

ATHABASCA UNIVERSITY

**ENVIRONMENTAL LITERACY AND DISTANCE LEARNING:
A WINDOW TO THE FUTURE OF EDUCATION IN ONTARIO**

LAWRENCE ARTHUR WHITE

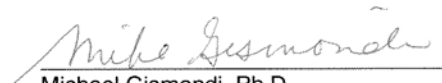
A thesis submitted to the
Athabasca University Governing Council
in partial fulfillment of the requirements for the degree of
MASTER OF DISTANCE EDUCATION


Athabasca, Alberta

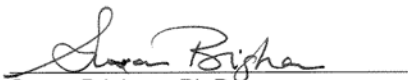
May 2006

ATHABASCA UNIVERSITY

The undersigned certify that they have read and recommend to the Athabasca University Governing Council for acceptance a thesis entitled ENVIRONMENTAL LITERACY AND DISTANCE LEARNING: A WINDOW TO THE FUTURE OF EDUCATION IN ONTARIO submitted by LAWRENCE ARTHUR WHITE in partial fulfillment of the requirements for the degree of MASTER OF DISTANCE EDUCATION.

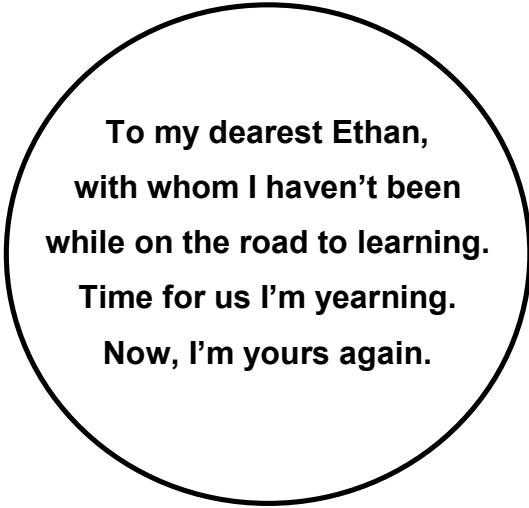

Michael Gismondi, Ph.D.
Supervisor


Martha Cleveland-Innes, Ph.D.


Susan Brigham, Ph.D.

Date: April, 2006

DEDICATION



**To my dearest Ethan,
with whom I haven't been
while on the road to learning.
Time for us I'm yearning.
Now, I'm yours again.**

ABSTRACT

Increasingly, scholars claim that formal education fails to provide for either the current or future needs of our society and, because of this, the field of education finds itself is at a crossroads. During the last two centuries, it has evolved into a knot of specialized and compartmentalized pedagogies that maintain a respectful distance from one another, often competing for significance in a world of economic globalization. The gap emerging between curriculum delivery and social need is of significance in this thesis.

It has been argued that education reinforces *unsustainability* and that the missing components in today's curricula can be addressed through a focus on and inclusion of environmental and sustainability education principles. Providing opportunities for learners to engage in critical thinking, self-reflection, open discourse and real world problem solving reinforces the necessity of an interdisciplinary approach in today's society. It is necessary to problematize the compartmentalization created by years of specialization.

This thesis reports on the environmental knowledge, attitudes and behaviour findings of the first Ontario Environmental Literacy Audit. The Audit affirms the importance that Ontarians place on their environment, and it simultaneously identifies the need for changes within our system of education if we are to produce environmentally literate citizens.

The Audit reinforces the need for educational paradigm change and, emerging

from this reality, distance education is identified as a viable method for the field of education to progress and retain its relevance – both as a necessary social institution and as a means by which to do so more sustainably.

This thesis recommends the use of a model that incorporates the values of sustainable learning with the practices of distance education in content research, course development and instructional design. A series of recommendations for stakeholder action is also presented.

ACKNOWLEDGEMENTS

As with any undertaking, especially one of this magnitude, there are many deserving folks to acknowledge. Whether or not they are aware of their specific role, each of the following has been instrumental to me in seeing this thesis through to a successful completion.

- Dr. Susan Brigham, professor in my first Athabasca University Masters course, for your valuable and sustaining interest in my work and my development, and for your encouragement as I entered the world of academia;
- Drs. Michael Gismondi and Martha Cleveland-Innes, thesis supervisor and academic advisor (respectively), for your open and thought-provoking feedback and guidance;
- M. Norma Haddad, Associate Registrar, and Deborah Rowan-Legg, Registrar, both at Algonquin College, for challenging me to pursue a professional development opportunity that culminated in this thesis;
- Elise Houghton, Director, Environmental Education Ontario, for your countless hours of reading, feedback, and ideas, and for offering a venue for this work to be put to active use upon completion;
- Patricia Balon, Dennis Cinnamon and Steve Shaw, friends and colleagues, each of whom offered their unfettered and continuous support throughout all of my academic pursuits;
- My parents, Arthur and Lynda White, without whom my success, ultimately, would not have been possible; and
- Dr. David W. Orr, professor and Chair, Environmental Studies, Oberlin College, Ohio, for being brave enough to venture into new environmental and educational territory. You are one of the first authors I encountered on the subject. Reading your books has kindled what is sure to be an everlasting interest in educating for the future of our planet.

To each of you, I offer my sincerest gratitude and thanks.

Resistance to and transformation of societal structures emerges from the adult population, and is premised upon men and women's ability to learn new ways of seeing the world and acting within it.

Michael Welton, 1987

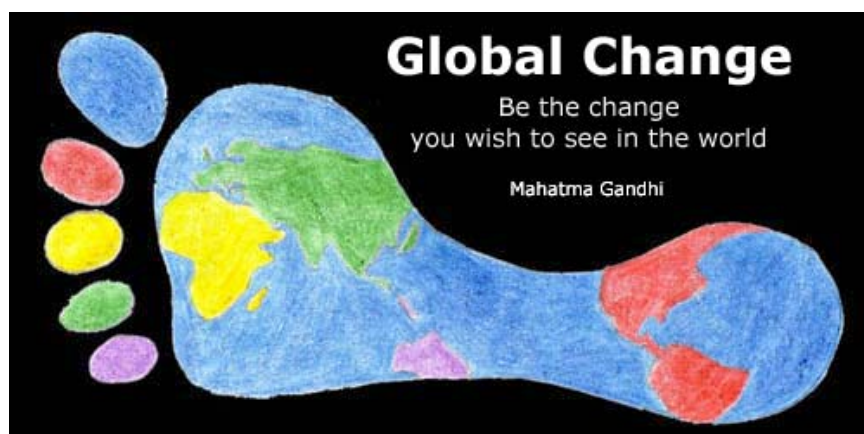


TABLE OF CONTENTS

CHAPTER I	1
INTRODUCTION.....	1
STATEMENT OF THE PURPOSE.....	8
<i>RESEARCH QUESTIONS AND HYPOTHESES</i>	10
<i>LIMITATIONS</i>	12
<i>DELIMITATIONS</i>	13
<i>BIAS</i>	14
DEFINITION OF TERMS	15
<i>EDUCATION AND DISTANCE EDUCATION</i>	15
<i>SUSTAINABLE DEVELOPMENT</i>	15
<i>ENVIRONMENTAL AND SUSTAINABILITY EDUCATION</i>	19
<i>ENVIRONMENTAL LITERACY</i>	20
<i>DISTANCE EDUCATION</i>	23
CHAPTER II	28
REVIEW OF RELATED LITERATURE.....	28
<i>OVERVIEW</i>	28
<i>DISTANCE EDUCATION AND ENVIRONMENTAL EDUCATION</i>	31
<i>ENVIRONMENTAL AND SUSTAINABILITY EDUCATION</i>	34
<i>SYSTEMS APPROACH TO ENVIRONMENTAL EDUCATION</i>	35
<i>PUBLIC ENVIRONMENTAL LITERACY</i>	37
<i>RELATED ENVIRONMENTAL LITERACY RESEARCH</i>	41
<i>ENVIRONMENTAL AND SUSTAINABILITY EDUCATION IN ACTION</i>	43
<i>THE PARADOXES OF ENVIRONMENTAL AND SUSTAINABILITY EDUCATION</i>	45
<i>ENVIRONMENTAL CITIZENSHIP</i>	48
<i>RELEVANCE / CONTRIBUTION OF DISTANCE EDUCATION</i>	53
CHAPTER III	57
METHODOLOGY.....	57
<i>DEVELOPMENT OF THE AUDIT INSTRUMENT</i>	58
<i>AUDIT INSTRUMENT: ENVIRONMENTAL KNOWLEDGE</i>	58
<i>AUDIT INSTRUMENT: ENVIRONMENTAL ATTITUDES</i>	59
<i>AUDIT INSTRUMENT: ENVIRONMENTAL BEHAVIOURS</i>	60
<i>AUDIT INSTRUMENT: COMPOSITE SCORE</i>	60
<i>AUDIT SAMPLE</i>	61
<i>DATA COLLECTION / TREATMENT</i>	61
CHAPTER IV	64
RESULTS	64

<i>DEMOGRAPHICS</i>	65
<i>ENVIRONMENTAL KNOWLEDGE</i>	66
<i>ENVIRONMENTAL ATTITUDES</i>	72
<i>ENVIRONMENTAL BEHAVIOURS</i>	74
<i>COMPOSITE ENVIRONMENTAL LITERACY</i>	76
<i>ENVIRONMENTAL LEARNING</i>	77
INTERPRETATION OF FINDINGS	80
<i>ESTABLISHING AN ONTARIO BASELINE</i>	81
<i>COMPARISON TO MINNESOTA'S ENVIRONMENTAL LITERACY SURVEY</i>	83
<i>PARADIGM CHANGE – COGNITIVE TO AFFECTIVE LEARNING</i>	84
IMPLICATIONS FOR DISTANCE EDUCATION	91
<i>THE ECONOMICS OF HIGHER EDUCATION</i>	92
<i>THE CHALLENGES FACING HIGHER EDUCATION</i>	93
<i>THE IMPORTANCE OF HIGHER EDUCATION</i>	99
<i>FORMAL LEARNING</i>	100
<i>INFORMAL LEARNING</i>	102
<i>GENDER AND DISTANCE EDUCATION</i>	106
<i>A ROLE FOR DISTANCE EDUCATION</i>	107
<i>DISTANCE EDUCATION: A MODEL FOR CHANGE</i>	110
CHAPTER V	115
CONCLUSIONS AND RECOMMENDATIONS	115
<i>RECOMMENDATIONS</i>	118
REFERENCES	126
APPENDIX A	142
<i>SCRIPT FOR THE ONTARIO ENVIRONMENTAL LITERACY AUDIT</i>	142
<i>ONTARIO ENVIRONMENTAL LITERACY AUDIT</i>	143
<i>CLOSING SCRIPT</i>	151
APPENDIX B	153
<i>ONTARIO ENVIRONMENTAL LITERACY AUDIT RESULTS</i>	153

LIST OF TABLES

		<u>Page</u>
Table 1	Research Questions and Hypotheses	11
Table 2	Attributes of Distance Education	32
Table 3	Demographics of Respondents	65
Table 4	Self-Assessed Environmental Knowledge	67
Table 5	Environmental Knowledge Results	68
Table 6	Environmental Attitudes Results	73
Table 7	Environmental Behaviours Results	75
Table 8	Composite Environmental Literacy Results	77
Table 9	Importance of Being Environmentally Literate	77
Table 10	Environmental Learning Preferences	78

LIST OF FIGURES

		<u>Page</u>
Figure 1	Sustainable Development as a System	17
Figure 2	Value Systems in Sustainable Development	18
Figure 3	Environmental Literacy	21
Figure 4	Ontarians' Environmental Knowledge Grade Summary	69
Figure 5	Environmental Knowledge by Gender	70
Figure 6	Environmental Knowledge by Education Level	71
Figure 7	Environmental Knowledge by Residential Location	71
Figure 8	Attitudes and Behaviours as a Function of Environmental Knowledge	83
Figure 9	Higher Education Model of Sustainability as an Integrated System	98
Figure 10	Distance Education for Sustainable Learning	111

CHAPTER I

INTRODUCTION

Imagine a timeline – a geological timeline that commences with the creation of our planet some 4.6 billion years ago and continues up to the present day. Humans have lived on the Earth only for the most recent 2.5 million years, civilizations emerged some 10,000 years ago, and written language in the last 5,000 years. Consider now that, in the last 200 years alone, our species has caused more mayhem on the planet than has taken place in the previous billion years. To help you better envision this, imagine a movie that plays for an entire year from one second after midnight on the morning of January 1st through to precisely midnight on the following New Year's Eve. The yearlong movie corresponds with our geological timeline. Our species has been on the planet only for the last eleven minutes of the movie. The industrial era, corresponding to the last 200 years, would only be portrayed in the final two seconds of the movie (Milbrath, 1989).

Yet, in that tiny time period, we have denuded vast tracts of forested land, used massive quantities of resources often reshaping the Earth in order to acquire them, altered water tables and ecosystems to serve our needs, polluted our atmosphere to the point of global warming, climate change and ill health, and

driven many species to extinction in the wake of our craving for progress (Gore, 1993; Milbrath, 1989; Suzuki, 2002). We have taught ourselves how to do these things in the name of development under the guise of nurturing a market economy (Orr, 1992; Sterling, 2001). More importantly, we now face an environmental catastrophe of previously untested proportions. Our actions with respect to the environment have left us facing crises of carrying capacity, safety, equity and freedom (Gore, 1993; Orr, 1992; Suzuki, 2002) and this has a direct impact on the health and well-being of the human population as well as that of our planet.

Imagine, now, a different timeline that begins with the emergence of humankind on the planet. Since our arrival, we have been learning. Indeed, learning is an ongoing process attached to every experience, decision and action in which we engage (Mezirow, 1991). In millennia past, our learning was broadly attached to the surroundings in which we toiled to survive. Hence, we had a symbiotic relationship with the environment – one in which we could innately relate to the nuances and characteristics of the world around us; one in which the environment was respected because of the potential it had to foster or destroy human life. In the last 200 years of the timeline, the industrial era, human civilization has quickly changed and adapted with a drive for specialization and economic progress.

Undeniably, formal education has evolved during this period, as have many

social institutions, into a knot of specialized and compartmentalized pedagogies that maintain a respectful distance from one another, often competing for significance in a world of economic globalization (Banathy, 1995; Orr, 1992; Sterling, 2001). Because of this, education neither suits societal needs of the present nor those of the future (Bowers, 1995; EEON, 2003; Filho, 1997; Orr, 1992; Sterling, 2001). The gap emerging between curriculum delivery and societal need is of significance in this thesis.

As a consequence, education finds itself somewhat at a crossroads. The dilemma is whether to continue down the established track, educating cognitively for knowledge and specialization, as has been the pattern for centuries, or to reconsider a role for education in keeping with the need to prepare people effectively for the future – to prepare them affectively to engage critically and reflectively with the world around them, understanding the interconnections between their day-to-day decisions and their environment.

Systems theory teaches that all aspects of life are interconnected and that progress cannot be made in a vacuum separate from surroundings. Education, as a field, has only just arrived at this realization and has not yet incorporated this approach (Banathy, 1995; Sterling, 2001). Hence, the challenge for society is to determine where and in what way education ought to develop in the future in order to remain relevant and in order to meet societal need. Within education, distance education has a long tradition of development (Guy, 1991; Moore &

Kearsley, 1996) and provides opportunities and stepping-stones for growth within the field.

Environmental education has slowly evolved as one part of the educational curriculum that informs learners about the world around them. However, it is often taught in isolated pockets such as units within a larger course or, in some instances, as a stand-alone course. In Ontario, environmental education has been removed from the curriculum in public and secondary school. Therefore, teachers are no longer specifically trained in the delivery of information related to the environment. More importantly, learners in grades 1 through 12 do not have the opportunity to be exposed to a specific curriculum that will provide them with the basics they need in order to function later in life as environmentally literate citizens.

Akin to education, environmental education also finds itself at a crossroads, albeit of a different sort. Emerging primarily in the last century, entering into more common use since the 1987 report of the Brundtland Commission, *Our Common Future*, environmental education has yet to break into the mainstream (Orr, 1992; Sterling, 2001). Few would dispute the requirement for environmental awareness and knowledge in decision-making circles, such as those required by current and future business leaders, elected officials, voters, and those of us making day-to-day family, household and life decisions, but environmental education is often stigmatized as yet another tree-hugging initiative. In a world focused on

specialization, the broad scope of environmental education often falls outside the ability of people in decision-making capacities to envision.

Due to our growing awareness regarding the impact of human society on the environment and the realization that the Earth is a living system with finite resources upon which we depend for life, environmental education and education for sustainable development are emerging with increasing importance (Sterling, 1992). The challenge facing the mainstreaming of environmental education is establishing a means by which it can occupy a leading role within education – to reinstate it on a sustainable track that provides for the present *and* the future needs of society.

According to the Council of Ministers of Education in Canada, “it is widely agreed that education is the most effective means that society possesses for confronting the challenges and opportunities of the future” (n.d., p. 4). Confronting these challenges, however, calls for a change to the manner in which we think – about ourselves, about our world, and about our interconnectedness. Sterling (2001) agrees:

This would [result in] a transformative paradigm that values, sustains and realizes human potential *in relation* to the need to attain and sustain social, economic and ecological wellbeing, recognizing that they are deeply interdependent (p. 22).

Many experts suggest that the environmental crisis facing us is imminent and that it requires immediate action, with practical, positive, sustainable results within

decades if our species is to survive (Boyd, 2004; Environment Canada, 2004; EEON, 2003; Gore, 1993; Lovelock, 1988; NEETF, 2004; Suzuki, 1998).

“However, as McCarthy (2006) and Lean (2006) point out, the future is now. We have crossed the line in the sand – the threshold that scientists have long touted as the point of irreversibility. Indeed, if all human activity that generated greenhouse gas emissions were to cease today, temperatures would continue to increase at least another 1°C by 2100, likely continuing to increase as far into the future as 2400, and global ice sheets would continue to melt resulting in a sea level rise of about 10 cm per century (Wigley, 2005). The longer we wait to act decisively, the more committed our actions will have to be in the future – both with respect to longevity and intensity of action” (Houghton & White, 2006, in press).

In order to meet the physical and temporal challenges facing the environment and our education system, we require a means by which to make progress that mirrors the immediacy of the challenges ahead. Distance education, within the field of education, has already demonstrated that it has this ability and that it can satisfy the needs of society through benefits gained such as access, community building and opportunities for critical reflection. Little known beforehand, it emerged on the world stage in the 1970s primarily through the work of the UK’s Open University (Blackmore, 1998). Since then, it has undergone considerable transformation in the realm of delivery and establishing its reputation as a viable mode of study.

