were given construction paper, scissors, and glue to make a rainforest poster. Everyone was given a big piece of construction paper and they were expected to completely cover the paper with a picture of the rainforest, using other pieces of construction paper. These pictures would show how dense, colourful and beautiful the rainforest is.

When I returned, two days later, the rainforest posters were up on display on the bulletin board. She had brought fifteen potted geraniums for the children to take care of. The flowers were placed in the windows in the classroom. Jane was in the midst of teaching the children about leaves. And the children had a new entry in their Tree Books:

Leaves

Leaves are very important to plants. They make food for the plant to live and grow. In order to make this food, a plant needs water, carbon dioxide, and energy from the sun. Water is brought in by the roots and carried by the stem to the leaves. The carbon dioxide enters the leaf through small openings. The green part of the leaf is called chlorophyll. Chlorophyll's job is to catch the sun's energy to be used with the water and carbon dioxide. The food made by the leaves is sugar. Evergreen needles and cactus spines are leaves too. Draw a picture of three leaves we eat.

On November 2, during the class meeting, Jane led the children on a discussion about the environment. The class needed an alphabet for their classroom, and Jane thought it would be good for the children to make an environmental alphabet. The children agreed. The group talked about the new milk recycling program that Mrs. Boutilier had initiated. Mrs. Boutilier is a mother of one of the children in Jane's class. By recycling milk cartons, the students would be producing less garbage. Jane mentioned the Sackville landfill site, where all the local garbage is dumped. The children talked about picking up their own garbage. After a fifteen-minute discussion, each child picked a letter from the alphabet and set about drawing something on the letter card about the environment.

Most of the children automatically thought of an animal. Jane encouraged the children to think of something other than animals. In the end, twelve students drew pictures of animals. Some of the more outstanding ideas were: Bulldozer (uprooting trees), Environment (with a recycling plant, garbage bins and trees), Help the rainforest, Nature, Quit littering, Use a pump spray please, X-Don't let the animals become extinct, and You can help. These colourful cards were posted along the tops of two walls the next day.

On November 10, Jane taught the children about hardwoods and softwoods after their class meeting. She had

several samples of both kinds of woods. The children felt the wood and pressed their finger nails into the wood to feel the difference between the two types of wood. They could leave their fingernail mark in the softwoods, but not the hardwoods. This hands-on experience with hardwoods and softwoods would help the children remember the difference between the two types of wood. The children were given a written hand out about hardwood and softwood trees for their Tree Books. The children had to draw pictures on the hand out of coniferous (softwood) trees and deciduous (hardwood) trees. This activity marked the closing of the trees unit until December, when Jane would spend a few days teaching the children about Christmas trees and the Halifax explosion. Jane had started a short unit on mysteries. The children were learning about maps of Halifax. They were reading and creating mystery stories that took place in Halifax.

My last visit was on November 17, 1993. The children were now engrossed with mystery stories. However, I returned to meet with Jane on February 10, 1994. At this time, Jane explained that in December, the children had made paper, and had learned about Christmas trees.

Unfortunately I had to conclude my interviews with the children prior to these last two activities. The paper making and the Christmas tree debate, might well have changed the children's responses in the interviews.

During one of our discussions early in November, Jane and I talked about paper reduction and paper making in relation to the tree unit. From my observations and from the interviews with the children, I realized that the children were not making the connection between trees and their use of paper. Jane said that at her previous school, she with the help of other teachers had the students make paper. The whole school was making an effort to reduce their paper consumption. However, at this school she had not found enough time to develop a simple method of paper making, nor did she receive any help from the other teachers. Jane admitted that she would like to include paper making in her tree unit, but it was too big an undertaking for one person.

Jane approached Mrs. Boutilier and introduced her to another mother of a child in Jane's class. These two mothers volunteered to find an easy and efficient means of making paper. The women came into the class one day with blenders, rolling pins, plastic screens, water basins and old newspapers. Together they lead the paper-making activity. Each child made a piece of paper. The activity was a great success. A girl explains the paper making:

We Made Paper

Step one. First we tore little pices of newspaper and then we put the pices in a blender and then we blended them up then we put the moosh in a big bole and we took a plastic screen and dug the moosh flipped it over on the newspaper and put another newspaper on the top. Step two. We let the moosh sit for a second and then we took a

rolling pin and rold it out then we let it sit again and a little longer. Step three. Then we ired the paper with papertawle on top then we let it dry over night.

Jane's grand finale to her tree unit is a story about the Halifax explosion and the Christmas tree that the city of Halifax sends to Boston every year. The children learned the facts about the explosion. Jane also has a children's story about a young girl whose father and uncles are Christmas tree farmers. Jane facilitated a debate about the Christmas tree industry in Nova Scotia. They considered ideas like: Is the Christmas industry good? Should we have Christmas trees? Would you give up your Christmas tree to save a tree? Christmas trees provide an income for tree farmers. When Christmas tree farmers cut down their trees they plant more Christmas trees. The children wrote their own stories about Christmas trees and the Halifax explosion. From this girl's story one can identify some of the learning that took place:

Christmas Trees!

Every year at my house we get a Christmas tree. Every year 1,500,000 trees are sent to the states. The most popular kind of Christmas tree is the balsam fur. Each year we give Boston a tree. This year it was 50 feet high and had 1,800 lights! We give this tree to Boston because Boston helped during the Halifax explosion on Dec. 6, 1917. At our house we are going to get our Christmas tree next weekend. Some people bye fake trees because they are cheap, clean and people are not allergic to them.

When these writings were completed, Jane asked the children to take their tree books home to share them with

their parents. The children started and ended the Tree Book with their parents' involvement. Jane enclosed a comment sheet for the parents on the back covers of the Tree Books:

Today we are bringing home our Tree Books. Trees have been our theme all Fall. We have learned a great deal about trees and forests. Please look through these books with us. Ask us about trees. Let us know what you think.

The next day, the children returned with their Tree Books and read their parents' comments at the class meeting. Many of the children read the whole book to their parents. The children seemed very proud of their work. Sending the books home with the children, and having the children read their parents comments to the rest of the class is an excellent means of empowering the children and building their self-esteem. When the children share their knowledge and values about trees with their parents and classmates, they are becoming proactive environmentally.

The parents comments were all very positive and supportive; indeed, some parents mentioned that they learned something from their child's Tree Book. One mother wrote, "I really wasn't sure which trees were softwood and which trees were hardwood, but now I know the difference. I learned a little about trees myself." Another mother said, "I would like to take a walk in the woods to see some of these trees myself." This mother may take a walk in the woods, or she may not. But these statements offer confirmation that children can help their parents to know

more about the environment, and to become more active in caring for and appreciating the environment.

When I visited Jane in February, she was teaching the children about Black history in Nova Scotia. The children were writing stories in their own books about Black history. Jane said they would work on this unit for two or three months. In the spring she planned to return to the tree unit to teach the children about buds and seeds. She wanted to plant a tree in the school yard, but because of the vandalism around the school, she could not ensure the success of the tree planting project. She regrettably decided not to do it. Instead, she hoped to have a little tree seedling for each child to plant at home.

Summary

One of Jane's main objectives of the tree unit was to have the children become better observers of nature and the world around them. Jane used a variety of activities to help the children become better observers of trees and the natural world. The stories, discussions, creative writing and art work helped the children develop their awareness of trees. The rainforest video, stories, experiments, classifying and measuring helped the children gain knowledge about trees. Having the children share their Tree Books with their parents encouraged the children to take action to help trees and to help others know about trees.

The tree unit did little to engage the children in

solving problems and analysing societal and personal attitudes about trees. It did little to challenge the children to develop environmentally responsible behaviours and attitudes, such as: using less paper, using less toilet paper or spending more time outside with friends and family members.

The interviews with the children are presented in the next section of this chapter. The children's responses reveal the children's perceptions of tree unit and the environment. The children's comments provide a means of evaluating and improving Jane's tree unit so it may be more environmentally focused and more sensitive to children's learning capabilities.

Interviews with Children

The main purpose of these interviews was to understand how the tree unit affected the children and also to understand children's perceptions of the environment in general. Both the tree questions and the environment questions focused on the children's knowledge, attitudes and participation with regard to environmental education.

When I planned to interview the children, I had no intention of quantifying their responses; however, as I reviewed the transcriptions, many of the children had similar, sometimes rote answers to my questions. Jane thought the children might have been anxious to give me

answers they thought I wanted. The children's responses are included Tables 1-11, so as to provide an overview, a weighting of their ideas. Most of the answers reflect the things the children learned in the classroom, some of the answers reflect things they have learned elsewhere. I put these unique answers in bold print.

I have also included some of the children's more in-depth responses, which I feel reflect their understanding of the environment and their attitudes toward the environment. A few of the children had rather outstanding perspectives, so I attached a fictitious name to their responses to track them through their answers to the questions. With only twenty-five students, I did not notice significant differences between the boys' and the girls' responses, nor did I feel comfortable making assumptions about any differences with such a limited number of children. I discussed the children's responses with Jane and Anne Camozzi, an environmental education consultant; I have included some interpretations of the children's responses based on these discussions. These interpretations will be further elaborated upon in the following chapter. The answers are presented separately, with some reflections and then collectively summarised at the end.

Tree Questions

During the first interview, I spoke with the children individually and asked questions specifically related to the

tree unit. The question numbers correspond with the Table numbers.

- 1- What have you been learning about trees?
- 2- What did you like doing best, when you have been learning about trees?
- 3- Why do you think trees are important?
- 4- What do you think people can do to help trees?
- 5- What do you think you can do to help trees?

Table 1: What have you been learning about trees?

CHILDREN'S RESPONSE	NO. RESPONDING
Rainforest	9
Don't cut down trees	6
Trees make oxygen, My Tree Book, Different kinds of trees	5
Animal homes, Parts of trees, Function of tree parts	4
Trees give food	3
My favourite tree, Trees give shade, Deserts without trees, The Legend of the Birch Tree	2
Colours, Paper, Medicine, Clothes, Pollution, How trees help humans, Measuring, Big tree painting in the hall, Going outside, Trees stop erosion, Pictures, Trees stop floods, Trees look nice, Trees give us wind, Climbing trees, Books	1
TOTAL RESPONSES:	68

The rainforest video definitely had a strong impact upon the children. Almost half of the children mentioned that they had been learning about the rainforest. One boy said, "I learned that a lizard can run fast, I didn't know that snakes are that slow, and I learned that monkeys make those horrible sounds." Six of the children said they

learned not to cut down trees. One girl said, "There are some plants in the Costa Rica rainforest that live nowhere else in the world and if they cut it down they might become extinct before anyone can even start studying them."

Another girl whom I will call Julianne, explained her concerns about deforestation:

People are cutting down trees for fire wood, and if they keep cutting down trees, our city would look like a desert and we'll have sandstorms. All the dirt will turn to sand and our houses will be blown down by a sand storm. People don't even care that they're cutting down the animals houses and the animals have to find another place to live. We can do other stuff with trees, we can have them for wind.

A girl, who I call Grace, had similar concerns:

The trees stop erosion because their roots hold the ground. If the trees weren't here we would have lots of earthquakes and it would look like a desert and we would have sandstorms. The trees make water, sort of make water, and without the tree it wouldn't rain, and fish and salmon couldn't have new babies and then we would run out of food and we would die and other animals would die.

These children do not clearly understand the implications of deforestation. Unfortunately, they seem to have rather grave and pessimistic outlooks on the future. The children knew that if the Chipko people in India had not saved the trees, then their village would be destroyed by a wind storm. If the trees are cut down in the rainforest, then the rainforest animals will die. They logically thought that the ramifications of deforestation in India and Costa Rica (desertification and sandstorms), would be the

same in Nova Scotia. Julianne thought trees make wind and Grace thought trees make water. These erroneous understandings of ecology are prominent throughout the children's responses.

The children mentioned many of the things they had been learning about trees. They mentioned some reasons why trees are important. Some mentioned the stories and activities they had done in class. Clearly what was taught in class dominated the children's responses to the questions.

Table 2: What did you like doing best when you were learning about trees?

CHILDREN'S RESPONSE	NO. RESPONDING
Rainforest posters	11
Rainforest video	8
Writing stories, Collecting outside, Doing art	5
Measuring	4
Classifying sheet, My Tree Book	3
<u>The Legend of the Birch Tree, Climbing,</u> Stories read by teacher	2
Measuring my favourite tree, Word search, Writing about my favourite tree, Drawing My Tree Book cover, Leaf rubbings, Water experiment, Learning about maples, <u>Trees of Canada</u> story, Looking at trees, <u>The People Who Hugged the Trees</u> story,	1
TOTAL RESPONSES:	60

Eleven children said they liked the rainforest posters and eight children said they like the rainforest video. Five of the children said they liked going outside to

collect. One girl explained, "I liked going outside, because it better than staying inside." Five children mentioned the art work; five children talked about writing stories. A boy said, "I liked writing about trees...things that I was writing myself." Four children liked measuring trees. Two children mentioned climbing trees; this is the only response that reflects the children's experiences outside of school time. Only one boy mentioned the water experiment.

Two children referred to the story "The Legend of the Birch Tree." This story was read and then dramatised by the children prior to my visits. It is derived from a Native legend. In the story the trees in the forest are personified. The illustrations present Birch as pure white with eye shadow and lipstick. In the story Birch refuses to bow down and show her respect to Pine, the king of the forest. She has become too proud and vain. So when the wind blew, Pine reached over and scratched all of Birch's fine white bark and that is why birch bark is the way it is today. I was surprised with the children's comments about the story. A girl told me:

I liked doing the birch story. In the book it said that "a long time ago before people lived around, the trees used to talk to each other. And the wind is blowing that means that they are saying hello and talking to each other." Well it isn't true, but Birch had lipstick on and eye shadow.

A boy recounted the story:

The beautiful birch tree said that she wouldn't bow down to him, this guy, and he scratch her up and stuff and so that's how she got the needle marks. It was a good story.

I brought these responses to Jane's attention. She was surprised too, and said she would be more sensitive to the gender roles next year. For the dramatization of the story she had a girl be Pine and but she would make sure that boy would be Birch. Because it is a Native legend and because Jane has a Birch Bark reader for every student, she wanted to keep it in her tree unit. Generally the children liked most all of the activities in the tree unit, although they tended to prefer the rainforest poster and video.

Table 3: Why do you think trees are important?

CHILDREN'S RESPONSE	NO. RESPONDING
Oxygen	12
Animal homes	11
Shade	7
Take in CO2, Paper, Tree houses	4
Food	3
Firewood, Houses, Leaves to play in They stop floods, They stop erosion	2
They help with water, Stop deserts, Climbing , They help us breathe, Sap, Nice to look at, Syrup, Energy, Canoes , Make the world a better place, Pencils	1
TOTAL RESPONSES:	66

Most of the children's responses came from the "Trees are important" list that they made together at the beginning of the tree unit. Oxygen and animal homes were first and

second on the list which might account for so many children mentioning these two responses. Some of the children knew the right answer to the question: "trees stop floods", but did not necessarily understand the concept. As an example, one girl explained:

trees get their water because they are fresh and they drink their water like flowers...and they spread it underground...into the taps.

A boy said that "trees stop floods by sucking up water". And another girl said that "trees stop erosion", but when I asked her how, she replied, "I don't know."

The girl, whom I earlier called Grace, had another notion about the importance of trees:

What I think because of the dinosaurs, they have lots of trees there and all the trees were pushed over then the sun, the hot sun it dried up all the water and all the plants and they couldn't have any food then they tried to go off to another place but they couldn't because the hot sun it was too hot for them and they eventually died.

One boy, John elaborated upon his idea about cutting down trees:

People need wood to build their homes. But they shouldn't be taking that wood, they should be taking the broken, like the ones that got hit down by the lightning, or something. They should just be leaving the alive ones alone.

There were a few outstanding responses, which are in bold print. Four children mentioned tree houses; two students mentioned playing in the leaves; one student talked about climbing trees, and a boy mentioned that trees are used for making canoes. These responses are derived from

the children's personal and family experiences, not from school experiences. I find these responses to be very positive, as they reflect the children's appreciation of trees, in that they are playing and spending time with trees. One boy said, "at fall the leaves fall we can play in them. And we can make camps in the leaves."

Table 4: What do you think people can do to help trees?

CHILDREN'S RESPONSE	NO. RESPONDING
Stop cutting trees or tell people to stop cutting trees	17
Plant trees	10
Don't pollute or litter	7
Don't break branches, Don't pick bark	3
Recycle	2
Don't carve your name on a tree, Give a tree soil, Give a tree water, No forest fires, Use what you need, I don't know	1
TOTAL RESPONSES:	47

Seventeen of the twenty-five students were quite adamant about not cutting down trees. They felt that **telling** people not to cut trees down was as important as not cutting down trees. I noticed too, that there are a lot of "don'ts" as opposed to a more affirmative approach, as take care of trees, put garbage where it belongs, and use less paper. Only two of the children mentioned recycling.

One of the students said, "If they cut them all down, we'll have terrible floods." Another student said, "Don't

climb a tree because you could break off a branch and it could die." This boy had a more balanced perspective of how people could help trees, in his comment:

Stop cutting them down. Use what they need. Stop being cruel to them, like littering around them and ripping bark and breaking branches.

One girl addressed the issue of pollution and said, "Don't use a lot of gas, 'cause the smoke coming out from cars is making carbon dioxide and it's polluting. Make littler gas tanks." One boy said "After people cut them down you can plant more." The children obviously felt that people could be a lot more conscientious about helping trees. The children understood that the larger environmental problems of pollution and deforestation were destroying trees.

Table 5: What do you think you can do to help trees?

CHILDREN'S RESPONSE	NO. RESPONDING
Plant trees	14
Take care of trees	5
Tell people to stop cutting trees, Protect the rainforest, Tree house	2
Don't pollute, Bird feeders, Use of paper, Walk instead of going in the car, Help it grow, I don't know	1
TOTAL RESPONSES:	28

More than half of the children said that they could plant trees to help trees. A few of the children mentioned caring for trees. Because it was a more personal question,

the children offered personal experiences that they had with trees near their homes:

I planted one in my back yard yesterday. And there are these big bullies around my house...they litter and they knocked down one of our trees so I planted it.

We were going to grow an apple tree, but my mom threw the seeds in the garbage. But I did it again, I took the seeds out of an apple and I put the seeds in a cup and my mom got some soil for me and now it's about that big now.

I use my water hose a lot, to water trees. I don't pollute a lot. I can't drive a car.

Mrs. Boutilier's son was the only child to mention a bird feeder in this following comment:

In our backyard there's not many trees so we have some trees in our front yard and there not growing very good so we're going to transplant them into the back. There will be more shade in the back. We have a bird feeder. (ARE THE BIRDS HELPING THE TREES?) Kind of. Well the birds move the seeds around and plant some more.

This girl describes a particular tree she knew when she was younger:

When I was just a little girl we lived in this big apartment, and these people, they took the radio and put it out on the deck and played it full blast, and there was a tree right there, and they put it on every night; it woke me up and the tree it died because there was so much music every night.

In the following remarks, one can notice a rather sensationalized viewpoint about how this boy, John, could help the environment. One might question how much television he watches and/or marvel at his vivid imagination:

I really would like to go see the rainforest. And I'd like to go searching in a jeep with my dad. And I really would like to steer through the rainforest. I'd like to see all the animals, like the big elephants, and if the jungle people, the rainforest people had elephants that were trained I'd like to go riding on an elephant, around the rainforest. Well if you took out a bag of seeds and you kept on throwing some everywhere, and then more trees grew, we would save the rainforest.

The first question asked about the children's knowledge about trees and sixty-eight responses were provided. The second question asked about the children's preferences of activities in the tree unit and sixty answers were provided. This last question focused on the children's ability to help trees and only twenty-seven responses were given. These differences in the children's responses is a reflection of the emphasis of the tree unit. The tree unit tended to focus more on teaching the children information about trees and not as much on teaching the children about ways that they were connected with trees and ways they could help protect trees in their personal lives.

Environment Questions

During the second interviews, I spoke with the children in pairs, asking them five questions about the environment. These questions were less directly related to the tree unit, thus the children had to rely more on their own opinions.

- 6- If you were going to learn about the environment, what things would you learn about?
- 7- How do you learn things about the environment?
- 8- Do you think we live in a good environment?
- 9- How does that make you feel? Why?
- 10- What do you think people can do to make a better environment?

11- What can you do to make a better environment?

Table 6: If you were going to learn things about the environment, what things would you learn about?

CHILDREN'S RESPONSE	NO. RESPONDING
Trees	12
Garbage	7
Pollution, Don't litter, Animals	6
Not to pollute	5
Plants, Don't cut down trees	4
Clean air, Rainforest	3
Forest fires, Ozone	2
Clean water, Storks, Endangered species, Bulldozers, Recycling, Toilet bowls, Birds, Picking up garbage, Grass, Sun	1
TOTAL RESPONSES:	69

The children seemed to think that the environment was about trees, animals, plants and clean air. They do not mention anything about reducing our consumption, reusing materials or recycling materials. They do seem to recognize some environmental problems that humans have created. Although none of the children actually mentioned about how humans interact with the environment, they did acknowledge human impact when they responded with such answers as garbage, pollution, toilet bowls, forest fires and cutting down trees. One girl said, "I don't know what the environment is."