It follows, then, that distance education may be able to help bridge the delivery gap. “Sustainable development [and distance education,] may be considered like the two axes of a binomial able to set the stage for a real leap

forward in the knowledge, awareness and skills available to the people” (Novo, 1998, p. 66). By integrating the two – one an emerging problem and, the other, an emerging means of address – the potential for progress abounds. It is only when people have access to knowledge, gained through a critically reflective approach, that they have the sense of pride and ownership, and the determination required to participate freely, engagingly, and meaningfully as enlightened citizens of the world (Freire, 2002; Sterling, 2001).

“If we want the next generation of Canadians to have the same opportunities that we have enjoyed, we have to start changing now. That means including the social and environmental costs of our actions in all of our decision-making processes. It means focussing on the creation of genuine wealth, like health, education, and the state of our environment, rather than just the accumulation of more stuff. It means moving from being wasteful and complacent, to being efficient, modern, and thoughtful” (Suzuki, quoted in Boyd, 2004, p. vi).

STATEMENT OF THE PURPOSE

In order to proceed with what appears to be a somewhat daunting task, we as a society have several requirements. These include:

- An acknowledgment that change is required with respect to both the manner in which we inform ourselves about and function within our environment;
- A consensus as to the process for change;
- A vision of the anticipated outcome (a new paradigm?);
- A needs assessment that identifies a baseline from which to proceed towards the vision; and
- An action plan to sustain human and ecological growth and development into the future.

To a great extent, the first two requirements currently exist while the third exists in isolated pockets and these will be discussed in the Review of Literature. The David Suzuki Foundation provides a vision of federal sustainability (Boyd, 2004) while Environmental Education Ontario identifies a provincial vision (EEON, 2003). The first three requirements are discussed in greater detail under Review of the Literature. The fourth requirement, identification of a baseline from which to proceed, has not yet been realized in Canada. The fourth requirement, when combined with the previous three, would set the stage for the creation of a

future-oriented and sustainable action plan.

It is the purpose of this study, therefore, to explore the current status of the relationship between distance education and environmental and sustainability education and to tender a number of recommendations to assist in the search for and transcendence to a new educational paradigm, one that will merge traditional and distance learning pedagogies in order to meet the affective learning needs of Ontario citizens both in the present and in the future. It is expected that a study of this nature may have implications beyond provincial borders, but the focus of the study is on Ontario in order to:

- Provide the provincial government, municipal governments and non-governmental organizations, such as Environmental Education Ontario, with the necessary information to proceed with advocacy and policy change related to the advancement of democracy and social and environmental justice;
- Recognize the uniqueness of the province of Ontario with respect to its environmental, educational and demographic characteristics and needs;
- Recognize that the responsibility for education in Canada is mandated to the provinces;
- Establish a template for similar studies to be conducted in the future, both federally and provincially, in order to provide opportunities for

collaborative efforts to address issues that cross arbitrary human-created borders; and

- Facilitate ease of comparison with the results of similar studies conducted in Minnesota, on which the current study is based, in part.

To that end, the scope of the research reported in this thesis includes:

- Establishing a baseline with regard to the current status of environmental and sustainability education in Ontario – achieved through a literacy audit of the environmental knowledge (cognitive learning), attitudes (affective learning), and behaviours (psychomotor learning) of Ontario adults;
- Identifying the gaps in environmental learning – based on audit results in comparison with studies previously conducted in Minnesota as points of reference; and
- Recommending new directions for a shift in formal education in Ontario through the identification of means by which the use of distance education can be maximized in support of traditional forms of education.

RESEARCH QUESTIONS AND HYPOTHESES

In providing for the items identified within the scope of research, the following

questions will be addressed and form the basis for discussion:

Table 1: Research Questions and Hypotheses

Research Question	Background	Hypothesis
To what extent does an Ontario baseline environmental literacy audit reflect that of previous studies conducted in Minnesota?	<p>Minnesota has conducted two environmental literacy surveys and findings suggest that approximately half of the state's adult population has an average level of environmental knowledge (MOEA, 2002; MOEA, 2004).</p> <p>In addition, Minnesota has launched a detailed strategic plan to achieve environmental education goals in the state (MOEA, 2000).</p> <p>Based on a 1999 Environics opinion poll, Environment Canada reports that 98% of Canadians view nature as essential to human survival (Boyd, 2004).</p>	Ontarians will demonstrate a higher level of environmental literacy in comparison to their US counterparts in Minnesota.

<p>Based on the outcome of the literacy audit and the review of literature, is a new sustainability-themed educational paradigm warranted in Ontario? Such a paradigm would be future-oriented and focus on education <i>for</i> social change.</p>	<p>Considerable research and writing has contributed to the theory that a paradigm change is a necessity if we are to achieve sustainability (see Review of Literature). To paraphrase Orr, Sterling and Jucker, education today does not meet society's present nor future needs.</p>	<p>As suggested by the literacy audit, Ontarians believe that an educational paradigm shift is warranted. This is supported by the literature review, which evidences (a) the importance of reflective and critical thinking in education and (b) that online learning facilitates the development of these competencies.</p>
<p>To what extent can distance education be advantageous in such a paradigm shift, if warranted?</p>	<p>Society is faced with a critical challenge vis à vis the environment. Distance education plays an increasingly important role in the field of education, especially with respect to its ability to bridge temporal and geographic boundaries (see Review of Literature).</p>	<p>Based on the literature review, applied to the gaps identified in the literacy audit as a case study, distance education will assist Ontarians in responding more appropriately to the environmental challenges facing society.</p>

LIMITATIONS

Limitations are factors not under the control of the researcher that could and, perhaps, will affect a study.

2. The most obvious limitation facing a literacy audit is whether or not potential respondents would participate and, if they did, whether or not they participate honestly.

3. An extension of this point, given a set of respondents, is whether or not they would be demographically representative of the age and gender of adult Ontarians.
4. The language in which the audit was delivered, English, further hampers this limitation. This may have, therefore, limited the potential to include within the audit the environmental literacy of newcomers to Canada and others for whom English is not a common language of communication.
5. Since the literacy audit was conducted by telephone through random-digit dialling, a limitation of technology exists in cases in which potential respondents do not use or have access to telephones. Thus, the sample may not include Ontarians who are homeless or those that communicate through means other than by telephone. Likewise, Ontarians who are institutionalized or who may be on work assignment away from home may not be included in the sample.

DELIMITATIONS

Delimitations are similar to limitations in that they can affect the study but remain within the control of the researcher.

1. Sample size is a delimitation and falls under direct control of the researcher and the available budget for the study.
2. Given that the study was conducted through the use of random-digit

dialling technology across all Ontario area codes, the sample should be demographically and geographically representative of the province as a whole. Sampling could have been fine-tuned as required if respondents' demographics did not appear reflective of adults in Ontario.

BIAS

Bias is, simultaneously, a limiter and a delimiter. Bias is defined as the tendency to prefer one person or thing to another. It takes a variety of forms in research including central tendency bias (a preference to avoid perceived extremes) and social desirability bias (a preference to present oneself in a positive light).

While bias is not completely under the researcher's control, measures are in place in the study to mitigate the incidence of bias. These measures include randomizing the order of responses in the telephone survey and standardizing the language of responses to ensure that they conform to a uniform grammatical format.

DEFINITION OF TERMS

EDUCATION AND DISTANCE EDUCATION

While education and distance education are distinct social institutions, they are interconnected in the provision of their overall objective of public education. Indeed, many of the key elements of each are similar in that both are subject to elements of planning, instructional design and curriculum delivery. Because of these similarities, the use of the term 'education' may apply to both in this thesis. For distinction, if discussion relates specifically to traditional education, it will be referred to as 'traditional education' or the 'field of education.' If discussion relates specifically to distance education, it will be referred to as 'distance education' or 'distance learning.'

SUSTAINABLE DEVELOPMENT

The Brundtland Commission defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 43). Arising from this definition are two key concepts. First is the matter of *needs*, especially as it refers to the fulfilment of needs and desires. Inequities plague the issue of needs in that, while some people enjoy a superior standard of living, the majority are marginalized and, thereby, precluded from effective involvement. The

second concept is that of *limitation* both with respect to society's limitations regarding its own technologies and the limits of the environment in its ability to provide ecosystem services (WCED, 1987).

In order to address these issues, three themes emerge in conjunction with sustainable development. The first theme is the need to value the environment properly. Rather than assessing value strictly in financial terms, genuine value includes the natural, built and cultural environments as well as quality of life. The second theme is temporal such that realistic implementation timelines ought to be introduced in order to allow for the required behavioural and environmental changes. The final theme is equity and the requirement to address the global gap between disadvantaged and privileged people (Palmer, J., 1998).

The Canadian Council of Ministers of Education agrees that sustainable development is a complex concept. It supports Palmer's tri-themed version and suggests further that the interrelatedness of components cannot be overlooked. As illustrated in Figure 1, the Council considers sustainable development to be a system of "interrelated strategies" (CME, n.d., p. 7). System success, that being a truly sustainable environment, is achieved when "the Earth's resources are able to sustain ecosystem life, health and acceptable progress in a renewable way" (CME, n.d. p. 7).

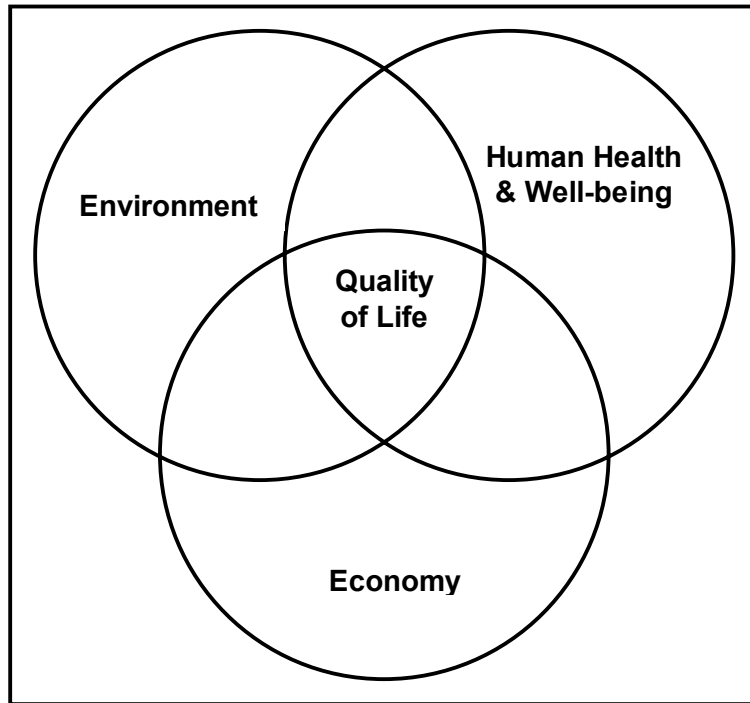


Figure 1: Sustainable Development as a System
[Adapted from: Council, n.d.]

Milbrath introduces the concept of values within his discussion of sustainability. He posits that “life in a viable ecosystem is the centrepiece of a value structure for a sustainable society” (Milbrath, 1989, p. 71) and that this is required first in order to foster core and instrumental human values. He provides a systems view of this structure, as shown in Figure 2. By emphasizing a viable ecosystem as the core of human value systems, Milbrath denotes that the health of the environment is both a cause and an indicator of human health. The two are inextricably linked.

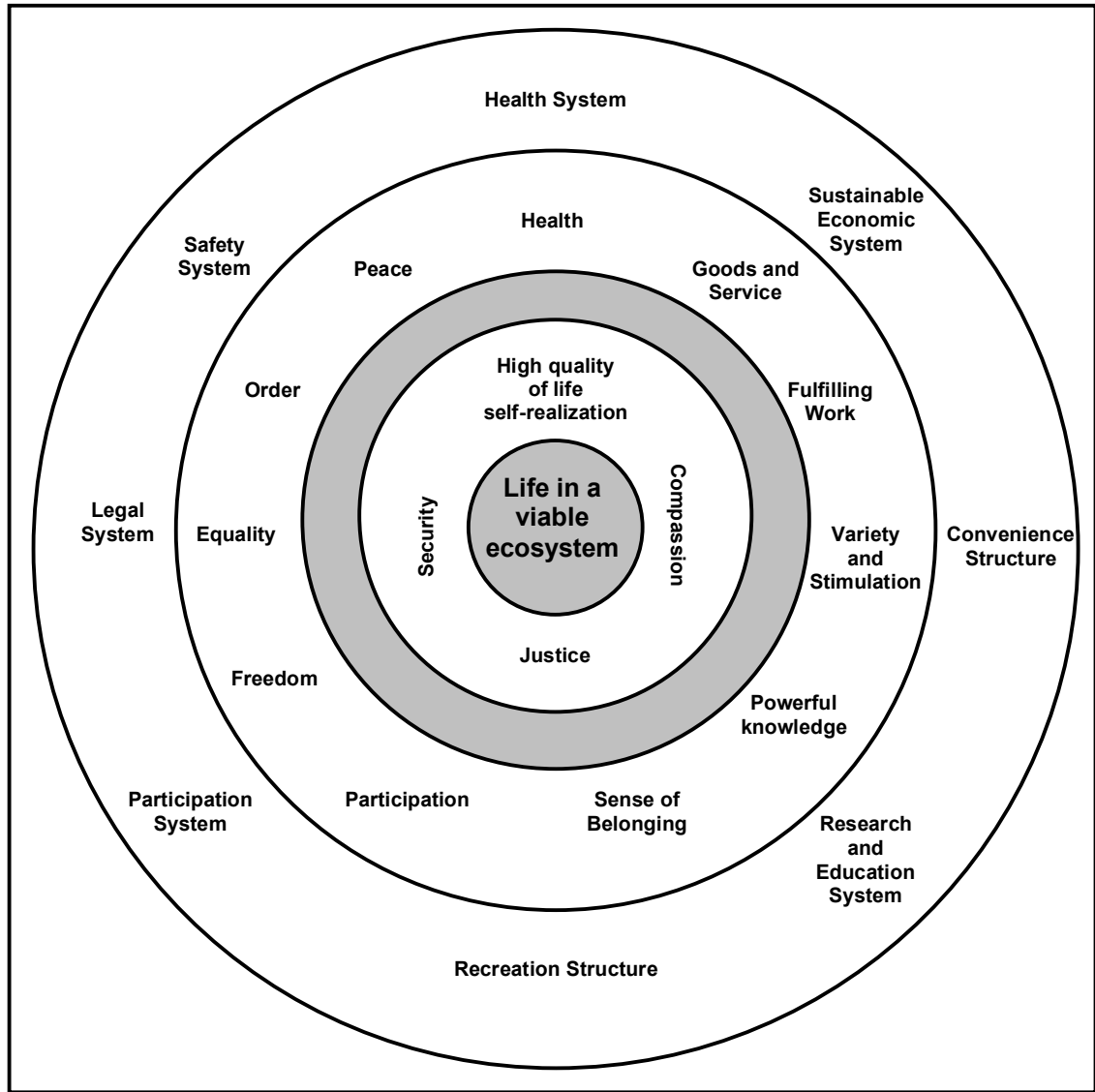


Figure 2: Value Systems in Sustainable Development
[Adapted from: Milbrath, 1989]

Considering the issue of sustainable development one step further, education for sustainable development has been defined as the process of developing awareness, values, and attitudes by increasing knowledge about the interdependence of natural and human systems and improving understanding

about the effects of peoples' actions and decisions with respect to the environment (Palmer, J., 1998). Senge agrees: "the unhealthiness of our world today is in direct proportion to our inability to see it as a whole" (1990, p. 68).

ENVIRONMENTAL AND SUSTAINABILITY EDUCATION

Environmental and sustainability education seeks to formalize the impact of education for sustainability. The US Environmental Protection Agency (EPA) defines environmental education as "the interdisciplinary process of developing a citizenry that is knowledgeable about the total environment in its natural and built aspects and has the capacity and commitment to insure environmental quality by engaging in inquiry, problem solving, decision-making and action" (MOEA, p. 5). Indeed the EPA definition covers all aspects of sustainable development illustrated in Figure 1.

Orr, however, argues, "all education is environmental education. By what is included or excluded, students are taught that they are *part of* or *apart from* the natural world" (1994, p. 12, my emphasis). In this, he contends that mastery of a subject is not the true purpose of education; rather it is mastery of one's self and one's abilities vis à vis the subject. Further, Orr maintains that, with such mastery comes the responsibility of ensuring that knowledge is properly applied, including an understanding of the implications of its use. Underlying Orr's concept of environmental education is the idea that the myth of learning as only being

achieved inside a classroom is to be overcome. Students, he says, “are being taught in various and subtle ways beyond the overt content of courses” (1994, p. 13) and beyond the walls of classrooms.

Sterling echoes Orr’s comments. He maintains, “the real need is to change from *transmissive* towards *transformative* learning” (Sterling, 2001, p. 11).

Sterling views environmental education as the solution to the current problems facing education. “Most education daily reinforces *unsustainable* values and practices in society” (2001, p. 21, my emphasis).

ENVIRONMENTAL LITERACY

To become environmentally or ecologically literate, terms often used synonymously, “we must learn to think systemically – in terms of connectedness, context and processes... Fragmented subject areas taught in schools engender segmented, disconnected knowledge without an organic understanding of our connection to nature and to one another” (Jucker, 2002, p. 270). By assuming a systemic approach, we begin to ask the all-important questions: What? How? Why? These are critical to environmental literacy because they help to inform what the problem is, why it is a problem and how it can be addressed. They promote critical thinking, problem solving and decision-making.

Orr simplifies environmental literacy as follows: “Literacy is the ability to read. Numeracy is the ability to count. Ecological literacy... is the ability to ask, ‘What

then?” (Orr, 1992, p. 85). By asking such a question, he maintains that ecological literacy demands the capacity to observe nature with insight. Literacy is driven by the search for knowledge while ecological literacy is driven by a sense of wonder (Orr, 1992). E. O. Wilson refers to this phenomenon as ‘biophilia,’ an affinity for the living world. Humanity, he says, “is exalted not because we are so far above other creatures, but because knowing them well elevates the very concept of [our own] life” (1984, p. 22).