Table 7: How do you learn things about the environment?

CHILDREN'S RESPONSE	NO. RESPONDING
Learning at home	13
Mostly at school	10
Books	8
Teacher	7
Movies	4
Both school and home, Television	3
Write stories, Encyclopedia, At school	2
Tape recorder, Dictionaries, Work sheets, Class trip, Museum, Talk about it, People, Mostly at home	1
TOTAL RESPONSES:	52

Half the children mentioned learning things about the environment at home, from their parents, siblings, books, movies and television. One boy said:

Once I found...my brother, we found three birds, we kept one, he almost broke his wing, like ramming into a power line, and we helped him, we left him in our garage for a night and turned the heat on, and he could fly the next morning.

Another girl explained a conversation she had with her father while she was watching television:

On TV I saw a commercial, like it was a birthday party and everyone was wearing these gas masks. And I asked my dad what it was for and he said, "it was for your health." I said, "Well you might have to use them latter." He said "No you won't," but I didn't believe him. (HOW DOES THAT MAKE YOU FEEL?) Well everybody keeps telling me that you might have to wear a bit of gas masks. Well you don't look very nice. And you sort of look like an alien. You can't really blow out your candles.

Although many of the children mentioned learning about

the environment with their family, ten children said they learned about the environment "mostly at school." Seven children said they learned from the teacher. One girl remembered this incident, "Mrs. Hart waited for a minute and then she told us that forty football fields got cut down." These responses about learning "mostly at school" and from the teacher stress the need for environmental education programs in the classroom. The only boy who said that he learned about the environment mostly at home was Mrs. Boutilier's son. Eight children said they learned from books, which stresses the importance of sound environmental education resource materials.

These comments reveal that the children learn about the environment from their teachers, their families and the television. Based on these responses, perhaps educators and parents need to be more cautious about their statements recognizing how impressionable children can be.

Table 8: Do you think we live in a good environment?

CHILDREN'S RESPONSES	NO. RESPONDING
No	12
Yes	6
Sort of	4
I like it, Not that bad, I don't think about it much	1
TOTAL RESPONSES:	24

Almost half of the children said they thought we did not live in a good environment. Six of the twenty-five students said they thought we lived in a good environment. Four of the children were not so sure. The children's commented on why they felt we did not live in a good environment:

the ground is polluted and the air is polluted. We're putting gasoline in the lakes and the rivers.

No, because they're putting so much stuff in the toilet and it's going down into the harbour.

Well not that bad. We're getting big holes in the ozone and then we have to get all kinds of sun screen and when the sun screen is all gone then you have to throw out the old bottles. I say we live in a pretty good environment.

The children have developed negative and positive impressions about the present state of the environment based on information they have obtained in school, at home and from the media. Unfortunately more of the children felt we did not live in a good environment. The tree unit could have helped the children develop more positive outlooks by providing the children with affirmative action plans. By participating in more environmentally responsible behaviours, the children would sense that they are capable of improving the state of the environment. As an example, the children would know that they are protecting the ozone layer by using pump sprays as opposed to using aerosol spray cans.

Table 9: How does that make you feel?
 (in response to "Do you think we live in a good environment?")

CHILDREN'S RESPONSE	NO. RESPONDING
Sad	8
Good	4
It doesn't really matter to me, Not very good	3
I don't know, All right, Bad	2
Mad	1
TOTAL RESPONSES:	25

Eleven children felt sad, bad or mad about the state of the environment. Four children felt good about the environment. Three children said it did not really matter to them. Jane felt that the children might feel sad about specific events, such as tree cutting, but not necessarily sad about the bigger picture of the state of the earth. One girl said, "I don't like it when people cut down trees. It makes me feel sad."

Up here there was all a big forest. There was all kinds of trees up around over there and now there's all kind of houses.

Because everybody is cutting down trees to make more homes. They should make smaller homes for people, instead of spreading them out like 40 feet, then they build another house and another house and soon they build apartments buildings and smoke stacks and bridges.

In this statement, John mentions that he feels hopeless:

[I]f we don't have many trees, then we won't have many houses and paper. That makes me feel very very sad, and hopeless, because I can't do anything about it.

This boy talks about his own dilemma, but in fact, it is the root of most environmental problems. How can people have the material goods they want without destroying the environment? How can people live more harmoniously and less destructively with the earth?

The following comment is an excellent example of the kind of critical thinking that environmental education promotes:

They are cutting down lots of trees and burning garbage, a couple of days ago. And they were cutting down trees to build duplexes and big, big houses. But they kind of go over board. They kind of build a big enough one and then they get carried away and they build even bigger, bigger houses. (HOW DOES THAT MAKE YOU FEEL?) Sad and happy, because we might move into one of the big houses. And I feel sad because the trees get cut down. If I ever move into one, there might be no trees in my backyard to build a tree house or camps in woods because there might be just houses behind.

This boy makes the connection between our actions (building homes) and our impact on the natural environment (cutting down a forest). The tree unit could have done more to encourage this kind of problem-solving.

Table 10: What do you think people can do to make a better environment?

CHILDREN'S RESPONSE	NO. RESPONDING
Stop littering, Plant more trees	8
Stop polluting	6
Pick up garbage, Recycle	5
Stop cutting down trees	4
Tell people not to pollute	2
Tell them to stop cutting down trees, Clean up leaves, Never use the toilet, Take the bus or walk instead of the car, Stop oil spills, Don't fish too much, Tear down industrial parks, Reduce, Lay in bed all day, Never use the toilet, Don't put dirty stuff down the drain	1
TOTAL RESPONSES:	46

The children seemed to believe that if people stop littering and polluting and if they plant more trees, they would be helping the environment. This child was the only one to state that cutting down trees was all right:

People are making air pollution and there are a lot of smoke stacks and they are also littering on the ground, but cutting down trees, you're all right with cutting down trees because there are a lot of trees and they don't do it that much.

One girl said, "Try not to have the bathroom tunnels go to the ocean." Unique answers are reflected in the following comments:

What they should do is they should like go to jail if they get caught littering, so you won't litter any more. Every tree you cut down, plant one beside it or something.

You shouldn't just take it in your hand and when you're playing, pretend you didn't drop it and really drop it.

The following comment demonstrates how personal and societal attitudes and choices are often in conflict with the healthy existence of the environment:

Don't make factories so big. Tear down any industrial park. Because there are a whole bunch of trucks there that let out smoke and there's factories. But not the Coca-cola factory because they give us pop.

Is this child prepared to give up pop to stop the pollution created by the industrial parks?

In general, the children's advice is constructive. Many of the responses were straightforward answers, but the children tended to "oversimplify" the problem and did not necessarily take all aspects of the problem into consideration. The tree unit could have guided the children to discover simple and specific changes they could make in their own lifestyles that would lessen their personal impact on trees and the environment. The children could learn to use paper more conservatively, to use less toilet paper or to bring their lunch to school in containers that can be reused, as opposed to disposable paper and plastic bags. By making personal changes, the children could feel personally responsible and proud about solving environmental problems.

Table 11: What can you do to make a better environment?

CHILDREN'S RESPONSE	NO. RESPONDING
Pick up garbage	8
Plant trees	6
Recycle, Reuse	3
Don't litter	2
Avoid using the car, Play in the leaves, Tell people to stop cutting down trees, Compost	1
TOTAL RESPONSES:	26

Picking up litter was the most popular response, though one girl mentioned the possible dangers of picking up garbage:

My mom doesn't let me go around and pick up litter off the ground, even with plastic gloves.

We can sometimes help the janitors clean up around here, because we know how much garbage there is outside. And maybe after the garbage is all cleaned up then our earth would look a little better.

Some of the children felt that telling people how to protect the environment was something they did:

Tell my friends not to litter. Tell my mom and dad don't pollute.

I saw this guy and he littered and I said, "Hey you better put that back in the garbage. It's not good for the environment." So he picked it up and put it back in.

I try to do stuff about it. Tell my friends not to litter, sometimes you can't cause you're only a kid.

The children often mentioned things they do at home and some things they did with their parents:

I usually recycle my boxes to make crafts out of them.

Sometimes I throw my peels on the ground so they could make like a garden or something and my mom says, "Don't do that, put it in the garbage or in the front row." And I say, "Can I bury it?" and she says "OK, then that's better."

I have this little jewellery box and last year I took a little piece from my Christmas tree and I put it inside and now whenever I open the box, the room smells like pine.

Where I live, I don't even think it is a good place even if there are lots of trees, but if you walk there's a brook but there's all kinds of car parts and garbage laying around. Before, me and my brother found all kinds of pop bottles. And my dad every summer sometimes he goes and cleans up but there's more garbage that comes along. I could help my dad get a lot more garbage out.

Me and my friend, we had a hide out across the street, and it's all forest and rock, and they took the rock and cut down all the trees...and they came and chopped down they trees and our hide out was gone.

Once again, John had a sensational answer:

Before the oil boats get out, the tar ships, if I was going out on the oil boat, I would say stop the ship and I would get off it and tell them not to do that, because it hurts the whales, and the sharks and it hurts all of the sea creatures. (WHEN THERE IS AN OIL SPILL?) We're not only important, they're important too and we need them to make shows and we need them to make great sea creatures.

Summary

In the first set of interviews, the children seemed to reiterate what they had learned in the classroom about trees. They shared some of their personal experiences with trees. From the children's responses, it appears that the tree unit taught the children a lot facts about trees, and promoted a "save-the-trees" attitude. The children,

however, did not appear to learn as much about how they could help trees in their day-to-day routines. They seemed to have difficulty understanding some of the ecological concepts associated with trees.

In the second interviews, the children tended to focus their ideas about the environment on trees. Many of the children felt they learned most about the environment at school, although many of them referred to things they learned and did at home. Almost half of the children said they did not feel good about the state of the environment. The children tended to provide "oversimplified" solutions to environmental problems, which might suggest that they did not understand the complexities of such problems. And again, the children did not know of many things that they could do in their own lives that would lessen their impact upon the earth. The implications of the children's responses will be further discussed in the next chapter.

Environmental Initiatives in the School

Two major initiatives took place in the school this fall; the first was a milk carton recycling program initiated by a mother volunteer and the second was an teacher in-service day that focused on the environment. These two initiatives are very important because they will offer support and direction to environmental education that is taking place in the classrooms. These two initiatives

will be discussed in this section.

Mrs. Margaret Boutilier, a mother of one of Jane's students, approached Mary Meads, the school principal about initiating a milk carton recycling program in September. She made arrangements to visit every class in the school to explain the recycling process. Each student was asked to rinse out their milk carton and to place it in a special bin. Later, two assigned Grade six students would rinse the cartons and place them out to dry. Margaret supervised all of this. Then, once a week, another parent would pick up all the milk cartons and deliver them to the nearby recycling depot. The milk cartons were then sent down to the southern United States, where they were made into fine white paper and envelopes.

Margaret spent a great deal of time organizing this program. She was pleased to be so well received at the school, and she was impressed with the children's enthusiasm. She was rather shocked because of the lack of participation by other parents in the community. A Blue Bag recycling program was started up in the community only the year before, so for many community members, recycling seemed to be a new practice. She asked parent volunteers to help with the milk carton program, but she was shocked when only one parent responded to be the delivery person.

Margaret was also one of the two mothers who organized the paper-making work shop for Jane's class. Jane would not

have been able to include the paper making work shop in her tree unit if it were not for the help of the volunteer mothers.

On November 12, there was a scheduled school in-service program. The topics for the in-service day were decided by a committee of teachers. Two of the teachers had attended a school board global education in-service earlier in the fall. The teachers chose to focus on self-esteem in the morning and environment in the afternoon. For the afternoon session, Margaret Boutilier and I were invited to attend and contribute. Margaret explained to the teachers the milk carton recycling program. She also made the teachers aware of the education program that the recycling depot has available for class visits.

I was invited to attend the in-service and spoke briefly about the main objectives of environmental education: awareness, knowledge, attitudes, skills and action. The staff then divided into smaller groups to brainstorm about how the school could become more environmentally responsible and active.

Some of the ideas that were discussed in one of the small groups were: recycling paper, garbage pick up around the school, ways to use less paper (use the black board more, photocopy less, photocopy on both sides) use cloth or fabric to cover the bulletin boards as opposed to paper, use newsprint when possible instead of bleached paper, become a

scent-free school, establish a gardeners' club (plants for inside the school, because of the vandalism, it would be risky to plant outside), off-site compost, initiate "garbage-less" lunches and get involved with the SEEDS (Society, Environment and Energy Development Studies), "Learners in Action Program". This SEEDS program provides direction for schools, who wish to become more environmentally active. Awards are presented to schools across Canada, who initiate environmental projects.

The small groups, after twenty minutes reassembled into the large group and shared their ideas. Some innovative ideas were: inform parents of recycling program and environmental activities of the school, deal with wasted food in the cafeteria, student trash cops or a clean team, individually responsible for dishes in the staff room, Earth Day celebration, after school environment club (possibly difficult with most children taking the bus home), reuse things for art projects. At the end of the sharing session, three goals were established. First, there would be a sign-up poster in the staff room on which teachers could publicize the specific environmental issue that their class would be studying. Second, two teachers volunteered to look into the idea of reducing the litter around and in the school. And third, Jane and four teachers as well as Margaret Boutilier, volunteered to research the possibility of becoming involved in the SEEDS Learner in Action Program.

Summary

This in-service is important because it was planned and executed by the teachers. They were reacting to the perceived needs of the school community. The goals that they formulated can help to promote and implement environmental practices throughout the school. It is important for teachers and schools to promote and model sustainable lifestyle practices. But is also important that these practices are not imposed on the children without the children first understanding how and why these practices are helping to improve the present state of the environment. In this way, the children will become better motivated to be environmentally responsible, because they understand and feel that they can make a difference. Because Mary Meads let the teachers decide what would be discussed at the in-service and because the teachers collectively developed the environmental goals for the school, I would suspect that the teachers would treat the children in a similar empowering manner when these goals are implemented.

I agree with such "grassroots" in-services to promote environmental practices in schools. Teachers and parents are meeting specific the needs of their community. However, I also feel that teachers need to be more thoroughly in-serviced on the objectives and methodology of environmental education. This issue of teacher training will be discussed in a later section dealing with the barriers to

environmental education in the formal education system.

This chapter has presented a description of Jane's tree unit and has identified some of the achievements and limitations of her program from an environmental education view point. The responses of the children that were included in this chapter are reflection of the strengths and shortcomings of the tree unit. The responses also reflect the children's limited perceptions of environmental problems and the environment in general. The last section in this chapter described the teacher in-service that took place at Jane's school, whereby the teachers established goals to become a more environmentally responsible and active school. This teacher in-service and the initiatives that result from it can support Jane and other teachers in their efforts to implement environmental education in their classroom. These initiatives can also encourage the children to be more environmentally responsible and to adopt sustainable lifestyle practices within their own lives. The following chapter will further discuss the findings of this case study.

CHAPTER FOUR: DISCUSSION

Jane designed a very creative and informative tree unit, as can be seen from the description of the classroom activities and the responses of the children. She has fulfilled her objectives: the children have become better observers of trees and the world around them, and they have learned many facts about trees. However, Jane would like her tree program to be more environmentally focused.

With reference to the environmental education literature presented in Chapter One, this chapter analyses the achievements, limitations and environmental education possibilities of Jane's tree unit. The children's comments will be discussed, revealing how they were affected by the tree unit and how they perceive the environment. I will also outline the barriers that restrict Jane from implementing environmental education in her classroom. The questions that were posed in the opening chapter will be answered:

1. How is environmental education being infused into the elementary curriculum in Nova Scotia?
2. What impact does environmental education have on the elementary students?
3. What are the barriers to environmental education in the classroom and how can they be overcome?

In order to improve environmental education in the

classroom it is important not only to identify the barriers to infusing environmental education in the classroom, but also to seek solutions to overcoming these barriers.

Infusing Environmental Education

How is environmental education being infused into the elementary curriculum in Nova Scotia?

To answer this question, I will discuss some of the achievements of Jane's tree unit in relation to the literature about the objectives and methodology of environmental education. I will use the five objectives of environmental education from the Tbilisi Declaration (UNESCO, 1977) to comment on Jane's tree unit: awareness, knowledge, attitude, skills and participation. Although these objectives are interconnected, for the sake of clarity, I will focus on each one individually. It is important to note that Jane was not familiar with these environmental education objectives prior to planning the tree unit. The fact that Jane infused an environmental focus into the tree unit is mainly due to her personal values and her commitment to the environment. She has no formal training in environmental education and she is confronted with many other barriers in her attempt to infuse environmental education into the curriculum. By using these objectives, Jane and I were able to recognize that although environmental education was successfully implemented into

certain aspects of the tree program, there were also other opportunities where environmental education could have, and perhaps should have been included in the tree unit.

Awareness- to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

Jane is an ideal role model for anyone who wishes to become more aware of and more active in caring for the natural environment. Having a positive role model is essential in developing environmentally concerned and responsible individuals (Cohen, 1992; Greig et al., 1989; Hungerford & Volk, 1990).

Jane focused on developing the children's awareness and appreciation of trees. She used a variety of teaching approaches and practical learning activities in her tree unit (UNESCO, 1977). She incorporated many subject areas into a thematic unit on trees (Cole, 1992). Jane used stories, creative writing, art projects, drama, arithmetic, and science experiments. These activities presented trees as being very beautiful, fascinating and special. Jane made arrangements to take the children into the woods by the school for direct experiences in the natural world (UNESCO, 1986). She provided the children with activities to do with their favourite tree at home. This favourite tree helped the children develop a connection between their personal lives at home and their lives at school. All of these experiences heightened the children's awareness and their

knowledge about trees, but not necessarily their awareness about the interconnections between trees, humans and the environment. Environmental education would address an awareness about trees specifically, as well as an awareness of the environmental problems pertaining to trees and the connections between humans and trees. When we reviewed the children's responses, these shortcomings in her tree unit became more apparent. The children were not fully aware of their role in causing and solving environmental problems.

Knowledge- to help social groups and individuals gain a variety of experiences in and acquire a basic understanding of the environment and its associated problems (UNESCO, 1977).

Jane taught the children a great deal about trees. She used a variety of methods to teach the children about types of trees and how trees function. There was information about roots, stems, leaves, bark, the Chipko people in India who saves the trees, the Costa Rica rainforest, paper making, and the Christmas tree industry in Nova Scotia.

At the beginning of the tree unit, Jane and the children made the "Trees are Important" list. This list stressed that trees are important for people's health (oxygen, food, shade and medicine) for people's needs and desires (paper, beauty, houses and furniture) for animals' homes, for preventing erosion and for making water. However, trees are also important economically, socially, politically and spiritually. Jane's unit hardly addressed these other aspects of trees.

Assessing the program, Jane and I noticed that the tree unit provided little information about the environmental problems associated with trees. The tree unit could have provided a more holistic representation of deforestation problems, viewing the problems from an ecological, economic, political and social perspective (Caduto, 1985). The children could have discussed how people, themselves included, often waste paper products and tree products, thus causing excessive amounts of trees to be cut down. The children could have discovered more about local sustainable and exploitive forestry management practices. Many people in Nova Scotia earn a living from the forest industry: contractors, cutters, machine operators, foresters, private woodlot owners, and government officials. And other people earn a living by selling tree products locally, nationally and internationally. In Nova Scotia and throughout the world, biologists and environmentalists have been working with people in the forestry industry to develop and implement more sustainable forestry operations (Camozzi, 1990). The forestry industry is becoming more sensitive and making better efforts not to destroy wildlife habitat when they cut trees. Within the tree unit, Jane did not emphasize the complexity of the tree-cutting problem, nor did she challenge the children to be critical thinkers or problem solvers with respect to the environmental problems associated with trees (UNESCO, 1977).

Early on in the tree unit, very simplified versions of the tree cutting problem were presented. When Jane read the People Who Hugged the Trees (Rose, 1990), the children learned about people saving trees from the tree cutters in India. When the children watched the rainforest movie, they learned about the exotic animals living in the rainforest in Costa Rica and about people cutting down the rainforest trees. Both these resource materials provided information about a specific incidence of deforestation, but they did not include, nor did Jane include, any information about ownership, empowerment or personal lifestyles of people (Hungerford & Volk, 1990) in relation to the deforestation problems. Both the story and the video tended to focus on the environmental dysfunction of deforestation rather than on a systematic knowledge of the interrelated causes of deforestation (Rejeski, 1982). The video showed rare and exotic animals and trees, but it made no mention about land distribution between the rich and the poor people in Costa Rica. Often the wealthy people in developing countries own most of the land and destroy the forests to plant cash crops for exporting. The poor people, because they own so little land, are usually forced to destroy the forests to plant subsistence crops for their families. The deforestation problems could also have been brought into the context of the children's lives. Jane made no distinctions between the forestry problems in Costa Rica and the forestry industry in

Nova Scotia.

Jane realized that the curriculum did not articulate the interconnections between trees, people and the environment. Although Jane never actually said, "Don't cut down trees", the materials she used, the rainforest video and the story The People Who Hugged the Trees, promoted this kind of thinking. Thus the children were lead to believe that cutting down trees, regardless of the situation or procedure, was "bad"; they were not sufficiently informed of the many factors associated with tree cutting. The children learned about tree cutting in India and Costa Rica and they seemed to have little idea about local tree cutting. The children assumed that local tree cutting was the same as tree cutting in Costa Rica or India. They were not informed that trees can be successfully managed as a renewable resource, with the environment and people's needs in mind. Near the end of the tree unit, Jane challenged the children to think critically about the different viewpoints and issues related to the Christmas tree industry in Nova Scotia.