The US-based Environmental Education and Training Partnership concludes that environmental literacy “is the desired outcome of environmental education

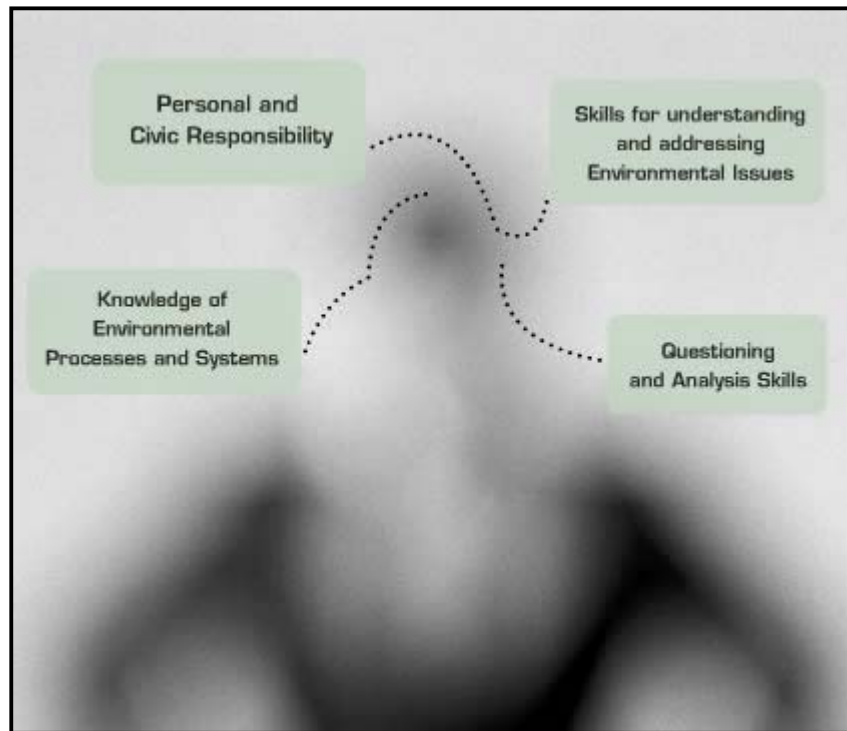


Figure 3: Environmental Literacy
[Reprinted with permission from Dr. R. Wilke, EETAP]

programs. [As illustrated in Figure 3], environmentally literate individuals understand both ecological and socio-political systems and have the inclination to apply that understanding to any decisions that pose consequences for environmental quality” (EETAP, n.d.).

Environmental literacy, therefore, includes those learning factors that permit us to effectively ask the question ‘What then?’ Mirroring the domains of learning, it is commonly accepted that these factors include knowledge, attitudes, and behaviours (Armstrong & Impara, 1991; Kibert, 2000; MOEA, 2002; MOEA, 2004; NEETF, 2004).

- *Knowledge* refers to cognitive learning achieved through the fact or condition of knowing something with familiarity gained through experience or association.
- *Attitude*, the product of affective learning, indicates a mental position, feeling or emotion with regard to or towards a fact or a state.
- *Behaviour* is the manner of conducting oneself – anything that an organism does involving action and response to a stimulus. Behaviours are achieved through psychomotor learning.

In keeping with the concept of environmental education, knowledge and attitudes are factors that can be addressed through the use of formal education (Kibert, 2000). Behaviours, on the other hand, are more difficult to train because they are the product of the first two factors and subject to individual discretion.

Consider Mezirow's transformative learning theory. Knowledge relates to experiences; items that are encountered on an on-going basis and which foster learning through the attainment of new knowledge and experiences. Attitudes relate to the meaning schemes and meaning perspectives formed because of the knowledge compiled. Behaviours are the end result of the interaction of knowledge and attitudes and which are manifest in the form of decisions and actions (Mezirow, 1991).

According to Smith and Ragan, "an attitude is a mental state that predisposes a learner to choose [based on cognitive strategies] to behave in a certain way" (1999, p. 68). In effect, they argue that, of the three domains of learning, attitudes are the most critical because they influence the choices learners make. Affective learning objectives are rarely overtly included within curricula, however, this thesis will argue that, with respect to environmental and sustainability education, affective learning plays a key role in personal and social development. The shift to a more overt form of affective learning, such as that exemplified by anti-drug campaigns and corporate diversity training, is critical to sustainable learning.

DISTANCE EDUCATION

Distance education has been defined as "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of

communication by electronic and other technology, as well as special organizational and administrative arrangements” (Moore, 1996, p. 2). It has been described as a “fully flexible and adaptive teaching methodology which can be of special use to those not able to benefit from conventional teaching programmes” (Filho, 1998, p. 9). This attribute coincides agreeably with and partially addresses Orr’s concern regarding the myth of education as occurring strictly within the walls of a classroom.

Bloom argues, “knowledge has become an increasingly important determinant of the wealth of nations, and access to knowledge, and the ability to disseminate it, has become a major source of competitive advantage” (2002, p. 2). Attention has become focussed on tertiary institutions in every country. Originally located on the “periphery of education practices” (Perraton quoted in Guy, 1991, p. 152), distance education has become mainstream in both developed and developing countries. It has emerged as a means by which the process of democratization can be disseminated among the general population. This has been accomplished through the achievement of such milestones as:

- Accelerating access to innovative knowledge (Perraton, 2000);
- Empowering learners through a more self-directed learning style (Rumble, 2000);
- Training teachers online using new curricula that are used to introduce political ideology (Alderinoye & Ojokheta, 2004; Guy, 1991);

- Propagating development, particularly in developing countries (Bloom, 2002; Evans, 1995); and
- Amalgamating academic thinking through partnerships, consortia, sharing and cooperative ventures (Atkinson, 2001; Prasad, 1997).

The University of the South Pacific (USP) is a particularly good example of the success achieved through collaboration. Serving the needs of twelve member countries spread across more than thirty million square kilometres of the Pacific Ocean and spanning at least four time zones (including the International Dateline), USP successfully explored and uses distance delivery via satellite. Today, USP offers face-to-face (main and regional campuses), satellite, video conferencing and Internet-based learning opportunities to provide for the higher learning needs of citizens of member nations (Rumble, 2000).

Similarly, Nigeria is an excellent example of the use of distance education to overcome development challenges. Faced with an acute teacher shortage in the mid-1970s, Nigeria's Universal Primary Education program embarked on a campaign of teacher training using distance education. Over an eight-year period ending in 1992, Nigeria was able to increase the number of teaching-certified graduates at least six fold, thus helping to achieve stability and quality and, at the same time, reducing the dropout rate (Alderinoye & Ojokheta, 2004).

In the developed countries of the North, the focus of distance education has shifted to a great extent from correspondence-based learning to online learning. Indeed, the preponderance of computers in developed countries has resulted in the use of the Internet as a tool for distance education (Bates, 2000). The use of this technology as a means of delivery for distance learning is entirely appropriate since most developed countries demonstrate the largest ecological footprints (Wackernagel & Rees, 1996) and, as such, arguably require the greatest educational effort.

Some have criticized the use of online technology for teaching because it creates a digital divide resulting in the exclusion of potentially large portions of a population. Farrell (2001), for instance, cites lack of access to equipment and infrastructure, up-front capital development costs and faculty reticence as challenges facing less developed nations.

However, in the Northern experience, online distance education brings people from a diversity of backgrounds and locales together to learn. Virtual discussion groups allow learners to participate from the comfort of their own home ecosystem, to share their worldviews and experiences and to learn from others with whom they would likely not have interacted had it not been for an opportunity arising as result of online learning. Learning in and from the ecosystem in which learners must live sustainably increases the effectiveness of converting knowledge into action. This is accomplished through learners' direct relationships

with real places and real problems as opposed to artificial and hypothetical classroom situations.

Perhaps one of the most noteworthy opportunities for online learning arises in the solidarity that results when bringing students from heartland and hinterland together. Rural and urban learners experience each other's worldviews and develop a camaraderie framed by shared understanding. This is significant from the perspective of a producer-consumer dichotomy if we are to make positive and sustainable change.

CHAPTER II

REVIEW OF RELATED LITERATURE

OVERVIEW

Among scholars in the field, there appears to be a consensus of opinion regarding the need to change the focus of education in order for it to retain and, indeed, reclaim its relevance. Sterling contends that, “the world for which education is preparing people no longer exists” (2001, p. 23). If this is true, Orr describes education as a potentially “dangerous thing... [in need of] an educational ‘*perestroika*’” (1994, p. 17). With respect to the environment, Swan (1974) suggests that current environmental problems stem from our inability to create and maintain functionally operative systems that support our values and social structure. Bowers (1995) posits that, as long as education maintains a foothold in the current approaches to globalization, it is unlikely to result in positive environmental impact.

The British Columbia Ministry of Education (1995) supports the need for a shift in the focus of education.

There is growing concern about the state of the environment, yet we are often confused by the complexities of economic, ethical, political, and social issues related to it... [We must] turn to ourselves as individuals to make change and develop a new ethic –

a responsible attitude toward caring for the earth (p. 3).

Environmental Education Ontario (EEON) also agrees. EEON is a citizens' coalition promoting an environmentally literate and sustainable future and it seeks to make ecological literacy mainstream. Within its mandate, EEON was able to contribute two questions related to public perception of environmental knowledge as part of a survey that was conducted by Environics for the Sustainability Network. Responses to the EEON questions indicate that only 2% of Ontarians felt they have a sufficient knowledge of the environment to make sound and healthy decisions. This compares to 4% for Canadians as a whole. Equipped with that information, EEON provided Ontario with a vision for sustainable environmental education through the release of its *Greening the Way Ontario Learns: A Public Strategic Plan for Environmental and Sustainability Education* (EEON, 2003). A critical next step envisioned by EEON is the determination of the current Ontario baseline with regard to environmental literacy.

Likewise, the David Suzuki Foundation has published a national vision for Canada with respect to sustainability, *Sustainability within a Generation: A New Vision for Canada* (Boyd, 2004). The national vision statement promotes (a) the achievement of sustainability within a lifetime, and (b) a national focus on genuine wealth as opposed to simply considering economic wealth alone. Genuine wealth, according to Boyd, is wealth that encapsulates human, natural, social, manufactured, and financial capital together as the key assets that provide a

measure of quality of life (Boyd, 2004).

The proposed research aligns particularly well with the needs identified by both EEON and Boyd while, at the same time, it coincides well with the requirement for a shift in the manner in which we reflect upon, operationalize, and deliver education in Ontario.

At the same time, hosts of non-governmental organizations, particularly green social movements, are shifting the manner in which they engage the public. Communication from within such organizations is often electronic and engaging public debate, participation and netactivism via websites that are often interactive (with technology such as blogs, chat arenas, webinars and other online learning opportunities). These activities strengthen the role of informal learning in educating the public and provide opportunities for educational growth and change (Tsaliki, 2003).

It is clear that there is a pressing environmental crisis that will require a citizenry that is both knowledgeable and participative, one that adapts as required to new and increasingly diverse situations and challenges, one that endorses inclusion, equity, security, and pride in one's world.

After reviewing the literature, it becomes obvious that, not only is there an apparent need for a new direction for both education, in general, and environmental education, specifically, but that environmental and sustainability education has the ability to provide a framework within which education can be

restructured, thereby improving its relevance to society. By doing so, and to rephrase Sterling's words (cited earlier), education can be assured that it is preparing people for the future.

DISTANCE EDUCATION AND ENVIRONMENTAL EDUCATION

"If education is ultimately to become a factor of change towards sustainability, educational systems must be adapted to the needs and potential of globalised society" (Novo, 1998, p. 47). However, opportunities for traditional scholarship are limited. Universities and colleges are not located in every community inhabited by people. People, themselves, have complex agendas that allow little, if any, extra time to become traditional students again. There is, therefore, a need to link people with learning both geographically and temporally. Distance education can play a role with respect to this union. Further, if such education is oriented towards the environment, then such an implementation would be "innovative and vivifying enough to counter the crisis of our times" (Novo, 1998, p. 48).

"Distance education is particularly endowed for incorporating environmental education because its methods and timing for reaching a wide audience of working people is exceptional" (Molero, 1998, p. 117-118). Leal Filho (1998) identifies a variety of attributes of distance education that lend themselves particularly well to both environmental education and a new direction for

education. These are summarized in Table 2.

TABLE 2: ATTRIBUTES OF DISTANCE EDUCATION

Attribute	Applicability
Suitability	<ul style="list-style-type: none">• Meets information requirements• Suits effective needs analyses
Flexibility	<ul style="list-style-type: none">• Satisfies a variety of possible conditions
Accessibility	<ul style="list-style-type: none">• Operates using various modes, depending on need
Participation	<ul style="list-style-type: none">• Provides opportunities for interactivity and shared experiences
Timing	<ul style="list-style-type: none">• Allows access anytime, 24/7
Diversity	<ul style="list-style-type: none">• Caters to a wide range of groups' and individuals' informational needs
Efficacy	<ul style="list-style-type: none">• Translates to useful, applicable initiatives that can be incorporated into regular routine

Distance education could deliver personal training, technical or vocational training, specialist training, teacher education, post-secondary education, and provide public information. However, it is not a *panacea* for the delivery of environmental education. In order for such delivery to succeed, change is required with respect to the concept of education as a whole.

According to Molero, distance education's involvement vis à vis environmental

education should not simply materialize in the offering of environment- and ecology-oriented courses. The characteristics of environmental education should “permeate the teaching curricula” (1998, p. 119). In order to accomplish this, the disciplines of society that form the problematic knot of specialized and compartmentalized pedagogies would have to change and adapt, recognizing their respective places within the broader system that is our global environment. By doing this, tertiary institutions would, by default, begin the process essentially with the production of people able to critically evaluate global environmental problems and facilitate solutions (Novo, 1998).

Changes like this, however, are not a simple task to accomplish because they require not only the provision of opportunities to acquire knowledge (cognitive learning), but also opportunities to develop new environmental attitudes (affective learning) and behaviours (psychomotor learning). Such changes extend beyond personal transformation. Through action and reflection, they begin the process of changing social values, ethics and beliefs.

Within education as a whole, including informal education, one of the greatest challenges to overcome will be the transcendence from the tolerance and boredom associated with supplantive learning to generative learning, thereby enhancing our capacity for creativity. Through the incorporation of environmental education values into curricula and with a focus on meaningful learning, learners become more engaged with the subject, actively exploring and pursuing uses for

the information they acquire, rather than remaining as simple repositories for disassociated items of knowledge (Wals & de Jong, 1997).

ENVIRONMENTAL AND SUSTAINABILITY EDUCATION

There is a vast array of literature on the subject of environmental education. Also known as sustainable education (Sterling, 2001), education for sustainability (Sterling, 1996), environmental literacy (Coppola, 1999; St. Clair, 2003; Mancl, Carr & Morrone, 1999), ecological literacy (Orr, 1994; Salmon, 2000), ecologically sustainable education (Bowers, 1995; Bowers, 2001), conservation literacy (Brewer, 2001), and ecopedagogy (Kahn, 2003), environmental education has emerged with increasing importance since Rachel Carson challenged the world to view environmental issues with a different perspective in her 1962 publication, *Silent Spring*. Since that time, there has been considerable scientific research conducted regarding the state of the environment and human impact on the environment as well as dire predictions made to indicate that we are approaching the limit of the Earth's carrying capacity. This information has been popularized through the writings of prominent authors such as Suzuki and Gore.

Human civilization is now so complex and diverse, so sprawling and massive, that it is difficult to see how we can respond in a coordinated, collective way to the global environmental crisis. But circumstances are forcing just such a response; if we cannot embrace the preservation of the earth as our new organizing principle, the very survival of our civilization will be in doubt (Gore, 1992, p. 295).

A variety of literature written by such academics as Orr (1992; 1994), Sterling (1992; 1996; 2001), Bowers (1995; 2003), and Freire (2002) support the concept, through systemic discourse, of radical changes to our education system to the extent that humanity is not simply *immersed in* the world, but that we “*emerge from* the world, objectify it, and in so doing can understand it and transform it” (Freire, 2002, p. 125, my emphasis). What these scholars propose is nothing short of a paradigm shift with regard to the manner in which we embrace and operationalize education. They propose that the delivery of education shift from a focus on delivery for cognitive purposes to that for affective purposes. The importance of affect within education is not yet mainstream within our learning systems.

SYSTEMS APPROACH TO ENVIRONMENTAL EDUCATION

Among those supporting a paradigm shift for education and the incorporation of environmental education, knowledge, skills, and values, a systems approach seems to be the preferred method of change. Indeed, Lovelock (1988) spoke of the Earth as a living system on a planetary scale, Gaia, such that the Earth's biota, collectively with its environment, acts – and has acted – as a single, self-regulating, living system in such a way as to maintain the conditions that are suitable for life.

It follows then, with no surprise, that environmental education theorists pursue

the concept of a systems approach to improving environmental literacy and encouraging participation.

An ecological view of the world emphasizes *relationship*. Such thinking is systemic rather than linear, integrative rather than fragmentary. It is more concerned with process than things, with dynamics than linear cause-effect, with pattern rather than detail. It is both descriptive and purposeful, being concerned with both recognizing and realizing wholeness (Sterling, 2002, pp. 16-17).

Middleton (2001) identifies some of the interconnectedness between humanity, environment, place, and peace, and he suggests that the relationships between all of these variables, and others, create a situation in which a more global approach toward learning and education is appropriate. This, he maintains, is a systems approach.

Daudi concurs with both Middleton and Sterling and states further that education ought to be approached through a process of “thinking using system ideas” (2001, p. 18). A systems approach distinguishes itself from the more traditional analytical approach, he says, because it focuses on the relationships and interconnectedness between different components of the system. The implication of this within the field of environmental education is that it provides a new way of thinking about environmental education as being embedded within and having a relationship with all other educational components. Daudi (2001) summarizes a model of Earth Systems Education that is intended to provide outputs that develop scientific thought and environmental knowledge, promote

environmental stewardship, and foster an aesthetic appreciation of the Earth.

In his book, *Our Common Illiteracy: Education as if the Earth and People Mattered*, Jucker (2002) agrees with these sentiments, but he cautions that it will be an uphill struggle. While it is very well to speak of education as a system and environmental education as a factor, he maintains that it must not be forgotten that education is a component of a larger social system that also includes politics, economics, and social structures and, further, that changes in one system, such as education, cannot function in isolation. “Any attempt to reform the university without attending to the system of which it is an integral part is like trying to do urban renewal in New York City from the twelfth story up” (2002, pp. 253-254).

PUBLIC ENVIRONMENTAL LITERACY

As determined through a review of the literature, there appear to be no Canadian studies about environmental literacy related to establishing a baseline level of environmental knowledge, attitudes, and behaviours. There are, however, several such studies that have been conducted in the United States.

In 1999, Ohio launched a survey regarding environmental literacy of Ohio adults (Mancl, Carr & Morrone, 1999). With a focus primarily on ecological knowledge, Ohio surveyed respondents with regard to their knowledge about such principles as ecosystem succession, carrying capacity, diversity, and materials cycling. The survey reports that, on the whole, Ohioans display a

general understanding of the basic ecological principles and it concludes that this foundation would provide an excellent opportunity for citizens to “expand their [ecological] vocabulary” (1999, p. 59).