Jane said she had omitted a problem-solving approach to trees for several reasons: her lack of knowledge of environmental education methodology, no local resource materials, limited planning time and her uncertainty as to how children might react to such complex and sometimes overwhelming environmental problems. We were both concerned

about how to present environmental problems to children. We would not want the children to become overwhelmed or frightened by the problem, but we would want them to sense the complexity of the problem and to feel that they could make some contribution to solving the problem. Given environmental education training and local resource materials, a teacher could cope better with this dilemma. This sensitivity to the children's perceptions is further discussed in a following section about "Children's Perceptions of the Environment."

The tree unit definitely provided the children with a lot of knowledge about trees. However, in order for the tree unit to be more environmentally focused, it could have provided the children with a more comprehensive knowledge of the importance of trees, and the extensive causes and problems associated with local as well as international tree-cutting. The tree unit could have helped the children recognize how their personal lifestyles affect forests. With this awareness and knowledge of their personal impact, the children might well be encouraged to adopt new attitudes and behaviours that would lessen their impact on trees and the environment.

Attitudes- to help social groups and individuals acquire a set of values for the environment and motivation for actively participating in environmental improvements and protection (UNESCO, 1977).

Consciously and unconsciously, Jane made the children aware of her personal and societal attitudes about trees,

through the resource materials she included and omitted, and through the means by which she presented her program.

Anyone would recognize that Jane was concerned with developing personal, social and environmental responsibility (Greig et al., 1989), not only in the way she lived her own life, but also in the way she dealt with her students and other staff members. Jane always seemed to have a very positive and empathetic relationship with the children. She facilitated harmonious group dynamics and respect for individuals in the class. It was obvious that Jane valued and appreciated people and the natural by the way she presented the tree unit and by the way she dealt with the children and the environment. The children seemed to adopt Jane's positive values towards people, trees and the environment although they did not necessarily reflect on their personal values.

The "Trees are Important" list taught the children that trees are valuable to people mostly for anthropocentric reasons: oxygen, food, houses and medicine. The People Who Hugged the Trees story promoted a more biocentric reason: respect the intrinsic values of trees (Greig et al. 1989). Different people and different social groups often have conflicting values about the environment. With a more holistic awareness of the differing values that individuals and societies uphold about trees, the children may have been able to understand that environmentally responsible

behaviours require people, the children included, to develop different values from the ones they have learned (Randle, 1989). With this understanding, the children then may have realized a need for them to change some of their behaviours and attitudes. The children may learn to value wood products more, and would not scribble on desks or doors. They may be encouraged to reduce their use of paper, paper lunch bags or toilet paper.

The tree program taught the children to protect and value trees. The children shared the values they had learned in school with their parents when they shared their Tree Books. But the tree program did little to help the students understand the reasoning or feelings behind societal and personal environmental values. What people do can often conflict with the values they say they uphold. Many people, for example, say they are concerned about protecting the forests; yet many of these same people frequent fast food restaurants and shops, and they end up throwing excessive amounts of paper packaging and cups in the garbage after they eat. The program could have challenged the children, more than it did, to improve their awareness, analysis, modification, and implementation of their own values (Iozzi, 1989).

Skills- to help social groups and individuals acquire the skills for identifying and solving problems (UNESCO, 1977).

The tree unit helped the children to acquire many

different skills. The class meetings and the Tree Book encouraged the children to develop their communication skills. The group work, class meetings and the sharing of stories helped the children develop social skills. The celery and carrot experiment, the hardwood and softwood testing, the classifying and the tree measuring helped the children develop numeracy, scientific and research skills (Nova Scotia Round Table on Environment and Economy, 1993). As was noted earlier, the program could have challenged the children to develop problem-solving skills with regard to environmental problems and trees.

Participation- to help social groups and individuals with an opportunity to be actively involved at all levels in working toward resolutions of environmental problems (UNESCO, 1977).

Participation and action projects are aimed at improving the environment and life in the community (UNESCO, 1985). Jane agreed that this proactive involvement is definitely "feasible and advisable", although often difficult for one teacher to orchestrate. The tree program fostered this proactive involvement by having the children share some of the tree activities (their favourite tree, measuring their favourite tree) and their Tree Book with their parents and friends.

Jane had hoped to plant a tree with the class in front of the school, but because of the vandalism around the school property, she felt that their efforts might be destroyed. She wanted to ensure the success of an action

project, so as to encourage the children to participate more. Her plan in the spring was to provide each student with a maple seedling to plant at home. The paper-making session was an attempt at an action project, although the children, once again had difficulty making the association between paper, trees and reducing paper in their personal lifestyles.

Jane's tree unit included a lot of information about trees. It focused on the functioning of trees, individual tree parts, the beauties of trees and the issue of tree cutting. In order for the tree unit to be more environmentally focused, it would need to included a more holistic and realistic representation of the connections between trees and humans. How do people's lifestyles affect trees? The social, ecological, economic, political and spiritual aspects of trees could have been explored. The forestry industry in Nova Scotia could have been more thoroughly examined. The different perspectives of the tree-cutting problem, both local and international, could have been discussed, thus challenging the students to recognize the complexities of environmental problems and to discover their own impact and their personal contribution to alleviating environmental problems. Jane and I agreed that the tree unit could have done more to challenge the children's attitudes and develop their confidence in their ability to make a difference (Nova Scotia Round Table on

Environment and Economy, 1993).

Jane felt she could make some minor adjustments in the tree unit, but in order to make an effective environmental education unit about trees, Jane felt she needed more planning time, local resource materials, and more support from teachers, parents, community, and curriculum advisors at the school board and provincial level. These barriers to environmental education will be elaborated upon when answering the question about barriers to environmental education.

The effectiveness of the tree unit can be judged by how it was implemented but also by how it influenced the students. The next section discusses the children's responses to the interview questions.

Impact on the Children

What impact does environmental education have on the elementary students?

In response to this question, I will present Jane's comments about the children's responses. I will discuss the comments made by the children which reveal what the children liked about the tree unit. However, it is apparent from the children's responses, that the tree unit was not the only factor influencing their attitudes and knowledge about trees and the environment.

Many comments made by the children made me realize that

the tree unit and any program that attempts to incorporate an environmental focus, need be sensitive, both in design and implementation, to children's learning capabilities, perceptions (Rejeski, 1982), feelings and personal experiences. One child said, "If they keep cutting down trees, our city will look like a desert and we'll have sand storms and our houses will be blown down." Does this child realize that certain parts of the world are more susceptible to desertification than others? Is she aware that desertification would occur over a long period of time, if it happened at all in Nova Scotia? Or does she fear that within a few years her house might be blown down by sand. Young children tend to be very egocentric and have difficulty displacing themselves temporally, perceptually and affectively (Rejeski, 1982). Therefore, this chapter will also address: where children learn about the environment and children's perceptions of the environment.

Jane's Comments

In his studies, Rejeski (1982) discovered that trees were of great importance for young children. Jane was wise in choosing trees as a theme; the children were enthusiastic about the program. In class Jane recognized that the tree unit was influencing the children. The children demonstrated their feelings and knowledge about trees by their comments and their writings. They were approaching Jane more often to tell her about their tree observations

(UNESCO, 1986). Jane was impressed that the children had retained so much information about trees. She felt the children learned so much because of the intensity of the program and because the children did so many personal writings for their Tree Books. She realized that the children were preconditioned by their home environment and by previous schooling and social experiences; thus each child would react differently to the tree unit. Jane questioned how long the effects of the tree unit would last.

What the Children Liked About the Tree Unit

When I asked the children "What have you been learning about trees?", nine of the twenty-five students said the "rainforest" and six students said, "Don't cut down trees." When I asked the children what they liked learning about most, eleven children said, "rainforest posters" and eight said, "rainforest video." The children said they liked many of the tree activities. Only one child mentioned the vivid water experiment with dye and plant roots. None of the children even mention their favourite tree. But almost half of the children liked the rainforest video and the rainforest posters more than the other activities.

Why did almost half the children mention the rainforest video? Were the children impressed by the rare and exotic animals they had never seen before? Are the children becoming so accustomed to being entertained by television that they are not as interested in reading and writing

stories and going outside? What did the children learn from such a video?

These questions are worthwhile considering, especially since the video is a relatively poor environmental education resource material. The rainforest video was produced by National Geographic and Chevron. I would question the hidden agenda (Iozzi, 1989) of Chevron being involved with a video about environmental preservation, when oil companies tend to be responsible for so much environmental degradation. This video focused on the animals of the rainforest and on deforestation. It focused on the environmental dysfunction of deforestation as opposed to providing information about the causes of deforestation (Rejeski, 1982). It failed to address the connections between the social, cultural, ecological, economic or political factors involved with deforestation in Costa Rica. The video included information about the rainforest, but it did not include any ownership, empowerment or values analysis (Hungerford & Volk, 1990) with respect to the viewers and deforestation. The video did not mention how people in Nova Scotia could help preserve the rainforest. It did not demonstrate how the high standards of living in North America impact on the people and the forests in Costa Rica and other developing countries. It is little wonder then that the children concluded that "Don't cut down trees" was the logical and only solution to the deforestation

problem. The video lead them to believe that such a simple solution would solve the problem.

Jane used this video because it is was so powerful and so well done. She could not find any local materials that were as powerful. The lack of accessible, comprehensive and local "environment" resource materials is one of the barriers facing environmental education in schools and will be discussed further.

Where the Children Learn About the Environment

When I asked the children, "Where do you learn things about the environment?" only four children said they learned about the environment from movies and three children said they learned things from television. Thirteen of the twenty-five children told me about their personal experiences at home. They often mentioned spending time in the natural world with their parents, siblings and friends. These people are overtly and covertly teaching the children about the environment and about how humans interact with the environment (Hungerford & Volk, 1990), as can be seen in this girl's comments:

Sometimes I throw my peels on the ground so they could make like a garden or something and my mom says, "Don't do that, put it in the garbage or in the front row." And I say, "Can I bury it?" and she says, "OK, then that's better."

Some of the children talked about working in the garden with their parents. A few children talked about special places in the woods near their home: "Me and my friend had a secret

hide out across the street and it's all forest and rocks." Four children mentioned tree houses; only Mrs. Boutilier's son mentioned compost, canoes and bird feeders, showing a more advanced awareness of environmental practices. Being raised in an environmentally sensitive social environment develops a child's appreciation and concern for the natural environment (Hungerford & Volk, 1990). Although many of the children mentioned things they had learned at home about the environment, seven of the children said they learned things from the teacher and ten of the children said they learned about the environment "mostly at school". If this is the case, then schools need to ensure that they are presenting effective environmental education programs at all levels, as well as implementing and maintaining practices which reflect the principles of environmental education (Nova Scotia Round Table on Environment and Economy, 1993). Schools must also realize that children can teach their parents and community about environmental concerns and practices and about other things they learn at school (Bonnevillie, 1994).