The State of Pennsylvania became the first North American jurisdiction to launch a survey to determine the state of environmental stewardship among its citizens. Identifying that environmental stewardship depends on both an informed public and their individual and collective actions, *The First Pennsylvania Environmental Readiness for the 21st Century Survey Report* was presented. The report concludes that, while Pennsylvanians take pride in their responsibility for environmental decision-making, they have a poor understanding of both environmental issues and knowledge. Furthermore, the report concludes that such a lack of knowledge has a detrimental effect on Pennsylvanians’ ability to act as environmental stewards (PCEE, 2001).

Similarly, Minnesota recognized that the looming environmental crisis would require an environmentally literate citizenry in order that the needs of the State and the needs of the environment could be addressed adequately through future decision-making. To that end, in 2002, it presented *The Minnesota Report Card on Environmental Literacy: A Benchmark Survey of Adult Environmental Knowledge, Attitudes and Behavior* in order to determine, as a baseline useable for future comparison, the current level of environmental literacy among adults in Minnesota. The survey concludes that more than half of the state’s adult

population demonstrate a less than average level of environmental knowledge while, at the same time, most Minnesotans indicate that they are self-taught with respect to such knowledge. Minnesota recognizes this paradox and the report recommends that formal and non-formal learning opportunities be made available to address the shortcoming (MOEA, 2002).

Interestingly, Minnesota has since conducted a follow-up study in 2003, *The Second Minnesota Report Card on Environmental Literacy* (MOEA, 2004). Findings in the 2003 study indicate that 4% more Minnesotans display at least an average knowledge of the environment in comparison with the baseline study. In general, as well, attitudes with respect to environmental factors have improved. Findings indicate relative *status quo* regarding attitudes about environmental laws, but show slight and significant improvement regarding attitudes about wetlands and air quality, respectively. Attitudes regarding the need for environmental education remain unchanged in comparison to 2001, with an overwhelming 90% favourable response rate. Individual behaviours fluctuate in comparison with 2001 results but, overall, Minnesotans' environmental behaviours remain relatively constant (MOEA, 2004).

Minnesota has also embarked on the creation of a plan to incorporate the environment as an underlying theme in its educational curricula. Entitled *A GreenPrint for Minnesota* (MOEA, 2000), the plan establishes strategies to achieve:

- Enhanced partnerships and coordination between environmental education providers;
- Funding for environmental education at the local level;
- Focus on out-of-classroom experiences for K-12 students;
- Support for training of environmental educators;
- Improved access to environmental education information and resources;
- Improved education regarding responsible environmental choices; and
- Implementation of an environmental education assessment tool.

In 2002, Louisiana also embarked on a survey of environmental attitudes and knowledge. In *Louisiana RoperASW Study: Environmental Attitudes and Knowledge Survey 2002*, Louisiana reports that, while a majority of adults self-assess their level of environmental knowledge as at least fair, fewer than 30% demonstrate that they can answer basic questions about the environment correctly. In conclusion, the Louisiana report suggests the need for additional learning opportunities with respect to environmental issues and problems (RoperASW, 2002).

Federally, the US Government has launched several surveys intended to track the level of environmental knowledge among adult Americans. In its 2004 draft report, *Understanding Environmental Literacy in America: And Making It a Reality*, Americans are characterized as having an understanding of the need for

environmental education. However, on the whole, the study finds that just one-third of Americans have a basic awareness about environmental issues and, further, that one-fifth of Americans formulate their environmental knowledge on the basis of outdated or incorrect information. The study finds, in addition, that there is no distinction between the level of environmental literacy of the general public and that of elected officials. It points to a need to achieve a base of knowledge with regard to the environment and posits a variety of means by which to do so (NEETF, 2004, draft).

RELATED ENVIRONMENTAL LITERACY RESEARCH

A variety of studies have been conducted to determine the level of environmental knowledge, attitudes, and behaviours among specific demographic groups within a population. Many studies have tried to ascertain such information as it pertains to elementary and secondary school children in an effort to recommend changes to curricula. There are, however, a few studies that are directed toward adult learners.

Undergraduate students at the University of Florida were surveyed in 2000 with respect to environmental literacy. Built upon the premise that universities have been challenged to increase their role in developing an environmentally literate citizenry as adopted in Chapter 36 of Agenda 21¹, the study analyzes the relationship between environmental knowledge, attitudes, and behaviours in order to provide the University of Florida with a baseline related to environmental

¹ Agenda 21 is the global plan for sustainable development that was adopted at the 1992 Earth Summit in Rio de Janeiro. Chapter 36 addresses the promotion of education, public awareness and training.

literacy in the event that the University might wish to pursue the implementation of either a formal environmental literacy requirement or program. It concludes that, among the three components of environmental literacy, undergraduate students display highest results with regard to attitudes, followed by lower levels of knowledge, and still lower levels of behaviour (Kibert, 2000).

Similarly, students at Taiwan's Providence University were the subjects of a 1998/99 study to determine the effectiveness of a 16-week environmental education course in promoting students' responsible environmental behaviour. The study concludes that, upon completion of the formal course, students' environmental behaviour did improve significantly and, further, that the results of learning achieved in the course remained with students when re-tested several months after the course ended. The study recommends the adoption of formal environmental education learning opportunities as a means by which to improve environmental literacy in Taiwan (Hsu, 2004).

In *Shades of Green*, a link between public attitudes regarding the environment and the economy is drawn in political terms. Indeed, the relationships between these two often-conflicting social factors have caused scholars to consider a new educational paradigm. Identifying that the two dimensions actually exist on a continuum ranging from extremely ecocentric (save the environment at all costs) to anthropocentric (support economic growth at all costs), the study concludes with the creation of two models – an ecology model, as a basis from which to

work, and an integrated economic-environmental model, that allows for joint causal relationships and influences in decision-making (Nielson, 1999).

ENVIRONMENTAL AND SUSTAINABILITY EDUCATION IN ACTION

A diversity of literature exists related to practical examples of environmental education in action and, more importantly, means by which to incorporate an environmental education-based curriculum. It provides additional background support to the primary discussions noted above, and outlines the connections and relatedness between environmental education and other components of society.

Both Leal Filho (1998) and Molero (1998) draw a clear connection between environmental education and distance education, citing arguments for the incorporation of environmental components within distance offerings. These include such benefits as the development of a conservation ethic through the integration of environmental, social and economic issues (a benefit for distance education), and ease of delivery to a wide cross-section of society that may participate in specific distance education courses (a benefit to environmental education).

Concurring, Sharma (1998) points to the need to incorporate all parts of society and women, specifically, in opportunities for personal growth and development. She continues by outlining that the flexibility and individuality inherent in distance education systems lend themselves well to a world that is not

homogeneous in its outlook.

Both Coppola (1999) and Devuyt and Hens (1992) consider environmental education as being within the formal education process. With a primary interest in post-secondary education, both identify means by which curricula could be adapted in order to include aspects of environmental education. Gough (2001) expands this concept to include non-formal environmental education and training with a focus on moving toward a theory of lifelong learning.

Volk and Cheak (2003) study the collateral impact of introducing an environmental education program in elementary school on the students, their parents and the community over a period of five years. The results of the study indicate that students emerging from the program are not only more knowledgeable about ecology and environmental issues, but that they demonstrate better skills related to critical thinking and cognition. The study also reports that parents and the community tend to become involved with students that are immersed in such a program “through the students’ presentations at symposia, articles published in the local newspaper (authored by students), and by witnessing of changes in behaviour on the part of students and their families” (2003, p. 23).

Another component of society that has a collateral impact on its level of environmental knowledge is the media. Brothers, Fortner, and Mayer (1991) examine the impact of television news on the environmental knowledge of adults

in Cleveland. The study concludes that the media can play a role with respect to improving environmental knowledge. However, in a separate study, the US National Environmental Education & Training Foundation (NEETF) warns that the media also play a role in dispensing misinformation and causing misapprehension in regards to environmental issues by sensationalizing those that are considered newsworthy. For example, the coverage of the Exxon Valdez oil spill in 1989 is so ingrained into most peoples' minds that, as determined in the 2004 national survey, most Americans erroneously believe that major oil spills are the source of most oil pollution (NEETF, 2004).

Yet another study, conducted by Schuett and Ostergren (2003), links environmental concern and involvement with participation in voluntary associations. The study reveals that those who volunteer in environment-related associations tend to have a better understanding about the environment and tend to engage to a greater extent in environmental activism.

THE PARADOXES OF ENVIRONMENTAL AND SUSTAINABILITY EDUCATION

Sustainable development was first verbalized in Canada in 1915 when the Commission on Conservation “declared our need to live within the world’s means” (CME, n.d., p. 57). In the mid-twentieth century, authors such as Aldo Leopold and Rachel Carson penned their concerns related to exponential growth. In 1972, world governments became involved and, with the participation of delegates from

some 113 countries, the Stockholm Declaration was drafted and set the stage for future planning with respect to limits to growth and development.

Though present several decades earlier, the concept of sustainable development received global acclaim in 1983 when the Brundtland Commission first used the term publicly. It defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43). Since then, it has risen in popular use on global, national and local fronts, and as time progresses, the concept continues to evolve. The resulting inability to agree on a standard definition of sustainable development has fostered discussion that remains largely theoretical. Paradoxically, however, we do not seem to be deficient in identifying examples of human activity that is *unsustainable*. Most theoretical discussion considers sustainability to be a paradigm that merges thinking about the environmental, social and economic parameters of life. It is believed that the pursuit of such a paradigm would result in development that is sustainable and that would improve quality of life (McKeown, 2002; Orr, 1992; Sterling, 2001).

The exploration of education as a support mechanism emerged in parallel with the appearance of the concept of sustainable development. Interestingly, however, it did not follow the same pattern as most educational development. In fact, unlike most educational change, the academic community has not been instrumental in constructing the concept of education for sustainable development

until recently. The primary push for an alliance between the two concepts originated with non-governmental organizations and international political and economic forums such as the United Nations and the Organization for Economic Cooperation and Development. “In many countries, [education for sustainable development] is still being shaped by those outside the education community” (McKeown, 2002, p. 10). Often, government ministries create curricula or establish guidelines, which are released, in turn, to the education community for public delivery. Such is the case in Manitoba, where the provincial government has enacted a Sustainable Development Act, requiring its Ministry of Education to evaluate coverage of environmental topics in its curriculum.

An interesting and somewhat incongruous circumstance emerges as result of the involvement of the education community as it works towards education for sustainable development. It is generally accepted that population growth and resource consumption are key items in the problem of sustainability (McKeown, 2002; Orr, 1992; Sterling, 2001; Wackernagel & Rees, 1996). Education has links to both. The education of females, for example, correlates positively with sustainable development because it reduces population growth by reducing fertility rates. The reverse, however, is true of resource consumption (McKeown, 2002). People that are more highly educated tend to have higher incomes and, as a result, tend to consume greater quantities of resources. The developed countries of the world, all of which tend to have the greatest ecological footprints,

exemplify this. That is, they tend to consume resources beyond the capacity of the earth to provide, and they tend to produce waste at a rate beyond the capacity of the earth to absorb (Jucker, 2002; Wackernagel & Rees, 1996).

Finally, as argued by Sterling, education has always been involved with “first-order learning” (2003, p. 358) in order to ensure continuity. However, the more that we continue to do the same to maintain continuity, our unsustainable practices increase the likelihood that our future will be discontinuous with the past.

ENVIRONMENTAL CITIZENSHIP

The public is, arguably, the largest stakeholder group with respect to the environmental challenges we face and in determining ways in which we ought to live sustainably. However, it is probably the group with the weakest voice because of its lack of cohesion and varying personal and social interests. In other arenas, the public has played a critical role in regard to citizenship rights (for example, the abolition of slavery, the labour movement and women’s, gay and civil rights movements). It follows, then, that the public is likely to become pivotal as we address the challenges of the environment as the next social movement.

As with any subject that focuses on social involvement and development, gender has emerged as an issue. Men and women do not face the today’s social challenges in the same fashion. Obstacles to equal participation include

constitutional factors, cultural, social and psychological factors, and economic factors. For example, “women own less than 1% of the world’s land property, [and] are often responsible for the majority of agricultural production, producing the bulk of domestically consumed food and sustaining the livelihood of their families” (UNESCO, 2002).

Despite that, women have been important leaders in promoting an awareness of the environment. From Rachel Carson’s *Silent Spring* to the work of others, such as Jane Goodall, Dian Fossey, Gro Harlem Brundtland, Vandana Shiva and Naomi Klein, many are leaders in the cause. However, the vast majority of women, primarily in developing countries, are prevented from effective involvement in environmental planning and issues management because they are occupied trying to provide for their families’ well-being, safety and security. Consequently, any discussion regarding the environment and environmental education must consider the opportunity for all to participate. To this end, the Institute for Womens’ Policy Research (IWPR) published a study in 2003 identifying key opportunities for the inclusion of women in both environmental literacy and activism (IWPR, 2003). Some of the findings emerging from the IWPR study include:

- Women are less likely than men to support government initiated environmental spending cuts;
- Women are less sympathetic to business than men when it comes to

environmental regulation;

- Both men and women reject the need to choose between jobs and the environment;
- Women are particularly concerned about environmental risks related to health and safety;
- Women have less trust in the integrity, practices and results of institutions that are tasked with environmental preservation; and
- Since environmentalism and political participation are linked to income and education, it is significant to note that women with higher incomes and higher levels of education are more likely to engage in environmental activism.

There has also been research to suggest that the language we use – nomenclature, metaphors, etc. – play a role with respect to environmental literacy. Hill and Johnston identify that considerable good work has emerged with regard to “social change by challenging oppressive systems” (2003, p. 17). However, they suggest that language, because of its direct impact on culture, has a hitherto understated role to play with regard to social change and environmental education. Since language has been used successfully to exclude members of society and to retain power, and since metaphors have an impact on the ordering of our thoughts and worldviews, it is critical, they say, to ensure that “our talk is in part our action” (2003, p. 22).

Similarly, Russell, Sarick, and Kennelly, suggest that it is equally important as a means of assuring that all societal voices are heard, that we understand the problems associated with “heteronormativity, essentialized identities, and the heterosexualization of our theories and practices” (2002, p. 54). Once diversity is acknowledged, they contend, social experience will no longer be universalized and there will be recognition of the unique approaches to a problem and understanding of an experience that different people encounter and offer.

Culture also plays a critical role in social development. From indigenous knowledge and the rekindling of learning relationships with developing societies, western nations are also faced with cultural change from within. Young people today, currently moving through the education system and embarking on new careers, have a huge impact on our world. “The powers behind branded clothing, cosmetics, fast food, computer software, and the entertainment and leisure industries, reshape young peoples’ desires and identities while global flows of information, signs and symbols encourage their brains to think fast, make connections, and value the emotional life of the heart more than the rational life of the mind” (Huckle, 2001). Because of this, the transition to the immediate and the affective becomes all the more prominent.

The green social movement is comprised primarily of NGOs that believe in public involvement and in the development of ecological or environmental citizenship. Today, they make use of the Internet as a primary tool for

democratization through participation to promote their message(s). In addition, they are engaged in developing a symbiotic relationship with the media in order to make green issues more widely known and to motivate the largest audience possible. The process of relationship building with the media and the public and engaging both in environmental debate has been described as “global internetweaving” (Tsaliki, 2003). For example, environmental protests provide for the formation of “collective participation in nexuses of global action where citizens can combine an active consumer society with direct democracy on a world scale” (Beck, quoted in Tsaliki, 2003). Over the years, thanks mostly to the use of electronic and communication technology, green NGOs have shifted from a focus on discrete issues to a more holistic approach, thereby enabling them to respond more effectively (Princen & Finger, 1994).

The broadening of meaning allows new social movements to focus on democracy through participation and is conducive to Habermas’ (1996) view of discursive democracy in which the locus of democracy rests with the ability to generate communication. As a result, it can be argued that NGOs are entering the realm of transnational power brokering normally thought to reside with private enterprise (Kellner, 1999).

A variety of complexities follow such a power shift and organizations using these technologies for public education and participation must be cautious, whether the complexities are real or imagined. For example, greenwashing, “the

activity of giving a positive public image to putatively environmentally unsound practices,” (Wikipedia, 2006) has become a common practice in business circles in recent years. Johnson (2004) argues that businesses engaged in greenwashing deceive consumers into supporting unsustainable economic practices, lure investors who link environmental performance with profit, and mislead policy makers who are responsible to design and enforce environmental regulations.

From an eco-justice perspective, Bowers validates all of these points. “Diversity is as necessary to development as human beings as it is to ecological balance” (Marglin, quoted in Bowers, 2001, p. 43).

RELEVANCE / CONTRIBUTION OF DISTANCE EDUCATION

Through a systems approach to creating a new educational paradigm, distance education will have the opportunity to demonstrate that it is a relevant and viable means of assisting the field of education with progressive, sustainable change. As a field that emerged on the scene relatively recently, distance education has already proven its ability to be adaptive and proactive with regard to education (learner and learning provider benefits, curricula, technology, and delivery). Each of these qualities has a role to play within education itself.

Nonetheless, the use of distance education is not without its limitations. It has been argued that distance learning provides an opportunity for education to be

made available to all. However, by the very nature of presenting such a viewpoint, it assumes that there are no groups of people that are marginalized and no groups of people that do not have access to education. The fact remains, however, that this is not the case (Guy, 1991; Yates, 2000).

While perhaps unintentionally so, political aspirations as regards distance learning development often forget that, in the end, educational products must be supported by an infrastructure in order to ensure that they are both sustained and sustainable. Policy must, therefore, concurrently include plans for technological advancement and access to connectivity, provision of a stable electrical power base and the provision of a skilled workforce to provide for instructional design as well as technical and student support needs (Bates, 2001; Farrell, 2001). “No vision for virtual education can be successfully implemented without an enabling infrastructure in place” (Farrell, 2001, p. 148).

Education has been promoted as a basic human right (Orivel, 2000; Perraton, 2000b). Therefore, it should almost go without saying that there would be no distance learning if there were no learners. Indeed, learners are the most crucial element in any educational equation (Jenkins, 2003). However, challenges exist in this regard as well. With hundreds of nations and thousands of cultures and language groups to accommodate, offering distance learning opportunities in such a way as to ensure the continuation and support of each unique group is a huge undertaking (Guy, 1991). Few would argue the rights of individuals and

groups to preserve and protect their culture and language or the rights of nations to the ability to compete globally, but distance learning, in its effort to appeal to the masses and achieve economic viability, may be “masking, rather than addressing, issues of social equity and democracy” (Yates, 2000, p. 237). The creation of distance learning materials offers an excellent example of this phenomenon. In trying to appeal to the broadest audience possible, most material is produced in English. This has the effect of (a) increasing the level of difficulty for a learner whose first language is not English (Guy, 1991), (b) ignoring the differences in learning styles across cultures (Guy, 1991) and (c) ‘invading’ a cultural group with the course developers’ national values and ethics (Evans, 1995; Guy, 1991).

Moore argues that the consumer approach to distance learning has also had a troubling effect on its target audience. Rather than focussing on education for the “satisfaction of personal enlightenment and the reward of intellectual achievement” (Moore, 1996, p. 191), qualities that would support individualism and social democracy, the market-driven pursuit of a diploma, the buying and selling of education as a commodity, leads to philistinism, the self-righteous indifference toward culture. He cautions that, while the global distribution of distance learning opportunities is a positive factor, care must be taken to assure that it does not follow an impersonal, disdainful pattern (Moore, 1996).

Obviously, distance education risks exposure and failure. However, a solid

systems approach would incorporate the feedback necessary to rebuild or restructure the system to include the needs and changes identified. It is my opinion that the use of a systems approach within distance education will enable it to rise to meet the challenges associated with the pursuit of environmental education. Doing so will firmly establish distance education within the environmental and sustainable education field and as a model upon which education, as a field, can draw as it comes to terms with both current and future paradigm changes.

As a society, it will be our role to remain open-minded and inquisitive, and to understand the need to be more cognizant of both our environment and our impact on it as well as the reciprocal effects of the affected environment on our own health and well-being. After all, we are all more interconnected than our current educational experiences may lead us to realize.

CHAPTER III

METHODOLOGY

It is the purpose of this study to explore the current status of the relationship between distance education and environmental and sustainability education and to proffer a number of solutions to assist in the search for and transcendence to a new educational paradigm, one that will meet the needs of Ontario both in the present and in the future.

To that end, the scope of the research reported in this thesis includes:

- Establishing a baseline with regard to the current status of environmental education in Ontario – achieved through a literacy audit of the environmental knowledge (cognitive learning), attitudes (affective learning), and behaviours (psychomotor learning) of Ontario adults;
- Identifying the gaps in environmental learning – based on audit results in comparison with studies previously conducted in Minnesota as points of reference; and
- Recommending new directions for a shift in formal education in Ontario through the identification of means by which the use of distance education can be maximized in support of traditional forms of education.

DEVELOPMENT OF THE AUDIT INSTRUMENT

The Ontario Environmental Literacy Audit (see Appendix A) was adapted for use in measuring the level of environmental literacy among adults in Ontario. Sources for the adaptation include similar surveys conducted by the Minnesota (MOEA, 2002; MOEA, 2004) and US governments (NEETF, 2004, draft), as well as similar thesis research conducted to examine the three factors of environmental literacy within the student body at the University of Florida (Kibert, 2000). The factors included in the Audit that comprise environmental literacy are environmental knowledge, environmental attitudes, and environmental behaviours. A similar pattern of survey design has been used successfully in a number of US state studies (Mancl, Carr & Morrone, 1999; PCEE, 2001; RoperASW, 2002) as well as in other thesis research (Hsu, 2004; Volk & Cheak, 2003). In this study, adaptations made include mainly the incorporation of Canadian, specifically Ontario, data in the environmental knowledge portion of the Audit.

AUDIT INSTRUMENT: ENVIRONMENTAL KNOWLEDGE

The environmental knowledge portion of the Audit comprises ten questions that range across the breadth of subject material related to the environment and ecology. The questions are intended to be a sample of both the diversity of information available as well as several items of key importance in Ontario.

Responses to the questions will provide a representation of Ontarians' actual knowledge with respect to the environment. Correct responses are assigned a score of four and incorrect responses are assigned a score of zero, for a total possible score of 40.

AUDIT INSTRUMENT: ENVIRONMENTAL ATTITUDES

The environmental attitudes portion of the Audit comprises thirteen questions that provide an indicator of what Ontarians *believe* about certain environmental issues. With three specific exceptions, responses are scored using a Likert-type scale, ranging from 'strongly agree' to 'strongly disagree.'

For the ten Likert-type questions, the most preferred (or environmentally friendly) response is assigned a score of four, and scores are successively graduated down the scale to an assignment of zero for the least desirable response. Responses of 'no opinion / don't know' are assigned a score of zero because it is defensible to argue that having no opinion with respect to an environmental issue is the least desired response. The greatest possible score for these questions, therefore, is 40. It is worth noting that some statements are worded such that environmentally friendly responses may be at either the top or the bottom of the list of responses. Scoring is adapted to ascend or descend as required.

Responses to the remaining three attitude questions are simply compared for

general interest because they ask about respondents' attitudes with regard to multiple scenarios.

AUDIT INSTRUMENT: ENVIRONMENTAL BEHAVIOURS

The environmental behaviours portion of the Audit comprises ten questions that provide an indicator of what Ontarians actually *do* in their daily lives that has an impact on the environment. Responses are scored using a Likert-type scale, ranging from 'never do it' to 'frequently do it.'

For the ten Likert-type questions, the most preferred (or environmentally friendly) response is assigned a score of four, and scores are successively graduated down the scale, in multiples of two, to an assignment of zero for the least desirable response. The greatest possible score for these questions, therefore, is 40.

AUDIT INSTRUMENT: COMPOSITE SCORE

Following the assumption that each factor – knowledge, attitudes, and behaviour – is equally important as a determinant of environmental literacy, a composite environmental literacy score is derived simply by adding the scores from each of the three factors together. The lowest possible score, therefore, is zero and the highest possible score is 120.

The composite score, as well as the scores for each of the component factors, are not intended to be an evaluation of the public. Rather, they are a means by

which to identify a baseline concerning the knowledge about, attitudes toward, and behaviours related to the environment in Ontario. It provides an opportunity for comparison when, and if, future similar studies are conducted as well as providing a point for discussion related to the role of distance education in a new educational paradigm.

AUDIT SAMPLE

The Audit is intended to be representative of the Ontario adult population. To that end, the population has the following characteristics as determined by the 2001 census²:

- Total Adult Population (age 18+) 9,105,540
- Percentage Male 49.4%
- Percentage Female 50.6%

Sampling principles suggest that, for a very large population (such as the adult population of Ontario), a small sampling ratio still produces accurate, representative results. Economic constraints also being a factor, the sample size in the Audit is n=76.

DATA COLLECTION / TREATMENT

Through the engagement of a market research firm, the Audit was delivered by telephone using random-digit dialling technology across all Ontario area codes in January 2006. Participants were asked to respond verbally, by telephone, to a

² Source: <http://www.gov.on.ca/FIN/english/demographics/demog04et4.htm>.

series of 33 questions related to their environmental knowledge, attitudes and behaviours and to a series of eight general and demographic questions.

Telephone surveys tend to be easier and more efficient to administer than either in-person or self-administered surveys and offer the following advantages (Neuman, 2003):

- A large proportion of the population can be reached by telephone;
- Data can be collected quickly;
- Data collection processes can be monitored through the quality control practices of the research firm conducting the survey;
- Data can be collected more economically than via other means (for example, there are no travel costs as would be associated with face-to-face surveys); and
- Data can be collected more efficiently by capitalizing on the technologies that exist within the research firm.

Each respondent's confidentiality has been respected and the data gathered is not tied to any unique personal identifiers. The demographic data collected does not identify the respondents. Respondents were advised that they have the right to choose to participate, to cease participation at anytime, or to decline to respond to any question(s) as they wish.

The Audit is intended to act as a baseline from which to discuss the results as they relate to education in general. More specifically, the data will be reviewed in

order to determine a role for distance education in helping to bridge the gaps that are expected to emerge vis à vis environmental knowledge, attitudes and behaviours. Information concerning the relationships between education, environmental education, environmental literacy, and distance education will be obtained through a review of the existing literature on the subject.

The collection of data is expected to achieve two primary goals:

- The identification of a baseline level of environmental literacy among adults in Ontario from which to begin discussions related future plans and policy; and
- The identification of a role for distance education, based on preceding discussions, to help bridge the gap in a manner analogous to the importance of the environmental challenges we face.

CHAPTER IV

RESULTS

It is the purpose of this study to explore the current status of the relationship between distance education and environmental and sustainability education and to proffer a number of solutions to assist in the search for and transcendence to a new educational paradigm, one that will meet the needs of Ontario both in the present and in the future.

To that end, the scope of the research reported in this thesis includes:

- Establishing a baseline with regard to the current status of environmental education in Ontario – achieved through a literacy audit of the environmental knowledge (cognitive learning), attitudes (affective learning), and behaviours (psychomotor learning) of Ontario adults;
- Identifying the gaps in environmental learning – based on audit results in comparison with studies previously conducted in Minnesota as points of reference; and
- Recommending new directions for a shift in formal education in Ontario through the identification of means by which the use of distance education can be maximized in support of traditional forms of education.

DEMOGRAPHICS

Opinion Search, a research firm specializing in survey research data collection, conducted the Ontario Environmental Literacy Audit from January

TABLE 3: DEMOGRAPHICS OF RESPONDENTS

Item	Number of Respondents	Percentage
<u>Gender</u>		
Male	38	50.0%
Female	38	50.0%
<u>Age Range</u>		
18 – 29	13	17.1%
30 – 39	18	23.7%
40 – 49	16	21.1%
50 – 59	15	19.7%
60 +	13	17.1%
Refused	1	1.3%
<u>Education Level</u>		
Less than high school	6	7.9%
High school graduate or GED	20	26.3%
College diploma	24	31.6%
Undergraduate degree	10	13.2%
Graduate degree	16	21.1%
<u>Residence</u>		
Large city	21	27.6%
Medium city	15	19.7%
Small city	10	13.2%
Suburban town	9	11.8%
Small town	8	10.5%
Rural or farm area	13	17.1%

16-18, 2006. In all, 76 respondents participated in the survey. All were Ontario residents and all were adults (age 18 or older). The gender split between respondents was 50% male and 50% female, approximating gender demographics presented in the most recent Ontario census. The majority of respondents are urban, with 60.5% indicating that they live in cities. Of the remainder, 22.3% reside in towns and 17.1% reside in rural or farm areas. Respondents are also well educated, with 65.9% possessing a post-secondary education. Respondents are relatively evenly distributed across age cohorts. See Table 3.

ENVIRONMENTAL KNOWLEDGE

Knowledge refers to cognitive learning achieved through the fact or condition of knowing something with familiarity gained through experience or association. Therefore, within the Audit, environmental knowledge provides an indicator as to the level of cognitive learning related to the environment and/or environmental issues that adults in Ontario are able to demonstrate.

The Audit begins with a question asking respondents to rate their level of environmental knowledge. It is interesting to note that a majority of respondents, 82.9%, self-assess with at least some environmental knowledge and, of these, 13.2% self-assess that they have a great deal of environmental knowledge. Equally interesting is the fact that, among respondents, there are none that report

that they have no knowledge of environmental issues and problems. See Table 4.

TABLE 4: SELF-ASSESSED ENVIRONMENTAL KNOWLEDGE

Item	Number of Respondents	Percentage
A great deal of knowledge	10	13.2%
Some knowledge	53	69.7%
Not very much knowledge	13	17.1%
No knowledge	0	0%

In order to determine the level of environmental knowledge, respondents were asked ten questions that range across the breadth of subject material related to the environment and ecology. The questions are intended to be a sample of both the diversity of information available as well as several items of key importance in Ontario. Of a total possible of 40 points in the environmental knowledge section of the Audit, respondents scored, on average, 17.7 points. See Table 5.

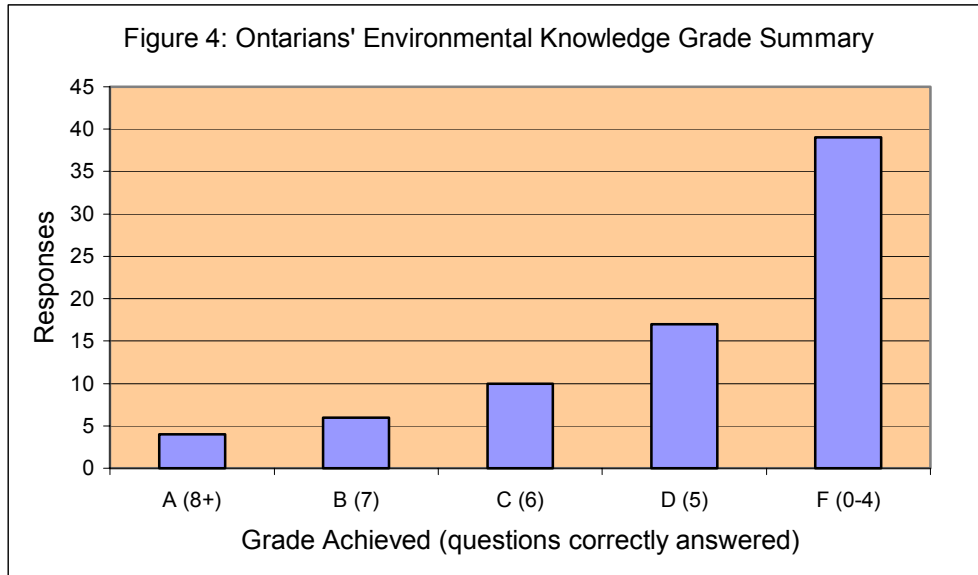
If a report card were generated to indicate the environmental knowledge of Ontarians based on the Audit and, if it were based on the Ontario College grading system (A \geq 80%, B = 70-79%, C = 60-69%, D = 50-59%, F \leq 49%), only 13.2% would receive an above-average grade of B or higher. See Figure 4.

Based on these results, it appears as though Ontarians self-assess their knowledge realistically. Table 4 reports that 13.2% of respondents self-assess their level of environmental knowledge as high and, as indicated in Figure 4, 13% of Ontarians received an above-average grade on the environmental knowledge

Audit questions. It is troubling, however, that only about one-quarter of the provincial adult population has at least an average level of environmental knowledge.

TABLE 5: ENVIRONMENTAL KNOWLEDGE RESULTS

Questions Answered Correctly	Responses	
	<u>Number</u>	<u>Percent</u>
10 questions	0	0%
9 questions	1	1.3%
8 questions	3	3.9%
7 questions	6	7.9%
6 questions	10	13.2%
5 questions	17	22.4%
4 questions	14	18.4%
3 questions	13	17.1%
2 questions	9	11.8%
1 questions	3	3.9%
0 questions	0	0%
<u>Weighted scoring</u>		
Total number of correct answers	336	
4 points for each correct answer	1344	
<u>Average Score</u>		
Out of 40 possible points	17.7	



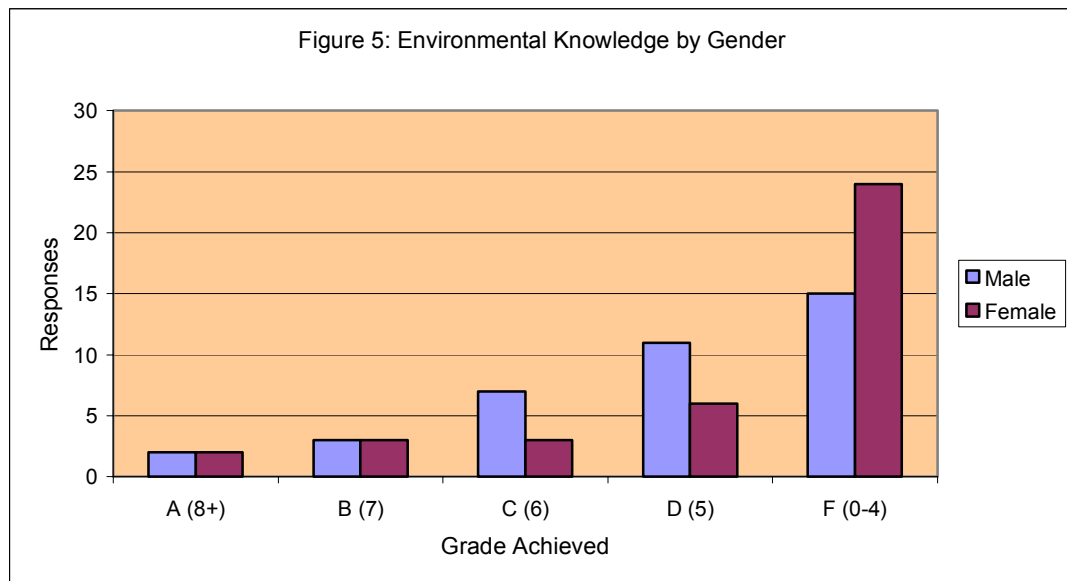
Some of the most interesting indicators arising from the environmental knowledge portion of the Audit include:

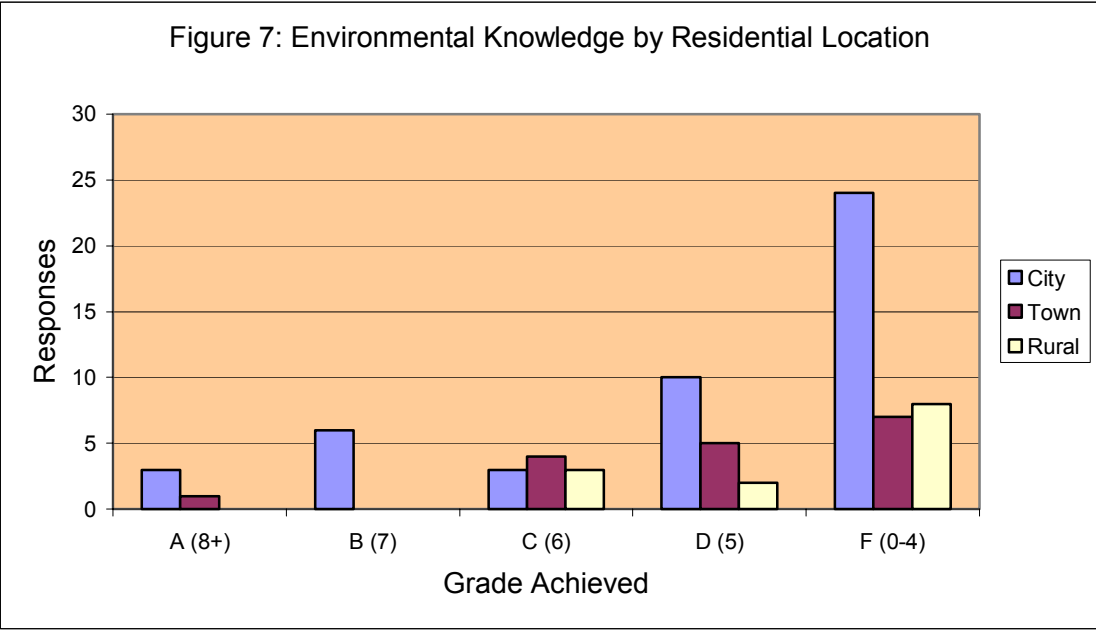
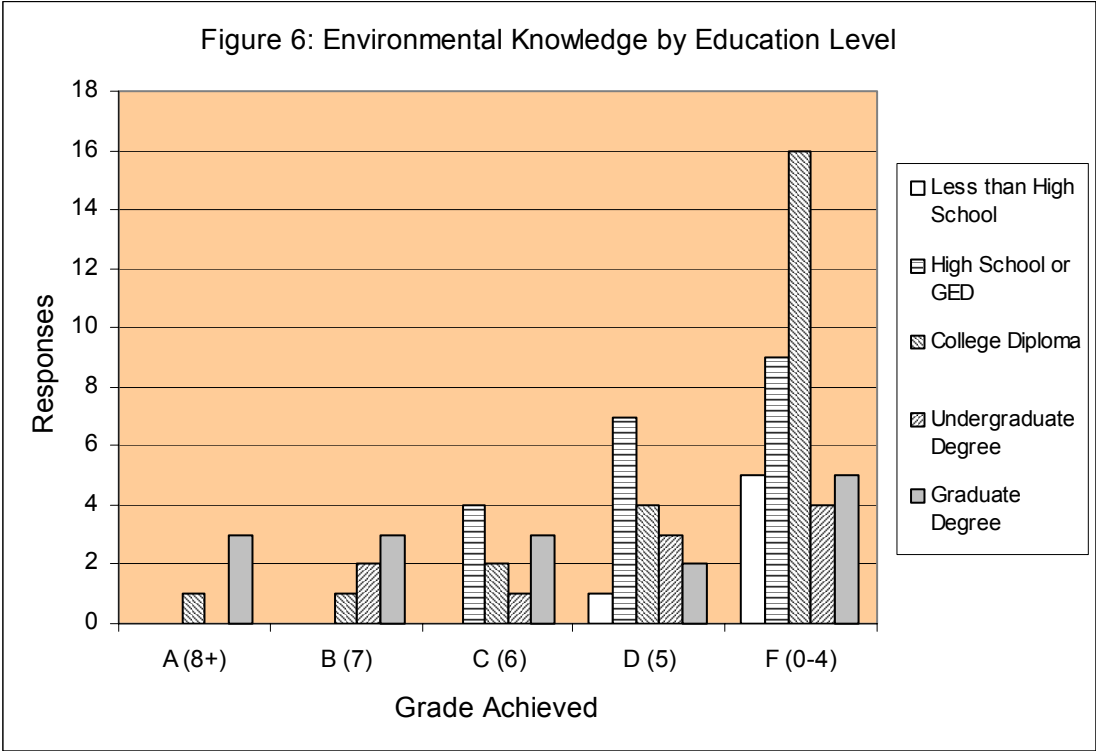
- Ontarians agree equally that natural wetlands and sewage treatment plants are best at filtering water despite the fact that wetlands are far more productive in this regard;
- More than four-fifths of Ontarians know that loss of habitat is the most common reason that animal species become extinct; and
- Three-quarters of Ontarians identified that humans will survive as a species only if the ecosystem remains balanced.

Ontarians struggled to find the correct responses to questions related to causes of water pollution, solutions for excess solid waste, climax species in food chains, and photosynthesis.

Environmental knowledge can also be compared against the demographics identified in Table 3. Recalling that most Ontarians achieved a below average grade (Table 5):

- Both genders performed equally well in the above-average cohorts, males performed better than females in the average cohorts and fewer males than females demonstrated a failing performance (see Figure 5);
- Graduate degree holders performed better in the above average grade cohorts (see Figure 6);
- Those with a high school education or less did not achieve an above average grade (see Figure 6); and
- Urban residents are more likely to achieve an above average grade than their rural counterparts (see Figure 7).





ENVIRONMENTAL ATTITUDES

Attitude, the product of affective learning, indicates a mental position, feeling or emotion with regard to or toward a fact or a state. Therefore, within the Audit, environmental attitude provides an indicator as to the level of emotion or feeling Ontarians have with regard to the environment.

In the environmental attitudes section of the Audit, 13 questions are asked, of which ten are used to generate a score related to environmental attitude. The remaining three questions are asked for comparison purposes because they seek information about respondents' attitudes with regard to multiple scenarios.

The majority of respondents demonstrated a positive environmental attitude. Certainly, 88.1% of respondents indicated a concern for the environment in their responses. Almost all respondents, 90.8%, believe that everyone plays a role in maintaining a healthy environment. To that end, 57.9% believe that the government should enact more legislation to require people to protect the environment, even if it interferes with their rights to make their own decisions. While 25.0% of respondents said that economic development was more important, 65.8% ranked environmental protection as more important. Such an overwhelmingly positive response potentially augurs well for the future of the environment in Ontario. See Table 6.

TABLE 6: ENVIRONMENTAL ATTITUDES RESULTS

Question	Responses (Context: environmental friendliness)									
	Best		Good		Poor		Least		No Response	
Q12	49	64.5%	26	34.2%	0	0%	1	1.3%	0	0%
Q13	19	25.0%	32	42.1%	6	7.9%	5	6.6%	14	18.4
Q14	31	40.8%	32	42.1%	9	11.8%	3	3.9%	1	%
Q15	5	6.6%	30	39.5%	31	40.8%	4	5.3%	6	1.3%
Q16	8	10.5%	43	56.6%	17	22.4%	8	10.5%	0	7.9%
Q17	31	40.8%	44	57.9%	1	1.3%	0	0%	0	0%
Q18	14	18.4%	36	47.4%	11	14.5%	1	1.3%	14	0%
Q19	13	17.1%	47	61.9%	14	18.4%	1	1.3%	1	18.4
Q20	27	35.5%	45	59.2%	3	3.8%	0	0%	1	%
Q21	14	18.4%	30	39.5%	23	30.3%	8	10.5%	1	1.3%
<u>Weighted</u>										
<u>scoring</u>										
Points for										
each										
answer	4		3		2		1		0	
Total										
points	844		1,095		230		31		0	
<u>Average</u>										
<u>Score</u>	28.9									
Out of 40										
possible										
points										

It is interesting to note that 79% of respondents indicated that they would be

willing to pay higher prices for products and services in order to protect the environment (see results from Question 19 in Table 6). Of those, the most common response indicated a willingness to pay 10% more in some form as long as that money is directly specifically towards protecting the environment.

ENVIRONMENTAL BEHAVIOURS

Behaviour is the manner of conducting oneself – anything that an organism does involving action and response to a stimulus. Behaviours are achieved through psychomotor learning. Therefore, environmental behaviours are those actions in which people engage that demonstrate an environmental affinity or awareness.

Ten questions were asked in the Audit in order to determine what Ontarians actually do in their daily life that has an impact on the environment.

Three-quarters of respondents, 78.6%, engage in behaviours that are beneficial to the environment. Of those, 47.5% frequently engage in environmentally friendly behaviours while 31.1% sometimes engage in such behaviours. One-fifth of respondents, 19.9%, report that they never engage in environmentally friendly behaviours. See Table 7.

TABLE 7: ENVIRONMENTAL BEHAVIOURS RESULTS

Question	Responses (Context: environmental friendliness)							
	Frequent		Sometimes		Never		No Response	
Q25	69	90.8%	5	6.6%	2	2.6%	0	0%
Q26	46	60.5%	24	31.6%	6	7.9%	0	0%
Q27	67	88.2%	9	11.8%	0	0%	0	0%
Q28	25	32.9%	28	36.8%	22	28.9%	1	1.3%
Q29	9	11.8%	39	51.3%	28	36.8%	0	0%
Q30	29	38.2%	33	43.4%	11	14.5%	3	3.9%
Q31	62	81.6%	6	7.9%	4	5.3%	4	5.3%
Q32	30	39.5%	40	52.6%	5	6.6%	1	1.3%
Q33	9	11.8%	35	46.1%	32	42.1%	0	0%
Q34	15	19.7%	17	22.4%	41	53.9%	3	3.9%
<u>Weighted</u>								
<u>scoring</u>								
Points for								
each								
answer	4		2		0		0	
Total								
points	1,444		472		0		0	
<u>Average</u>								
<u>Score</u>								
	25.2							
Out of 40								
possible								
points								

Some of the most interesting indicators arising from the environmental behaviours portion of the Audit include:

- Most Ontarians recycle and, more importantly, most attempt to reduce

waste by means other than recycling;

- Most Ontarians make use of self-propelled transport, take public transit or carpool at least some of the time;
- Private vehicles belonging to Ontarians overwhelmingly get serviced on a regular basis;
- More than four-fifths of Ontarians consider a political candidate's position regarding the environment at least sometimes during election campaigns;
- Almost all Ontarians purchase products that are environmentally friendly first at least some of the time; and
- Slightly more than half of Ontarians participate in environmental projects such as tree planting and stream clean-ups at least some of the time.

COMPOSITE ENVIRONMENTAL LITERACY

It is commonly accepted that environmental literacy is comprised of the three factors noted above: knowledge, attitudes and behaviours (Kibert, 2000; Minnesota, 2002b; Neilson, 1999; Pennsylvania, 2001). In this study, these three factors have been accorded equal weight.

According to the responses provided during the Audit, Ontarians demonstrate a composite environmental literacy score of 71.8 points. This corresponds to a

grade of 59.8%. See Table 8.

TABLE 8: COMPOSITE ENVIRONMENTAL LITERACY RESULTS

Factor	Score	
	Number	Percent
Knowledge (Table 5)	17.7	44.3%
Attitudes (Table 6)	28.9	72.3%
Behaviours (Table 7)	25.2	63.0%
<u>Composite Score</u>		
Total score (120 possible)	71.8	59.8%

ENVIRONMENTAL LEARNING

Unanimously, respondents agree that it is important that Ontario residents be well informed regarding environmental issues. Of these, 68.4% strongly agree with this need. See Table 9.

TABLE 9: IMPORTANCE OF BEING ENVIRONMENTALLY LITERATE

Level of Agreement	Responses	
	Number	Percent
Strongly agree	52	68.4%
Agree	24	31.6%
Disagree	0	0%
Strongly disagree	0	0%
No response	0	0%

Ontarians also agree on the means by which they believe that they should be kept informed about the environment and environmental issues, concurring that

informal learning opportunities provide the best means. Of these, the vast majority of respondents indicated that learning through the media – newspapers and magazines, television and the Internet – was their preferred means of being kept informed about the environment and environmental issues. These are the preferred means of obtaining the necessary information for self-initiated learning with 85.5% of respondents preferring to learn via the media. This number increases to 90.7% in the same circumstance when respondents are asked about government-initiated learning opportunities. See Table 10.

TABLE 10: ENVIRONMENTAL LEARNING PREFERENCES

Factor	Self-Initiated Learning		Government-Initiated Learning	
	Number	Percent	Number	Percent
Continuing education courses	3	3.9%	1	1.3%
Formal, post-secondary education	3	3.9%	1	1.3%
Newspapers and magazines	33	43.4%	26	34.2%
Television	22	28.9%	41	53.9%
Through friends	1	1.3%	0	0%
From children bringing information home from school	3	3.9%	5	6.6%
Internet	10	13.2%	2	2.6%
Other	1	1.3%	0	0%

An interesting observation arising from Question 34 is that only 19.7% and 22.4% of respondents indicate that they participate in Canada’s One Tonne Challenge frequently or sometimes, respectively. The remaining 53.9% never

participate (see Table 7). Despite that Ontarians indicate that they wish to be kept informed about the environment via the media (see Table 10), the national advertising campaign launched by the Government of Canada in 2005 via newspapers, magazines, television, the Internet and poster campaigns (such as advertising in and on public transit) has not resulted in reaching a majority of the population because almost half indicate that they have not yet heard of the One Tonne Challenge. See page 105 for further discussion regarding the One Tonne Challenge.

INTERPRETATION OF FINDINGS

This is believed to be the first study of its kind in Canada and, therefore, it is the first opportunity we have had to identify the level of environmental literacy among adults in any Canadian jurisdiction. The greatest proportion of the Canadian population resides in Ontario making it, arguably, a good starting point in the identification of such critical information. Clearly, we cannot adequately plan for the future if we do not have an understanding of our current position.

It is the purpose of this study, therefore, to explore the current status of the relationship between distance education and environmental and sustainability education and to proffer a number of solutions to assist in the search for and transcendence to a new educational paradigm, one that will meet the needs of Ontario both in the present and in the future. To that end, the research reported in this thesis includes:

- Establishing a baseline with regard to the current status of environmental and sustainability education in Ontario – achieved through a literacy audit of the environmental knowledge (cognitive learning), attitudes (affective learning), and behaviours (psychomotor learning) of Ontario adults;
- Identifying the gaps in environmental learning – based on audit results

in comparison with studies previously conducted in Minnesota as points of reference; and

- Recommending new directions for a shift in formal education in Ontario through the identification of means by which the use of distance education can be maximized in support of traditional forms of education.

Table 1 identifies three hypotheses emerging from the research questions that are fundamental to achieving the purpose of the study as outlined above. To summarize, they are:

- To what extent does an Ontario baseline environmental literacy audit reflect that of previous studies conducted in Minnesota?
- Based on the outcome of the literacy audit and the review of literature, is a new sustainability-themed educational paradigm warranted in Ontario?
- To what extent can distance education be advantageous in such a paradigm shift, if warranted?

ESTABLISHING AN ONTARIO BASELINE

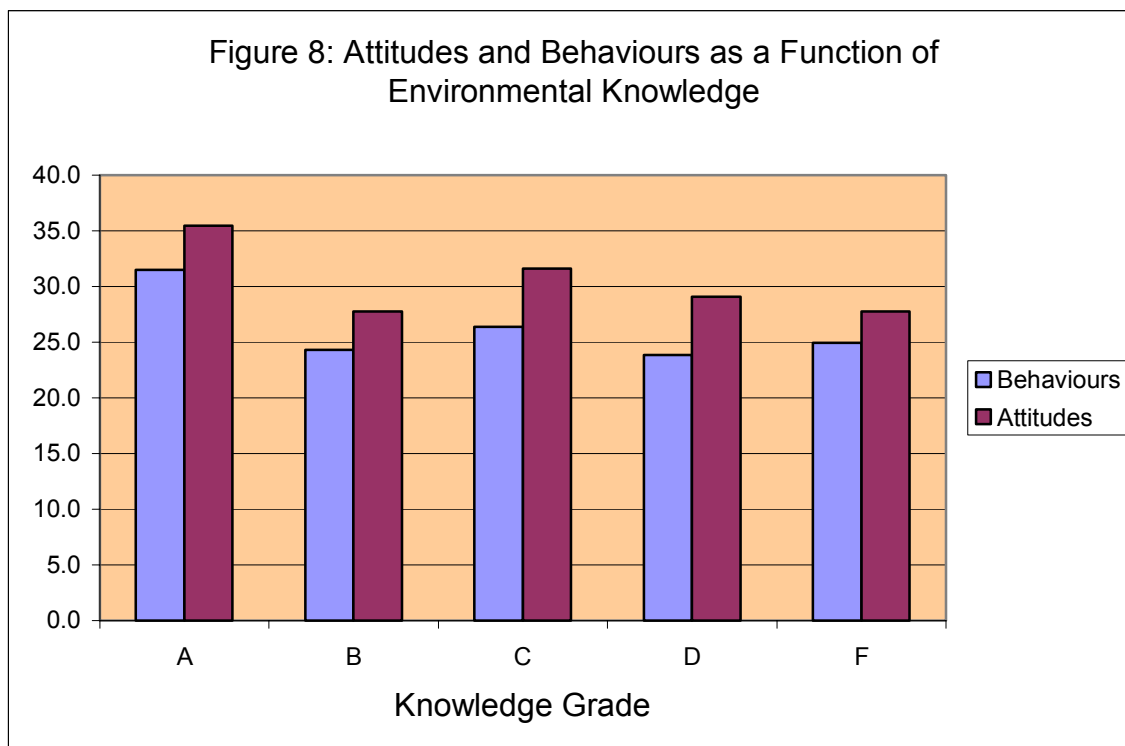
“What then?” This is the question that David Orr (1992, p. 85) asked us to consider more than a decade ago. Environmental or ecological literacy, he says, is the ability to observe with insight, and be driven by a sense of wonder (Orr,

1992). These abilities are critical to reaching our potential as a society and to elevating our status by developing an affinity with the world around us (Wilson, 1984).

Indeed, according to a 1999 Environics opinion poll conducted for Environment Canada, 98% of Canadians agree as to the importance of nature to human survival (Boyd, 2004). This sentiment is reflected in the Ontario Environmental Literacy Audit, in which Ontarians are unanimous in their support for the importance of environmental literacy. Table 9 indicates that 100% of Ontarians either agree or strongly agree with this sentiment. To that end, more than 90% of Ontarians believe that we all play a role in maintaining a healthy environment and three-quarters of Ontarians link human survival as a species to a balanced ecosystem.

Table 8 reports that the Ontario baseline score for environmental literacy among adults in Ontario is 59.8%. This corresponds to a D in the Ontario college grading system and represents a below average score. However, it is important to remember that this score is not an evaluation of the successes and failures of the public. Rather, it is a collection of baseline information concerning environmental knowledge, attitudes and behaviours among adults in Ontario. This baseline information can be used as a point from which to start planning for the future of environmental and sustainability education in the province and as a comparator for future studies either in Ontario or in other jurisdictions.

It also emerges from the findings, as illustrated in Figure 8, that higher levels of environmental knowledge correlate directly to more positive environmental behaviours and, to a lesser extent, to environmental attitudes.



COMPARISON TO MINNESOTA'S ENVIRONMENTAL LITERACY SURVEY

Only 13% of Ontarians scored above average on environmental knowledge, the same percentage that self-assessed their environmental knowledge as being high. At the same time, 26% of Ontarians scored at least average with regard to environmental knowledge.

Overall, these data compare less favourably to data from similar studies conducted in Minnesota (2002b, 2004) in which 31% and 26% of Minnesotans

achieved an above average score related to environmental knowledge in the 2002 and 2004 surveys, respectively, but almost two-thirds of the population rated their level of environmental knowledge as high, suggesting that Minnesotans are not as realistic as Ontarians in such self-assessments. In the surveys, 46% and 50%, respectively, achieved at least an average environmental knowledge score.

PARADIGM CHANGE – COGNITIVE TO AFFECTIVE LEARNING

Environmental and sustainability education is about encouraging learners to appreciate and see the world around them. It involves three key factors (Gough & Sharpley, 2005):

1. Education *about* the environment centres on the understanding and comprehension of important environmental and ecological facts and concepts;
2. Education *in* the environment provides opportunities for learning in a natural setting and making connections with the natural world through visits to forests, rivers and parks; and
3. Education *for* the environment promotes an awareness of limits to resource availability and fosters a willingness to change one's lifestyle accordingly in the interests of collective well-being.