Children's Perceptions about the Environment

The interviews also reveal that the children have limited perceptions and understandings about trees, the environment and environmental problems (Rejeski, 1982). When Jane, Anne and I reviewed the interview transcriptions, we found four common traits about the children's perceptions: the children's limited ecological knowledge,

the children's "oversimplification" of environmental problems, the children's impressions about the state of the environment, and the children's lack of ideas about how they could participate to help improve and protect trees and the environment. These four traits will be discussed.

Ecological Knowledge. The children seemed to have a limited knowledge of the ecological concepts associated with trees and the environment. Children at this age tend to be very egocentric (Rejeski, 1982). The children were more inclined to understand specific things about the trees, but seemed to have difficulty recognizing relationships between trees and other living and non-living things (Rejeski, 1982).

In their response to "What have you been learning about trees?" and "Why do you think trees are important?" the children provided me with many facts about trees, sometimes rote answers. But in some of their more lengthy comments it became apparent that the children did not understand tree ecology. One child said, "If trees weren't here we would have earthquakes." Yet another said, "Trees get their water because they are fresh...and spread it underground...into the taps." These children do not thoroughly understand how trees function in relation to the water cycle. They do not understand how and why earthquakes occur. This limited capacity to understand ecological concepts may explain why some of the children tend not to have very realistic

impressions of environmental problems and the state the environment. The tree unit did not focus on the complexities of environmental problems.

Environmental Problems. Many of the children did not fully understand the complexity of environmental problems. As was already noted, the curriculum was partially responsible for not sufficiently informing the children. The children definitely had a pro-environment approach to helping trees and helping the environment (Voelker & Horvat, 1976). However, they rarely considered a balance between human needs and the preservation of the environment. Only this one girl made mention of the connection between our wants/needs and the environment:

Tear down the industrial park because there are a whole bunch of trucks there that let out smoke and there's factories. But not the Coca-cola factory because they give us pop.

Even though this girl made the connection between human wants and the environment, I am not sure that she recognizes that she is personally responsible for polluting the air by drinking pop. Would she be prepared to stop drinking pop to help prevent air pollution?

Most of the children were quite adamant about "Don't cut down trees," as the solution to any deforestation problem. The boy I named John had sensationalized and almost romantic solutions to the deforestation problem. He wanted to drive a jeep through the rainforest with his dad and throw seeds around. He also thought that "people need

wood to build homes...but they should be taking the broken ones...and leaving the alive ones alone." John seemed quite confident and satisfied with the rationale of his proposals. He clearly had little notion of the reality of tree-cutting problem.

It was apparent that many of the children had a tendency to "oversimplify" environmental problems (Voelker and Horvat, 1976). One student said, "If you see somebody trying to cut down a tree, tell them to stop, and plant another tree if they cut it down." Another child said, "Try not to have bathroom tunnels go to the ocean." The children did not take into consideration the economic, social, political or ecological dimensions of environmental problems. They seemed to have little idea that each situation could have certain ramifications with respect to the way we live.

Children's Impressions. Fifty percent of the children said they felt we did not live in a good environment; only twenty-four percent of the children said they felt we lived in a good environment. One child said, "I don't think about it much." How are these negative and positive impressions about the environment developed? Teachers, parents, schools and adults in general need to realize that children develop their impressions of the world through their personal experiences and by the information that they obtain from people and resources available to them. With escalating

concerns about the state of the environment, adults need be sensitive to how they are influencing children's impressions of the earth. As seen earlier, children tend not to have a realistic impression of environmental problems and they can easily develop optimistic or pessimistic views of the future state of the planet. This point is illustrated in the following comment by one of the children:

On TV I saw a commercial, like it was a birthday party and everyone was wearing a gas mask. And I asked my dad what it was for and he said, "it was for your health." I said, "Well you might have to use them later." He said, "No you won't", but I didn't believe him. (HOW DOES THAT MAKE YOU FEEL?) Well everybody keeps telling me that you might have to wear a bit of gas masks. Well you don't look very nice. And you sort of look like an alien. You can't really blow out the candles. I don't know.

This child is uncertain as to who and what she should believe about the present and future state of the environment.

First I asked the children, "Do you think we live in a good environment?" and next I asked them, "How does that make you feel?" Four children said they felt good and eleven children said they felt sad, bad or mad. John said, "If we don't have trees, then we won't have many houses and paper. That makes me feel very very sad and hopeless, because I can't do anything about it." Environmental education needs to be sensitive to children's sad, bad, mad and hopeless feelings. One way in which environmental education encourages children, and adults for that matter, about the future state of the planet, is to provide

individuals and groups with an opportunity to participate actively in working toward resolutions of environmental problems (UNESCO, 1977). This lack of participation was a shortcoming in the tree unit and will be discussed in the next section.

Participation. Because the children did not have a realistic perspective about environmental problems and because the children did not clearly understand their relationship with trees and the environment, they therefore had few solutions as to how they could participate to help trees and the environment. When the children were asked, "What do you think you can do to help trees?" and "What do you think you can do to help the environment?" they had very few ideas. There were 68 responses for the question, "What have you been learning about trees?" and only 28 responses for the question, "What do you think you can do to help trees?" This is in part a reflection of the tree unit curriculum.

Fifty-six percent of the children said they could help trees by planting more trees. When they were asked how they could help the environment, 36% of the children said they could stop littering and 24% of the children said they could plant more trees. Often the children said "tell" people what to do as opposed to actually "doing" something themselves. One boy said, "Tell my friends not to litter. Tell my mom and dad don't pollute." Another child said, "I

try to do stuff about it. I tell my friends not to litter, sometimes you can't cause you're only a kid."

Three of the children said reuse and recycle. But the children seemed to have few specific and affirmative action ideas about how they could help. Children could use both sides of the paper, use less toilet paper, carry a handkerchief instead of using a paper tissue or spend more time in the natural world. Challenging the children to devise some affirmative action approaches might help to alleviate their negative feelings and help them realize that they are part of the problem of the present state of the environment, but they can also be part of the solution.

This chapter discussed the impact of the tree unit on the children. As can be seen from the interviews with the children and from this discussion, there are many other factors that influence children's understanding and appreciation of trees and the environment. The children learned a lot of information about trees, and they seemed to learn "Don't cut down trees." These interviews also articulate the need for elementary environmental education to be sensitive to children's learning capacities, their feelings and their personal experiences.

Jane infused environmental education to the best of her ability. She has a sensitivity to the children's abilities and a concern for the environment. And although she is aware of modifications she can make to her tree unit, she

finds it extremely difficult to do so. Jane is confronted with many barriers to implementing effective environmental education in the classroom. She questions whether or not her tree unit as it is now, has any significant impact on her students. She feels that in order for the children to change their lifestyles, to become more environmentally aware and responsible, the children need to see and experience responsible environmental behaviour throughout the school and at home. These barriers that impede environmental education in the classroom will be discussed in the following section.

Barriers to Environmental Education

What are the barriers to environmental education in the classroom and how can these barriers be overcome?

To answer this question I will discuss the barriers that impede Jane from implementing effective environmental education in her classroom. She is restricted by a lack of training, a lack of time and a lack of a cohesive effort from other teachers, the school, the parents, the school board, the provincial department of education and the community. Some initiatives have been taken to overcome the barriers to environmental education; these initiatives and other possible solutions will be discussed in this section.

The Teacher

Jane appreciates being responsible for planning her own curriculum, and she likes to present the tree theme in

depth, with sufficient background information. The tree unit definitely taught the children **about** trees, but it did not address environmental problems associated with trees and the connections between trees, the environment and humans. The time Jane spent teaching environmental education did not necessarily correspond with her positive attitude toward environmental education (Ham & Sewing, 1987). Many of the reasons why Jane has difficulty making her curriculum more environmentally focused are due to the following extenuating factors.

Lack of Training. Jane is limited by a lack of training in environmental education objectives and methodology (Ham & Sewing, 1989; Perry, 1993). In her Bachelor of Education, she had no formal training in environmental education. But what about professional development? "In-service days are considered one of the main catalysts for change" (Greig et al, 1989). Jane explained that although some environmental education in-services have been provided by the Global Education Project (Perry, 1993), usually only one or two delegates are allowed to be part of the training. These delegates are expected to bring these experiences back to their schools to assist their staff. But there seems to be little follow-up strategy, and those who are trained have little time or opportunity to network what they have learned (Greig et al, 1989). A half day environmental education in-service at her

school was organized by two staff members who had attended a school board global education in-service day earlier that year. The objective of the Global Education Project is to implement the project through decentralization. Teachers will be trained and then will train their schools in global education. As was mentioned in Chapter Three, the staff at Jane's school came up with environmental practices for the school. However, their in-service did not articulate or discuss the objectives or methodology of environmental education. Because this thesis used a participatory approach to research, Jane and her principal have learned more about environmental education methodology and objectives. The problem of training teachers in environmental education should not be considered as insurmountable. Environmental education could be infused into Bachelor of Education programs, and provided as in-service workshops.

Lack of Resource Materials. Jane was faced with limited resource materials. The achievements and limitations of the rainforest video as a resource material have already been discussed. Many of the resources that Jane uses, she has found personally. And she finds that the resources available to her are quite limited, particularly local resources. The school board has a resource library, but it is inaccessible to Jane because of distance and because the library hours of operation are similar to her

school hours. The school board has provided her with Explorations in Science, Level Three (Herridge & Moore, 1992), but they have neglected to provide Jane with background information materials. The so-called "environment" section in this book that suggests discussing and endangered species each month does not promote the holistic, problem-solving approach of environmental education. A curriculum advisor said that the provincial department of education has elementary teachers presently writing and collecting local "environment" resource materials.

Jane is faced with finding and sorting through so-called "environment" resource materials which can be extremely time consuming and often discouraging and/or misleading, especially for teachers who have little training in environmental education and cannot identify ethical "environment" materials (Iozzi, 1989).

Lack of Time. Jane is faced with a lack of planning time and a lack of time in the school day to incorporate environmental education. Jane has only forty minutes of preparation time a day. With all other curricular and social demands on a teacher, she has little time to plan how to incorporate or actually orchestrate environmental education into her curriculum. As an example, Jane would like to take the children outside more often, but she needs another adult to help supervise the children and she needs

time to organize an outdoor experience.