“The problem remains that, while these factors are easy to identify and while we can readily list any number of examples of *unsustainability*, we have yet to

implement these factors in a cohesive, meaningful and respectful manner that benefits our learners, our institutions, our societies at large, and our environment” (Houghton & White, 2006, in press).

Sterling argues that the root of the problems facing environmental and sustainability education in this instance lies in the “variety of theoretical and practical interpretations, and the fact that at the deeper level of cultural worldview, sustainability education lies partly within and partly without the dominant modernist worldview” (2004, p. 51). Historically, we have educated transmissively and instrumentally – focusing on education *about the environment*. In recent years, education has begun to shift, with a more constructivist view of the learner, to a more idealistic approach, with an emphasis on the quality of learning and drawing on the learner’s ability to think critically and reflexively – focusing on education *for being* (Sterling, 2004).

The emergences of environmental education, education for sustainable development and education for sustainability have all been products of this era. The concept of education as being *for* something as an end goal is, in and of itself, a limiting factor. Society needs to find a means of educating without limits, a means of preparing citizens for the realities they will face in an unknown future.

Sterling (2004) argues in support of what he refers to as sustainable education, claiming that it is not about finding a niche within education to satisfy its relevance, but that it is about moving beyond the limitations of modern

constructivism and post-modern deconstructivism towards relationalism – a revisionary, post-modern systemic or ecological view. Rather than set limits to education, he argues that sustainable education should be offered “*as a whole*” (Sterling, 2004, p. 56). Such a systemic view of education would provide the opportunities for environmental literacy in a new way that will be needed by our children and by their children.

Sterling (2004) does not suggest that sustainable education is a new paradigm. Rather, he argues that it is an emergence from the old paradigm that includes:

- Changing the purpose of education fundamentally;
- Educating *as* sustainability, rather than educating *about* or educating *for* sustainability;
- Removing the prescriptive nature of modern education;
- Affirming liberal humanist traditions in education;
- Challenging the limits of the dominant mechanistic paradigm; and
- Grounding education in systemics, emphasizing systemic learning as change rather than in response to change.

Each of these items is a challenge considering the reluctance of our society to change.

“The scope and philosophy of public education provided by societies for its young is guided by deeper defining characteristics of that society, its underlying values, key metaphors, aspirations, priorities, and needs. Canada’s present-day prosperity and fiscal

objectives are heavily focused on maximizing economic growth, maintaining markets for its abundant natural resources, and participating in free trade agreements that include a move towards deep integration or alignment with US trade priorities. Providing young Canadians with the skills needed for participation in this fast-paced, instant-messaging, globalized marketplace is therefore a key educational policy priority. Employability has moved to the top of many young peoples' educational priorities. They live in a society where unlimited economic growth is the primary goal, understood by many to be the most important foundation of individual freedom, prosperity, choice, and well-being. The idea of any learning that would challenge the wisdom of unfettered resource exploitation confronts this exuberant materialist philosophy with a profoundly uncomfortable and disorienting dilemma. It raises difficult questions not frequently aired in public debate" (Houghton & White, 2006, in press).

Because of this, the data presented in Figure 8, relating knowledge to attitudes and behaviour, is critical to the future of education because, if education is intended to be preparing citizens for the future, the benefits of collective increases in cognitive, affective and psychomotor learning become more apparent. It also suggests that education focused simply on increasing environmental knowledge is not the solution that might have been expected, but that it should be augmented with a focus on affective learning. Collectively, these lead psychomotor activities because people do not normally engage in behaviours unless they have personal meaning.

In education, cognitive learning is achieved by the manner in which content is presented, interaction is provided and learning is reinforced. Conversely, affective learning is determined by the level of motivation learners feel toward a subject

and the satisfaction they derive from engaging in it (Danchak, 2001).

Unfortunately, most distance learning opportunities do not incorporate attributes of affective learning. According to Lepper and Chabay, “motivational components of tutoring strategies are as important as cognitive components, and more generally, that truly personalized instruction must be individualized along motivational as well as cognitive dimensions (quoted in Danchak, 2001).”

Miller (2005) takes the case concerning the importance of affective learning one step further. She argues that effective instruction in this area contains a compelling message that is related to existing knowledge, that is intended to engender emotion in the learner, and that results in the learner acting out the desired new behaviour often assisted with positive reinforcement.

Affective learning is achievable in a distance education environment by working to simulate a face-to-face environment. For example, by streaming video segments of the instructor at key points in the course, technology can replicate what a live instructor might do to motivate or orient learners (Danchak, 2001). Another example of using online technology to enhance affective learning is through a concept called the Unibrowser. This adaptation uses a multiple-frame window configuration to video stream the facilitator in one part of the window, display the course lesson material in another part of the window, provide a navigator that facilitates communication with others and interactivity with course applets in a third part of the window and, finally, displays course menus that are

controlled by the learner in a fourth part of the window (Cupp, Danchak, Foster & Sarlin, 2001).

Miller (2005) agrees with the need for meaningful interactivity. Instructional material should be presented in a realistic and stimulating manner in the delivery of a credible message. Smith and Ragan (1999) suggest that these attributes are best aligned with demonstrated role models and opportunities for role-play.

Russo and Benson agree with the importance of providing opportunities for affective learning. “When students have a positive affect about [the course, the topic and the instructor], it can be argued that they will be more likely to complete courses, become involved intellectually with the material and the others in the online class, and be more satisfied” (2005, p. 55). The sense that a learner develops of immediacy or salience is of importance in generating affect. While distance learners might expect less interaction with their instructors than their face-to face peers, research correlates affective learning directly with instructor immediacy (Gorham, 1988; Russo & Benson, 2005; Sanders & Wiseman, 1990). This is especially true as regards learners’ perceptions of their own performance particularly if the instructor and the students themselves assess it. This may have the effect of heightened self-efficacy and self-confidence, both of which increase a learner’s sense of value within a course (Russo & Benson, 2005).

However, Freire’s model of literacy encourages public discourse, advocating openness and a willingness to recognize the perspectives of others. It should

involve people working with each other. When people become actors in their own learning, affect is derived when knowledge is partnered with dialogue. If there is too much focus on the instructor in the educational process, Freire (2002) argues that learning becomes more like banking with “the educator making ‘deposits’ in the educatee” (Smith, 2005).

IMPLICATIONS FOR DISTANCE EDUCATION

Exactly what does all of this research and discussion have to do with distance education? Clearly, in Ontario, we are lagging with respect to educational delivery of the knowledge required to create and manage a sustainable future. Our education system exemplifies the concerns raised by Sterling, that being, “most education daily reinforces unsustainable values and practices in society” (2001, p. 21).

The propinquity of the environmental challenges facing society dictate that a productive and efficient course of action with respect to paradigm change is essential if we are to successfully produce a citizenry capable of ensuring that our province has a future that is economically and environmentally viable and sustainable. However, there are “two levels to the concept of sustainability” (Cullingford, 2004a, p. 245). On one hand are the scientific matters (such as pollution, climate change and greenhouse gases). Science, however, does not function in isolation. Whatever scientific rationale is used to explain the clear-cutting of a forest or genetic modification in agricultural production, there remains, on the other hand, a moral component. The two are inextricably linked. But people do not want to learn about morals. They are more interested in learning and living in the present, with immediate gratification being of greater importance than responsibility for the environment or, even more of a stretch, for

the future.

“There has never been a time before when the possibility of self-destruction and of mutability has been so constantly before us. We cannot any longer project a simple self-centred optimism that mankind will keep ‘progressing.’ Yet, we are not haunted by these thoughts. For most people, the concept of sustainability is merely associated with personal inconvenience. For many, the only time they come against sustainability is in the ensuite bathrooms of hotels where the management pleads with guests, for the sake of the environment, not to demand new towels or new sheets” (Cullingford, 2004a, p. 246).

Our tendency to distance ourselves from the environment does little, if anything, positive, either for ourselves or for those that will follow us in the future. The reality of the situation is that every decision, every action that each of us makes and takes has an impact on other people and on the world around us. Regardless of economics, politics and personal worldview, we are all connected. The reality of this connection must become part of our system of education.

THE ECONOMICS OF HIGHER EDUCATION

In general, post-secondary institutions exacerbate the rift. Caught up in a competitive, market-oriented ethos, they vie for students, funding and research grants in order to capitalize on their market share and to enlarge the existing body of knowledge. However, they do this in pillars, or disciplines, building the very knot of specialized and compartmentalized pedagogies that create a problem for the future of society. Undeniably, knowledge is beneficial, but subject-specific knowledge in isolation from other disciplines is tragic. It is the

ultimate educational limit. “What is clear, for all the changes and arguments, is that it is in the idea of a subject – an academic discipline and all that this entails – that universities have their being” (Cullingford, 2004a, p. 249).

So, how do we, as a society, progress when we appear destined not to be able to do so? How do we bridge the disciplines? How do we change the manner in which we learn without uprooting the fabric of society? How do we change the nature of education when steering education toward a new paradigm is a bit like steering an ocean liner?

THE CHALLENGES FACING HIGHER EDUCATION

Post-secondary institutions, universities in particular, must open the doors to engagement in the new central debate affecting all life on Earth. They must work to make sustainability interdisciplinary and to brokering attitudes that foster sustainable education. They must band together, incorporating traditional and distance learning technologies and methods, setting aside individual competition, to serve the international community of which they are an integral part.

The historical change from education *about* the environment to education *for* the environment signals a paradigm change that shifts education from a reliance on the scientific method and the transmission of information to socio-political action and advocacy. It also signals the shift from environmental education as a discreet subject to one that spans curricula. To these ends, Mappin and Johnson

(2005) suggest that environmental education focus on three dominant perspectives: environmental education as behavioural change, personal change and social change.

Environmental Education as Behavioural Change

Historically, environmental education for behavioural change focuses on citizenship participation in the building of environmental knowledge, environmental sensitivity and developing responsible environmental actions. With a focus on behaviour change, this particular perspective has been criticized because of its denial of learners the right to control their own learning and has led to questions such as “What is environmentally responsible behavior and who decides?” (Uzzell, quoted in Mappin & Johnson, 2005, p. 12). Questions like these put educators in the difficult position of balancing behaviour change with personal and social values. Consequently, environmental learning offered within this perspective is often limited in scope to specific topics such as population dynamics, nutrient cycling and homeostasis.

Environmental Education as Personal Change

“In spite of increased environmental awareness and concern for global and local environmental issues, there is little evidence of increased environmentally responsible behavior among students or the public” (Mappin & Johnson, 2005, p. 14). This notion is supported by the findings of the Ontario Environmental Literacy

Audit and in similar surveys conducted in Minnesota (2002b) and Pennsylvania (2001). Therefore, this perspective purports to focus attention on nurturing understanding related to personal motivations that guide decisions, especially environmental decisions. Drawing primarily from the humanities, this perspective reifies the abstract by attempting to make it more concrete. It attempts to merge scientific knowledge with philosophy in order to better understand such concepts as the laws of nature and the origins of the Earth. The environment in this perspective is more a reconnecting, sensual experience. However, this perspective, too, has been the subject of criticism. Opponents claim that education for personal change results in the overgeneralization of concepts and values.

Environmental Education as Social Change

Finally, environmental education for social change is rooted in the concept that environmental problems arise from social, economic and political systems and from the worldviews that support those systems (Fein, 1993). In this perspective, environmental education is viewed as “an approach to changing social values and systems in order to achieve sustainability and social justice” (Mappin & Johnson, 2005, p. 17). Focussing on inquiry, emancipation, empowerment and environmentalism, this perspective seeks to provide mechanisms in order that people can work together toward sustainable change. This perspective makes use of science to inform about the environmental crisis

and, at the same time, rejects science as the cause of the crisis. It is criticized for its holistic approach, often assumed not to have a basis in scientific thought and, by association, no basis in education (Haila, 2000).

By introducing affective outcomes in the construction of distance education curricula, these perspectives are likely to be realized.

Summarizing the Challenges

Sullivan, in identifying the varying perspectives relevant to learning and teaching environmental education, summarizes the challenges facing higher education. These include (2004, p. 171):

- To advance understanding of our shared global problems and the need to act with a sense of universal responsibility;
- To provide people with a framework for critically evaluating their situation and identifying action goals for bringing about positive change; and
- To foster a culture of collaboration that facilitates new partnerships between civil society, business and governments.

Pittman (2004) also points to the challenge of overcoming fiscal barriers to incorporating environmental education and environmental practices within both the curricula and administrative practices at post-secondary institutions. He refers to these challenges as creating a “green wall” (Elkington, quoted in Pittman, 2004, p. 206) that prevent such integration. He argues that overcoming these

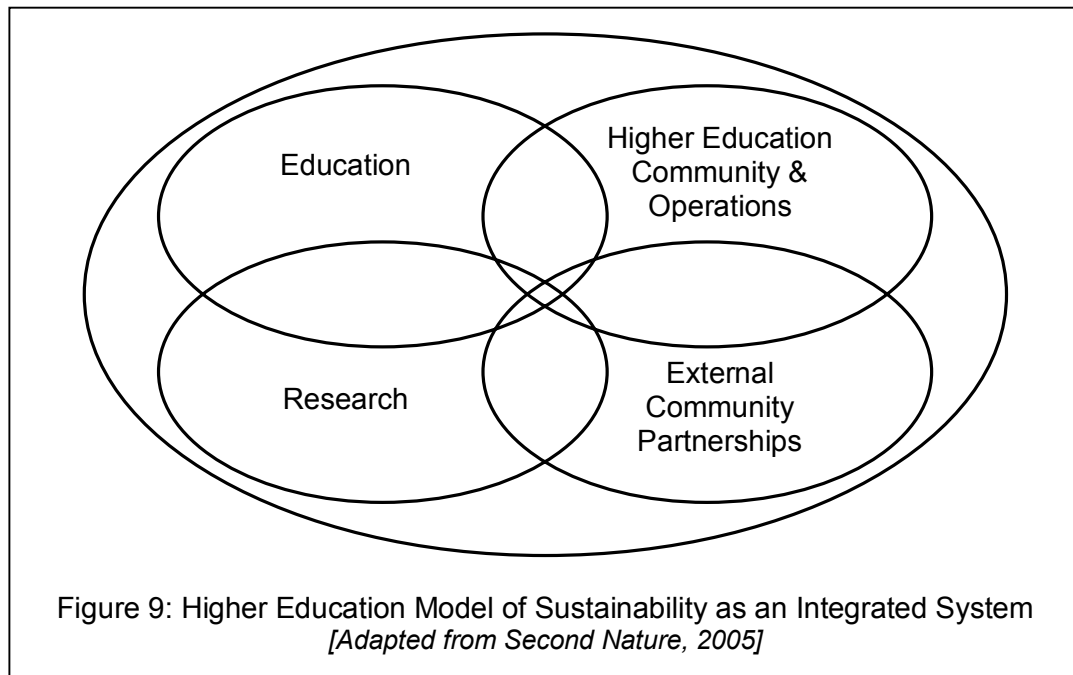
challenges and creating environmentally supportive administrative practices augments student learning as much as does an environmentally supportive curriculum. The situation emerging from this is an interconnection of both active and latent curricula that inspires involvement and engenders trust.

How might distance education emerge in light of these challenges and recommendations? Learning content would embrace interdisciplinary systems of thinking. Thinking would expand to transcend geographic and temporal boundaries. Education would encapsulate new levels of rigour, introducing the same thoroughness laterally across disciplines as already exists vertically within them. Such an approach would facilitate understanding and address the complex non-linear systems we face daily.

Learning context would stress the interdependence of human and environmental systems, emphasizing values and ethics as central themes. Learners would understand our integral role as part of nature as well as the role of ecological services critical for our survival. This approach would facilitate an understanding of the concept of ecological footprint and, more importantly, understanding how to minimize or mitigate its impact.

The learning process would focus on experiential and collaborative activities and real-world problem solving. Learners should be exposed to actual problems facing communities, governments and industry and work on solutions drawing from the accumulation of their learning, not just that from a single course.

Finally, educational institutions should behave as the microcosms of the larger community that they are, carrying out their daily administrative and physical activities in an environmentally responsible manner. The administrative activities of and partnerships forged by these institutions will be critical to the environmental learning of their students. These relationships are illustrated in Figure 9.



This is not an easy mandate. The challenge of achieving these changes will be in overcoming the reluctance of stakeholders to seemingly uproot a system they believe to be fully functional in favour of one that is untested.

THE IMPORTANCE OF HIGHER EDUCATION

In 1999 in the United States, there were 4,100 institutions of higher education with a total of 14.6 million students. In total, the operating budgets of these institutions amounted to US\$200 billion, more than the gross domestic product of all but 20 countries in the world (Second Nature, 2005). In Canada, the numbers are proportionally as high with almost 1.3 million students attending post-secondary institutions and public and private spending on these institutions in excess of C\$68 billion (Statistics Canada, 2004).

In addition, in a report released by Statistics Canada in March 2006, approximately 14% of adult Canadians returned to school for between two and five years in order to further their education. Of those returning but not pursuing a degree, diploma or certificate, 59% attended non-university, post-secondary institutions. Of those returning in order to attain a credential, 88% attended non-university, post-secondary institutions (Statistics Canada, 2006).

This information is critical because, if universities have traditionally been the pioneers of expanding knowledge, community colleges, trade schools and private colleges are becoming increasingly important among those returning to further their education. Therefore, non-university, post-secondary institutions play as vital a role, if not more, in the development of people as do universities.

FORMAL LEARNING

Distance education is a viable option for the province to consider in addressing these changes. Provincial coalitions for distance education already exist. An excellent example is OntarioLearn, a coalition of 22 Ontario colleges that collaborates with respect to the delivery of distance education in the province allowing member colleges “to rationalize resources, avoid duplication and, more importantly, increase the availability of online learning opportunities for their students” (OntarioLearn, 2006). Just imagine what might be achievable if the provincial government worked with OntarioLearn to incorporate sustainable learning inputs and to move forward with the introduction of eco-curricula!

There have already been successes. Provincially, through college and university offerings, environment-themed distance education courses and programs have been developed. These include such initiatives as Algonquin College’s *Environmental Citizenship* course, the University of Guelph’s *Sustainable Landscapes Certificate*, and the University of Toronto’s *Certificate in Environmental Management*. There also continue to be new programs being considered such as a post-graduate certificate in *Sustainable Thinking* recently proposed to Algonquin College.