Jane felt that one way to overcome this barrier would be to team teach. For instance, Jane thought there could be more coordination with the three Grade three teachers in the school. They could divide the lessons between them, and rotate from the different classes. Jane could lead a paper making session, while another teacher could lead a tree measuring activity. This unified effort could alleviate some of the planning time as well as it could reduce some of the materials needed for preparing the activities. Jane felt that the large size of the school accounted for lack of cohesive efforts between same grade teachers. Jane rarely sees some of the other teachers in the school because of different recess breaks and different lunch times. This lack of support from other teachers is partially due to different schedules, but it is also that because many people feel that environmental education is less important than other subjects (Ham & Sewing, 1987). Jane also suggested that half an in-service day in which teachers could organize their curriculum would help to alleviate this lack of planning time problem. Jane feels that the principals of schools would accept this notion, but that the administration would not understand such a need. A factor to consider with Jane's suggestion is the lack of funding available for in-service training. Jane feels that the school board and certainly the provincial department have

little concept of how much planning time and how much resource assistance teachers need.

Jane finds it difficult to infuse environmental education into her curriculum and even when she is able to do so, she questions if the children actually change their attitudes and behaviour. Jane feels that too often, the children experience contradictions to responsible environmental attitudes and practices when they leave the classroom.

The School

Jane is confronted with a lack of an organized and cohesive effort throughout the school with regards to environmental practices and activities. Four years ago at her previous school, Jane experienced the empowerment and the involvement of students, teachers and parents when the school collectively reduced their paper consumption. This month-long initiative became a long-term commitment throughout the school. Jane believes that environmental education needs to be better incorporated into the classroom curriculum at every grade level. She feels there needs to be a school-wide effort to incorporate sound environmental practices throughout every aspect of the school (Greig et al., 1989; Nova Scotia Round Table on Environment and Economy, 1993; Randle, 1989).

Just this year, however, Jane's school decided to develop a more cohesive effort in promoting environmental

practices in the school. As was described in Chapter Three, the staff chose to devote half an in-service day to organize environmental practices within the school. This in-service did not address environmental education objectives or methodology.

Mary Meads, Jane's principal, encourages cooperative problem sharing and collective problem-solving. She believes strongly in school-based management and grassroots movements (Greig et al., 1989), especially with environmental education initiatives. She promotes "openness and egalitarianism" (Greig et al., 1989, p. 16) in the way she deals with people and the way she manages the school. By involving teachers, students, parents and the community in the development of environmental education curriculum and any other curriculum for that matter, Mary contends that it becomes **their** change. This approach to management empowers people individually and collectively, and offers them a sense of ownership in sustaining whole-school change (Greig et al. 1989). Mrs. Boutilier started the milk carton recycling program in the school. And Mary found that more parents were approaching her with concerns. Mary also sent a letter to the parents asking for their input about the vandalism and the garbage and glass in the woods by the school.

This particular in-service day was a grassroots development. Three goals were established: post a sign in

the staff room on which teachers could publicize the specific environmental focus of their classroom; develop an school program to reduce litter and look into joining the SEEDS, Learners in Action program in the following September.

When I spoke with Jane a few months after the in-service day, she said that it was difficult to sustain the impetus of the environmental education in-service, because the school was faced with budget cuts and there was speculation that Jane's school might have to amalgamate with the neighbouring junior high school. Jane said that this chaotic rearranging and reorganization of schools and teachers was a typical occurrence for the last three months of school. Jane and the other teachers had little opportunity to learn about or apply to the SEEDS program. Jane did not even know what grade she might be teaching next year. This upheaval is a definite barrier to establishing any long-term, school-based goals of environmental education practices.

The Parents and the Community

Margaret Boutilier designed and implemented the milk carton recycling program in the school; she, with the help of another mother, also developed and directed the paper-making session with Jane's class. She went to every class in the school and explained the process. She originally supervised the collecting and rinsing procedures, but now

the students are doing it by themselves. Margaret is a model example of how parents can initiate and support environmental education in the school.

Mary Meads, explained that as yet few parents have become actively involved with the school. Just this year, Mary sent a letter to community members and parents to encourage them to be collectively involved with solving the environmental and social problems associated with the school vandalism and the conditions of the woods near the school. How can the community work together with the school to keep the woods free of garbage, broken glass and vandalism? This community, school and parental involvement in environmental problem-solving will only direct and support environmental education that is taking place in the school and in the classrooms.

The Administration

Jane said she receives little direction or support from the Nova Scotia Department of Education or the school board. The provincial department of education developed the Proposed Framework for the Elementary Science Program (1992). This document was written to revise the 1978 version of Science in Elementary Schools. One of the main priorities of the provincial department of education was to ensure that environmental education was being taught in the elementary schools throughout the grade levels. However, in this document, "environment" is presented as a science topic

as opposed to being presented as environmental education which focuses on lifestyle changes and problem-solving. This "scientific approach" that the Nova Scotia Department of Education is promoting may be grossly misleading and possibly intimidating for teachers (Iozzi, 1987). Environmental education is far more than science.

The province and the school board had distributed the document to receive feed back from administrators, teachers and community members, as well as to develop and support teachers. I find it ironic that neither Jane, nor her principal, who are both progressively involved in environmental education, was provided with a copy, until I presented them with one. This is an example of how curriculum developers and administrators often impose changes in the curriculum as opposed to involving teachers within the change process (Greig et al., 1989). Jane feels that the curriculum consultants need to be more aware and supportive of the teacher's situation. She rarely if ever has been contacted by a curriculum consultants.

When I spoke with a curriculum advisor of the school board, he said that the board was involved with the following environmental education programs: the Global Education Project, a local River Association, the SEEDS, Learner in Action Program and Earthkeepers. He explained that there is no direct funding available within the board for environmental education; funds are prioritized and taken

from the instructional budget.

This curriculum advisor felt that environmental education was not about specific activities per se, but more about changing attitudes, which entails a lengthy process. He agreed that the board could provide a more consolidated approach to infusing environmental education throughout the curriculum, as opposed to focusing on science. He also agreed that there was a need for a more unified and collective effort to implement environmental practices in the schools, rather than depending on the isolated initiatives of individuals.

Many educators, administrators and environmentalists are aware of what needs to be done in order to improve environmental education in schools, but like many problems, there are many factors involved and the process of change is taking a very long time.

Conclusion

This chapter analyzed how environmental education was infused into the tree program in relation to environmental education objectives and methodologies. The children's responses and the barriers to environmental education were discussed, with reference to the environmental education literature presented in Chapter One. Based on these discussions, it becomes apparent that there are several improvements that can be made in order to ensure that

effective environmental education is being implemented in the formal education system in Nova Scotia. The next chapter provides a summary of the major findings of this case study and includes recommendations based on these findings.

CHAPTER FIVE: SUMMARY AND RECOMMENDATIONS

This concluding chapter provides a summary of the case study and presents recommendations for improving environmental education within the formal education system.

Summary

The purpose of this case study was to investigate how a Grade three teacher in Nova Scotia infuses environmental education into the curriculum within the formal education system. Through observations of the classroom activities, interviews with individual and pairs of students, and through discussions with the teacher, the principal of the school and curriculum advisors at the school board and provincial level, I attempted to present an overall picture of the achievements and limitations of individual and group efforts to bring environmental education into the schools.

I used a qualitative, participatory research method in hopes of shedding light on all aspects of implementing environmental education in the classroom. I wanted to conduct my research with and for the teacher, to help her evaluate and improve how she infuses environmental education into her tree unit. As well, I wanted to present the teacher's experiences with environmental education so that administrators and curriculum advisors might become more sensitive to the needs of the classroom teacher in

implementing such programs.

This study was limited by the lack of literature and research addressing elementary environmental education in the formal education system. No such research has been conducted in Nova Scotia before. These limitations, however, point to the importance of this particular study and the need for more research in the field.

From my observations of the tree unit, I noted that the teacher incorporated many subject areas to develop the children's awareness of and knowledge about trees. She developed the children's respect for trees and encouraged the children to share their knowledge and awareness with their parents and friends. These achievements are within the objectives of environmental education. In order to incorporate environmental education objectives and methodology further into her tree unit, the teacher could have given more attention to local environmental problems, the children's problem-solving skills, analysis of personal and societal environmental attitudes. The program could have helped the students more in recognizing their connections with the environment, thus directing them to adopt more environmentally responsible behaviours which would lessen their impact on trees and the environment. The interviews with the children helped to demonstrate that the children enjoyed the tree unit and that they learned a great deal of facts about trees. The interviews also

revealed the children's limited ability to understand ecological concepts, environmental problems and their connections with the environment. The children often talked about things they learned at home, but almost half of the children said they learned about the environment mostly at school.

I found that this teacher incorporated environmental education into her program because of her personal commitment to the environment, not because of any curricular demands. In fact this teacher faced a number of obstacles to implementing environmental education in her classroom. She had no formal training in environmental education objectives or methodology; she did not have enough time to plan or implement environmental education programs; she had limited resource materials for environmental education, particularly materials that focused on local environment issues; and she felt she received little support or direction from the curriculum advisors at the school board and provincial level. This case includes staff and parent initiatives that took place to incorporate environmental practices within the school. These initiatives can only enhance the success of environmental education programs that take place in the classroom.

Based on this study the following recommendations are made to improve the effectiveness of environmental education in the formal education system.

Recommendations

From the results of this particular case study that investigated how environmental education was being infused into the elementary curriculum in Nova Scotia, certain recommendations emerge. I realize that many of these recommendations may involve specific funding, but I also feel that fiscal restraints and how they are implemented are a reflection of the values we uphold. If we care about the future of the earth and the future of our children, then serious consideration should be given to the following recommendations.

Commitment to Environmental Education

1. There is a need for the Nova Scotia Department of Education and school boards to make a commitment to ensure that environmental education is being effectively implemented in schools.

2. The Nova Scotia Department of Education and school boards should follow through with the recommendations made by the Nova Scotia Round Table on Environment and Economy (1993).

3. There should be a more consolidated and supportive effort between schools, teachers, students, parents, curriculum advisors, researchers, non-formal educational organizations, environmental organizations, community members, businesses and politicians to implement

environmental education programs in the schools. More importantly, these people, individually and collectively, need to implement and maintain practices that reflect the principles of environmental and sustainable development education. If environmental education becomes a part of the societal framework, then schools would receive greater support through the media and community efforts.

Training in Environmental Education

4. Environmental education objectives, methodology and practices should be included in Bachelor of Education programs and professional development programs. Teachers need to learn how to infuse environmental education into the curriculum and how to assess and use resource materials effectively and holistically in environmental education. It might also be beneficial for teachers to realize some of the possible barriers that may confront them when they are teaching, so they can deal with and possibly overcome these barriers.

5. In-services for practising teachers should include "grassroots" developments within local schools and communities, but also include environmental education objectives and methodology as well as information about selecting and using of "environment" resource materials.

Environmental Education Resource Materials

6. Create a team of curriculum developers to design environmental education materials that are curriculum fit,

"Monday morning ready", credible, relevant to the learner, flexible and pedagogically and environmentally sound. This team of curriculum developers should include mainly teachers, some scientists, curriculum specialists and environmental education consultants who are familiar with curriculum development (Bonneville, 1994).

7. So-called "environment" resource materials need be reviewed so as to provide teachers with usable, practical materials that present a holistic approach to environmental education.

8. The provincial department of education, school boards, schools and environmental organizations should concentrate on making information available, accessible and usable for teachers about the local environment and local environmental problems.

Further Research in Environmental Education

9. There should be further research conducted in the implementation of environmental education within the formal education system.

10. There should be more research done in order to understand how children perceive the environment and environmental problems. And from this research, greater sensitivity to children's perceptual and cognitive abilities can be used in designing and implementing elementary environmental education.

REFERENCES

- Ahoy, L.; Permikangas, T. and Lyyra, S. (1989). Finnish primary school children's preference in environmental problem solving. Science Education, 73(5), 635-642.
- Bennet, D. B. (1989). Evaluating environmental education in schools: A practical guide for teachers (2nd ed.) (Environmental Education Series: 12). Paris, France: UNESCO-UNEP.
- Beringer, A. (1990). Understanding Moral Development and Environmental Values through Experience. Journal of Experiential Education, 13(3), 29-33.
- Bonneville, L.; Camozzi, A.; Wong, K. and Harrison, G. (1994). Toxicology and pest management: An education strategy. Unpublished manuscript, ESD Consulting.
- Caduto, M. J. (1985). A guide on environmental values education. (Environmental Education Series No. 12). Paris, Franc: UNESCO.
- Camozzi, A. (1990). Adult Environmental Education: Designing and Facilitating workshops on Forestry-Wildlife Integration. Unpublished master's thesis, Saint Francis Xavier University, Antigonish, Nova Scotia.
- Cohen, S. (1992). Promoting ecological awareness in children. Childhood Education, 68(5), 258-260.
- Cole, E. (1992). Fostering ecological awareness: Art and learning. Childhood Education, 68 (5), 285-289.
- Cornell, J. (1991). Encouraging children's love for the earth. Green Teacher, 23, 27-28.
- Desinger, J. (1990). Environmental education for sustainable development? Journal of Environmental Education, 21(4), 3-6.
- Desinger, J. F. & Monroe, M. C. (1993). The environmental education toolbox(draft): Unit 1: Defining environmental education. Ann Arbor, MI: National Consortium for Environmental Education and Training.
- Engleson, D. C. (1985). A guide to curriculum planning in environmental education (4th ed.). Madison, WI: Wisconsin Department of Public Instruction.

- Greig, S.; Graham, P. & Selby, D. (1989). Greenprints for changing schools. London: The World Wide Fund for Nature and Kogan Page Ltd.
- Ham, S. H. (1992). Barriers to environmental education in elementary schools: Implications for libraries. Green Library Journal, 1(2), 41-44.
- Ham, S. H. & Sewing, D. R. (1987). Barriers to environmental education. Journal of Environmental Education, 19, 17-24.
- Herridge, D. and Moore, N. (1992). Explorations in science: Level 111. Don Mills: Addison-Wesley Publishers Limited.
- Hungerford, H. R.; Peyton, R. B.; Wilke, R. J. (1983). Yes, EE does have definition and structure. Journal of Environmental Education, 14, editorial.
- Hungerford, H. R. and Peyton, R. B. (1986). Procedures for developing an environmental education curriculum. (Environmental Education Series No. 22). Paris, France: UNESCO-UNEP.
- Hungerford, R. H. & Volk, T. L. (1990). Changing learner behaviour through environmental education. Journal of Environmental Education, 21(3), 8-21.
- Hungerford, H. R.; Volk, T.L.; Dixon, B.G.; Marcinkowski, T. J.; Sia, A.P. (1988). An environmental education approach to training of elementary teachers: A teacher education programme (Environmental Education Series No. 27). Paris, France: UNESCO.
- Iozzi, L. (1989). What research says to the educator: Part one: Environmental education and the affective domain. Journal of Environmental Education, 20(3), 3-8.
- Iozzi, L. (1989). What research says to the educator: Part two: Environmental education and the affective domain. Journal of Environmental Education, 20(4), 6-12.
- Jaus, H. (1992). The effect of environmental instruction on children's attitudes toward the environment. Science Education, 66(95), 689-692.
- Jickling, B. (1992). Why I don't want my children to be educated for sustainable development. Journal of Environmental Education, 23(4), 5-8.

- Johnson, M. (Ed.) (1992). LORE: Capturing traditional environmental knowledge. Hay River, NWT: Dene Culture Institute and the International Development Research Centre.
- Kirby, S. and McKenna, K. (1989). Experience research social change: Methods from the margins. Toronto: Garamond Press.
- Maguire, P. (1987). Doing participatory research: A feminist approach. Amherst, MASS: The Center for International Education School of Education.
- Morgan, B. (1992). Canada's environmental and global education organizations. Green Teacher, 30, 33-34.
- Nova Scotia Round Table on Environment and Economy. (1993). Report of the subcommittee on environmental and sustainable development education. Halifax, NS: Nova Scotia Round Table on Environment and Economy.
- Padua, S. (1993). Sustainability vs sustainable development. Green Teacher, 35, 13-16.
- Perry, G. (1993). Nova Scotia Global education project: Phase 11-Interim evaluation. Unpublished manuscript.
- Raffan, J. (1990). The failed curriculum. Journal of Experiential Education, 13, 3, 47-49.
- Randle, D. (1990). Teaching green: What do we mean? Green Teacher, 18, 1-9.
- Randle, D. (1989). A parent's guide to education for life on earth. London: Greenprint.
- Reading, J. (1993). Towards environmental literacy. Green Teacher, 32, 25-29.
- Rejeski, D. W. (1982). Children look at nature: Environmental perception and education. Journal of Environmental Education, 13, 27-40.
- Remick, B.; Armstrong, M.; Deeth, M. and Sutherland, B. (1984). Birch Bark. Toronto: McGraw-Hill Ryerson Ltd.
- Rose, D. L. (1990). The people who hugged the trees. London: Roberts Rinehart Inc. Publishers

- Rosseau, F. P. (1991). Report on the status of environmental education in Nova Scotia. Unpublished manuscript, The Nova Scotia Round Table on Environment and Economy's Subcommittee on Environmental Education.
- Sessions, G. (Summer/Winter, 1993). Radical Environmentalism in the 90's. Talking Leaves: Institute of Earth Education.
- Simmons, D. (1989). More Infusion confusion: A look at environmental education curriculum materials. Journal of Environmental Education, 20(4), 15-18.
- Suzuki, D. and Hehner, B. (1985). Looking at Plants. Toronto: Stoddart Young Readers.
- Suzuki, D. and Hehner, B. (1989). Looking at the environment. Toronto: Stoddart Young Readers.
- Thomas, I. G. (1989). Evaluating environmental education programs using case studies. Journal of Environmental Education, 21 (2), 3-8.
- UNESCO (1970). Trends in environmental education, Paris, France: UNESCO.
- UNESCO (1985). A problem approach to environmental education. (Environmental Education Series No. 15). Paris, France: UNESCO.
- UNESCO (1986). Environmental education module for pre-service training of teachers and supervisors for primary schools. (Environmental Education Series No. 5). Paris, France: UNESCO.
- UNESCO Institute of Education (1985). A comparative survey of the incorporation of environmental education into school curricula. (Environmental Education Series No. 17). Hamburg, Germany: UNESCO.
- Van Matre, S. (1990). Earth education: a new beginning. Warrenville, Illinois: The Institute of Earth Education.
- Van Wissen, F. (1992). Promoting responsible environmental behaviour through earth education camps: Sunship Earth and Earthkeepers. Unpublished master's thesis, Dalhousie University, Halifax, Nova Scotia.
- Volker, A. M. & Horvat, R. E. (1976). Elementary school children's views on solving selected environmental problems. Science Education, 60(3), 353-361.

Wilke, R. J. (Ed.). (1993). Environmental education: Teacher resource handbook: A practical guide for K-12 environmental education. Millwood, NY: Kraus International Publications.

Williams, A.T. (1979). The new environmentalism: A meaningless epithet. Journal of Environmental Education, 10, 4-6.

World Commission on Environment and Development (1987). Our common future. New York: Oxford University Press.

World Wide Fund for Nature (1988). A common purpose: Environmental education and the school curriculum. London: World Wide Fund for Nature.

APPENDIX A**Guiding Principles for Environmental Education
from the Tbilisi Declaration, 1977**

Environmental Education should:

-consider the environment in its totality - natural and built, technological and social (economic, political, cultural, historical, moral, aesthetic)

-be a continuous, lifelong process, beginning at the preschool level and continuing through all formal and non-formal stages

-be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective

-examine major environmental issues from local, national, regional, and international points of view so that students receive insights into environmental conditions in other geographical perspective

-focus on current and potential environmental situations while taking into account the historical perspective

-promote the value and necessity of local, national, and international cooperation in the prevention and solution of environmental problems

-explicitly consider environmental aspects in plans for development and growth

-enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences

-relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years

-help learners discover the symptoms and the real causes of environmental problems

-emphasize the complexity of environmental problems thus the need to develop critical thinking and problem solving skills

-utilize diverse learning environments and a broad array of educational approaches to teaching, learning about and from the environment with due stress on practical activities and first-hand experience

Appendix B

Janine Swales
Faculty of Education
Saint Mary's University
Halifax, Nova Scotia
B3H 3C3

October 4, 1993

Dear Parents,

I am presently writing a Master of Arts thesis about Elementary Environmental Education. Mrs. Hart has invited me to work with her and her Grade Three students, during the months of October and November. I will be working with only one class, to develop a rapport with the students and the teacher, with hopes of presenting their personal experiences with environmental education. Through a participatory research approach my report will include:

- 1- a review of the environmental education curriculum as written by the Nova Scotia Department of Education and the Halifax County-Bedford District School Board
- 2- observations in a classroom to see the implementation of the environmental education curriculum
- 3- personal and group interviews with the students, to know more about the impact of the environmental education curriculum
- 4- a listing and critique of available programs, resources for students, teachers and school boards, that will support and enhance the present environmental education curriculum

I can assure you of the confidentiality of my report; none of the children's names will be mentioned, only their ideas. I look forward to working with Mrs. Hart and the children. If you have any concerns about my work, please do not hesitate to contact me through Saint Mary's University.

On completion of my report, I would be happy to present you with a summary. I thank you for your cooperation.

Sincerely,

Janine Swales