But sustainable education is not about the creation of stand-alone courses or programs that create unique disciplines. It is about interdisciplinarity. It is about sharing values and looking at the whole of society in a critical and reflexive

manner. In its vision for the future, EEON (2003) identifies some of the ways that interdisciplinarity can be achieved. These include:

- Faculty attendance at multidisciplinary forums, seminars and workshops on environmental literacy and the integration of E&SE into teaching practices;
- Faculty balance the teaching of traditional anthropocentric learning with ecocentric learning, allowing students to choose their own worldview;
- Faculty acknowledge and discuss the gaps between current economic growth, mainstream practices and ecologically sustainable behaviour;
- Faculty create and become involved in the teaching of at least one true interdisciplinary course;
- Course materials draw from at least some environmental and sustainability information and are bias-balanced;
- College and university executives and boards of governors support 'green campus' projects and initiatives as well as environmentally friendly alternatives;
- Students develop skills related to critical thinking, problem-solving, self-reflection and decision-making in *all* of their courses; and
- Students apply their understanding of the natural and built environments to problems they face in all courses.

INFORMAL LEARNING

Informal learning encompasses a wide variety of learning opportunities that arise from daily activities related to work, family or leisure. In most cases, informal learning is unintentional and, as regards environmental education, it may include such activities as talking to others about environmental issues, reading the newspaper, visiting zoos, parks, museums or conservation centres.

In addition, community arts programs are emerging as an important tool for informal learning in the field of environmental education. In an attempt to break free from traditional forms of teaching, arts programs attempt to “nurture the spirit, to encourage concientizacion and to mobilize community. The arts are tools to explore issues ranging from economic development, gender inequity and primary health care to literacy and employment training” (Clover, 2000).

Similarly, experiential learning plays a key role in environmental education. It has been argued that opportunities to experience reality in a practical and concrete manner can be a key motivator to transform worldviews and generate action. By engaging in experiences augmented by existing knowledge, learners are able to make connections between ideas and reality and, by so doing, “effect change on both personal and societal levels” (Wittmer & Johnson, 2000).

Perhaps one of the most meaningful illustrations of the positive impact resulting from experiential learning is in peace education. According to the International Institute for Sustainable Development, environmental initiatives can

have a positive effect on conflict resolution. Engaging in the restoration of critical resources or common spaces, for example, can result in improvements in productivity and diversity that, in turn, potentially lead to the prevention of scarcity-related conflicts (Brown, 2005).

The Ontario Environmental Literacy Audit indicates that a majority of Ontarians believe that informal means of education – predominantly via the media – represent the best way to be kept informed about the environment and environmental issues. Clover (1995) acknowledges the role of the media in adult learning. “The vast majority of citizens, consumers, workers, employers, and parents... are not enrolled in educational or environmental programs, but are educated primarily through the media” (1995, p. 45). However, the media is famous for providing only snippets of information, sound bites on the local and national news and have been accused by some of sensationalizing news items (Clover, 1995; NEETF, 2004; Suzuki & Dressel, 2005). When information is presented incorrectly, knowledge is skewed, and misguided decisions and actions result.

When you watch a subject like climate change in the news, it's never treated as climate change. It's floods in China, or fires burning out of control wherever, or people dying of a massive heat wave in France or the Midwest. But generally speaking, those short, fast stories aren't presented as what they are: one long, slow, compelling story of how human behaviour is changing the climate of the world we live in (May, quoted in Suzuki & Dressel, 2004, p. 110).

The media, in all of its forms, has inundated us with information from all parts of the world. As is the result of anything that comes in huge quantities, we become complacent, almost immune, to the message. We are not shocked by stories about murder and mayhem. Our ambivalence results in a culture of inactivity and of non-responsiveness. It follows, then, that it is unsurprising when we do not react to stories that have an impact on our well-being (Suzuki & Dressel, 2004).

Even the most striking documentary about the environment is a fabrication of the truth in the sense that the painstaking hours and days and months that go into the making of a film are represented as a short feature length series of sensational shot after sensational shot. Such a portrayal is not reality but, rather, a fabrication – the reflections of the producer or editor or, in many cases, of the financial benefactor. A documentary on Arctic wildlife, for example, that portrays image after image of wildlife and their habitat and narrated to amaze, does not reflect the reality of life in the Arctic where many years can pass by without even sighting a fraction of the wildlife portrayed in a single documentary.

Thus, the media have caused us to lose sight of our concept of time. In our virtual, fast-forward, taped-and-watched-later world, the reality of Earth time is missing in our lives. Our images of nature through the media become a convenience. Even the introductory paragraph in this thesis offers a translation from Earth time to some distorted *unreality* in order to make it easier for the

reader to imagine.

The One Tonne Challenge provides another excellent example illustrating the effect that a benefactor can have on the use of the media as a means of informal public education. The One Tonne Challenge is probably best known for its television ads featuring comedian Rick Mercer encouraging Canadians to drive less, turn down thermostats and engage in activities that will help to reduce greenhouse gas emissions. Through a variety of media and in partnership with non-governmental organizations, Canadians became more aware of climate change as an issue. In fact, the One Tonne Challenge has been referred to as the most well-known federal climate change initiative and is unique “because it tried to engage individuals in cutting emissions because of their personal activities” (Mittelstaedt, 2006). On March 31, 2006, the newly elected federal government discontinued funding to the NGOs that were engaging the media in educating the public about climate change. Nothing further has been announced and this informal education activity has not yet been replaced.

The challenge we have ahead of us regarding the media is ensuring that it becomes a relevant source of education, rather than a fabrication. Since the media, in fact, acts as a “socialization agent” (Palmer, A., 2004) that shapes and influences public attitudes, it has a key role to play in the public advancement of environmental awareness. Through it, society must also, somehow, restore our concept of time. Suzuki and Dressel argue that slowing down the rate at which

we are barraged with information will help us to pay attention to “the true pace of the non-technological planet” (2004, p. 114).

A question emerging from this discussion and, perhaps, warranting further investigation is related to bias and the possibility that the public might extend the opinions it has of the media, if any, to environmental educators and NGOs that make use of the media. If this phenomenon exists, it would be a challenge to overcome, especially if the public is expecting to be kept informed via informal means.

GENDER AND DISTANCE EDUCATION

Just as distance educators must factor in a role for formal learning and informal learning (via the media as indicated by the preferences noted in the Audit), they must concern themselves with the issue of gender equity when designing courses and curricula. “Currently, more women than men are enrolling in online courses” (Garland & Martin, 2005, p. 69) and this signifies that course design must account for differences in worldviews of learners. Virtual classrooms reduce the anxiety and alienation that women face often in traditional learning environments. Technology allows participants the time they need in order to compose their thoughts before posting them publicly for others to see (Garland & Martin, 2005).

Furthermore, research suggests that women in online courses are more

studious than men, specifically setting aside online work/study time (after chores and family responsibilities have been addressed) and, when involved in an online course, women tend to progress methodically through the material. By contrast, men work at online courses in an adhoc fashion and do not plan for study time. Within the course material, men often jump ahead and back, demonstrating a lack of method to their approach. It has been suggested that women excel in online learning because of their engagement in the raising and caring for families, which blends adaptability, multi-tasking and self-directed learning (McSporran & Young, n.d.).

A ROLE FOR DISTANCE EDUCATION

Education is critical to our future and with increasing clarity we are beginning to understand that the role that education plays with respect to our social development must change. Similarly, the role played by distance education must change. However, within education as a discipline, distance education has the ability to move more rapidly by reaching a broader audience more quickly, thereby effecting a more immediate overall change than would be possible for education as a whole.

Imagine a world in which all nations agree that it was important to tackle the environmental crisis facing us as our first and foremost challenge. Imagine, as well, a world in which all nations agree further on the mechanism for addressing

such a challenge. Surely, near the top of the short list of possible solutions would be education for personal and social change. Imagine again, if you will, a world body entrusted with such a task. What would it look like? How might it be established? How would it ensure ongoing relevance?

In Ontario, a possible foundation exists with respect to the Ontario college system:

In response to provincial employers' expressions of concern that community college graduates were not emerging with a broad-based background that would lend itself to adaptation in the rapidly changing work world, the provincial government enacted new curriculum requirements within the Ontario college system that focus on general education and employability skills. A system of General Education (GenEd) elective requirements was mandated to add essential learning components to every Ontario post-secondary college program. Covering important social goal areas, knowledge gained from GenEd electives is intended to develop a good understanding of social responsibility and citizenship, and strengthen a student's ability to participate actively and fully in society.

In keeping with the spirit of the new provincial mandate, [the colleges] determined, further, that General Education offerings should be available as widely as possible and provide the greatest possible opportunity for cross-college learner collaboration. As a result, all such offerings at the [colleges] are online, allowing learners from all programs and campuses an equal opportunity to participate alongside their peers in learning initiatives (Houghton & White, 2006, in press).

If the province were to expand its system of General Education, by establishing mandatory courses within the scope of this initiative, for example, and including courses designed to provide learners with the opportunity to hone

their critical thinking, reflection and environmental decision making skills, we would, at least, be taking a huge step forward toward ensuring that the education that we are providing for our citizens helps to truly prepare them for the future.

Imagine, now, if this initiative, once proven successful, were expanded to incorporate universities and other post-secondary institutions and, further, if it were used as a model for a global education initiative. The global system of education would be well on its way to ensuring that we are educating the public for the future. Once established at the post-secondary level, a similar initiative could be expanded to the elementary and secondary school levels because, by that time, there would be adequate numbers of graduates emerging from post-secondary training to implement the delivery of similar educational opportunities in the non-post-secondary arena.

Distance education demonstrates that it operates beyond classroom walls, an important concept in environmental literacy as outlined by Orr (1994), reaching broadly to its audience on a global scale. In this regard, best practices can be learned from open universities, which provide learners with the flexibility to merge their educational needs with that of the rest of their lives and obligations as well as with their fears and perceived barriers. Learners engaging in distance education tend to be adults with an average age of 29, two-thirds are female, most already settled into their careers and many hold decision-making capacities (Athabasca University, 2005). Reaching out to stakeholders such as these should

be the goal of formal distance education by providing them with the skills and knowledge they require in order to develop their worldviews and to make well-informed decisions regarding the future (such as green business initiatives and partnerships).

DISTANCE EDUCATION: A MODEL FOR CHANGE

Figure 10 is a first level attempt to define a process to implement educational change by capitalizing on the benefits of distance education. It is not intended to be a final model but, rather, to offer a point from which to begin discussion in the hope that a solid and usable model might emerge.

From the literature review and from the Ontario Environmental Literacy Audit, there emerge a number of criteria that should be considered in any model that arises with respect to establishing a process for environmental and sustainability education or, as Sterling (2004) prefers, sustainable learning. These are identified in Figure 10.

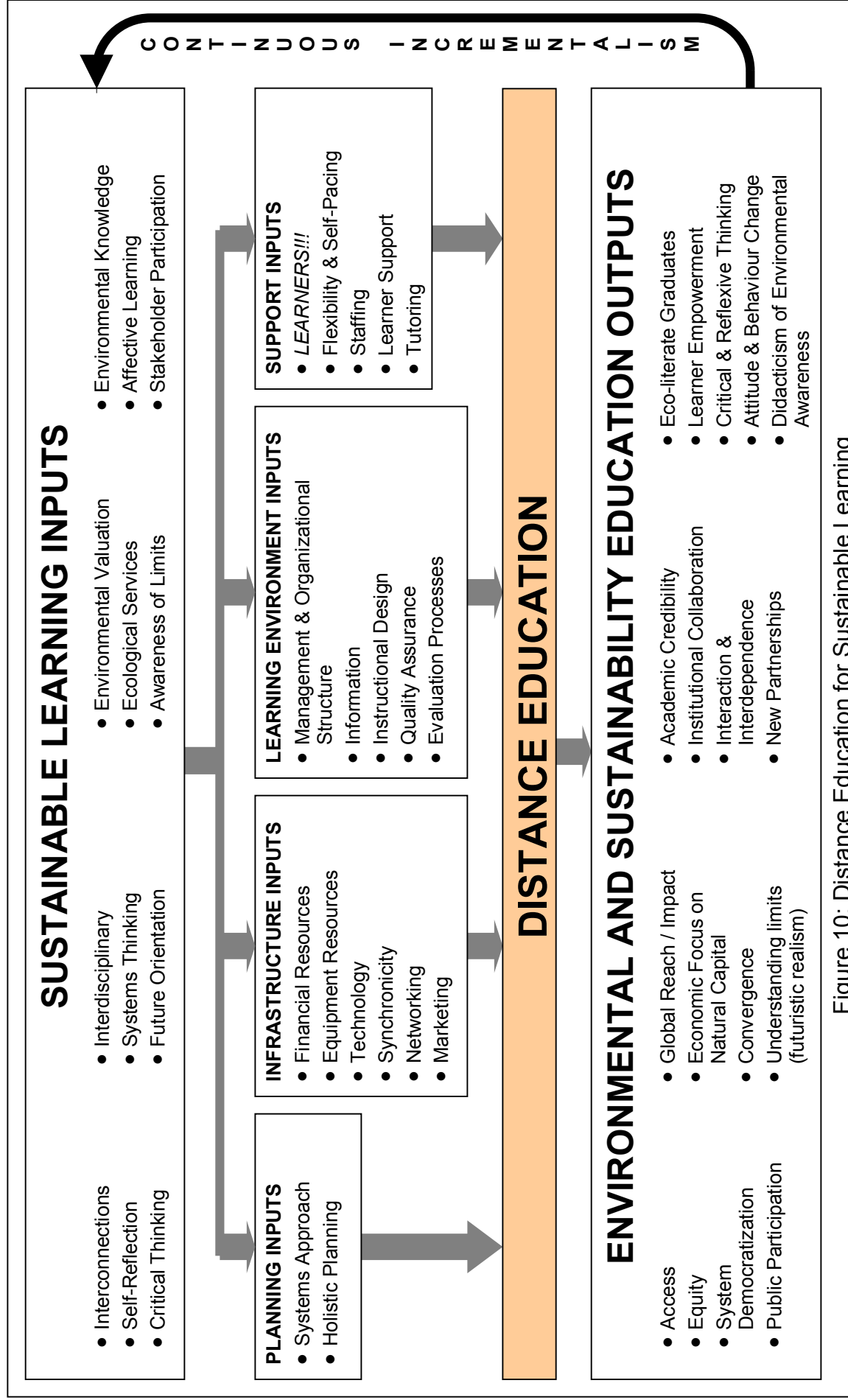


Figure 10: Distance Education for Sustainable Learning

When sustainable learning inputs are added to established distance education practices, including such inputs as planning, infrastructure, learning environment and learner support, the resulting outputs are aligned with the values and principles of environmental and sustainability education and provide for the achievement of Mappin and Johnson's (2005) three perspectives: environmental education for behavioural change, personal change and social change.

Distance education systems provide for wide access and opportunities for public participation. Within the constraints of each geographic or political region, the appropriate technology could be employed in order to reach the widest possible audience. This will serve the purpose of making education more widely available to populations that are often marginalized, such as women, disabled people, indigenous people and others who cannot normally participate in conventional education, thereby improving the equitability of educational opportunities. Overall, access, equity and participation facilitate the democratization of the educational system such that it "encourages people of various backgrounds to participate as much as possible [providing] everyone with an equal chance of success regardless of learning style, gender, academic preparedness, or other characteristics" (Brindley, 1995, p. 115).

The model focuses global attention on the economy, particularly the *unsustainability* of the current approach to market economics. Specifically, through inputs such as the awareness of limits, environmental valuation, and

ecological services, it fosters an awareness of the value and role of natural capital. This leads to a sense of futuristic realism such that the convergence of distance and traditional education, working in tandem, would enable social change by educating those in positions of authority and decision making capacities.

The model provides opportunities for institutional collaboration, such as that exemplified by OntarioLearn. By employing these economies of scale in new partnerships, such collaboration, in turn, has a direct and positive impact on institutional and academic credibility by increasing opportunities for learning, controlling expenses and establishing a culture of sharing. Interaction and interdependence between all stakeholders – learners, educators, educational institutions, business, non-governmental organizations and government – reinforces the interdisciplinary nature of sustainable learning.

Eco-literate graduates emerging from an educational system that is built on the premise of democratization and social and environmental awareness will arrive on the global scene empowered. With a practiced background in critical observation and thinking, self-reflection and social understanding, learners will demonstrate the attitudes and behaviours required in order to manage a sustainable world into the future, including a reliance on the didacticism, or instructional nature, of environmental awareness itself. “[Empowering] students so that, instead of quietly going away, they can actively participate in their

education and communicate with the institution about how to do a better job to serve them” (Brindley, 1995, p. 113) is a key outcome of the model. Of course, the outputs from the model will provide feedback opportunities and, if re-incorporated effectively as an input, would result in a situation of continuous incrementalism, a logical and ever-improving approach to global and sustainable progress. What better way to promote democratization than to produce a citizenry that believes it can truly make a difference?

In addition, the model helps the global community to achieve a number of its millennium development goals. Specifically, it promotes improvements with respect to achieving universal basic education, gender equality and empowerment for women, ensuring environmental sustainability, and growing global partnerships for development.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

In 2002, in a national survey conducted by Environics International for the Sustainability Network, Canadians were asked the following question: To what extent do you feel that you know enough about the environment to make decisions in your day-to-day life that maintain a healthy environment? Only 2% of Ontarians and 4% of Canadians felt that they had enough knowledge to facilitate healthy environmental decisions. Further, less than one-third of both populations felt they knew most of what was needed for such decisions. Therefore, it is safe to conclude, in 2002, that the majority of both Canadians and Ontarians felt that “they lack the full knowledge needed to consistently make sound, environmentally informed decisions” (EEON, 2003, p. 119).

In the same survey, 59% of Canadians and 56% of Ontarians considered public formal education to be the best source of environmental information. In addition, 28% and 34%, respectively, felt that the media plays a significant role in such education (EEON, 2003).

In January 2006, the Ontario Environmental Literacy Audit identified similar trends. In the Audit, it arises that 91% of Ontarians believe that everyone plays a

role in maintaining a healthy environment and that 58% of Ontarians believe that the government should enact more legislation to protect the environment even if it interferes with citizens' rights to make their own decisions. Further, 66% of Ontarians rank environmental protection as more important than economic development (see Table 6 and Appendix B). Overall, Ontarians ranked below average with respect to their composite environmental literacy result (see Table 8). While 100% of Ontarians agree with the importance of being environmentally literate (see Table 9), 91% of Ontarians prefer to be kept informed about environmental issues through the media – newspapers and magazines, television and the Internet (see Table 10).

More recently, in a February 2006 national survey conducted by McAllister Opinion Research on behalf of James Hoggan and Associates (2006), a sustainability consulting firm based in Vancouver, more than 80% of Canadians believe that the “government should enact stricter laws and regulations to support a more sustainable economy that protects and manages the country’s resources for future generations” (2006, p.1). The survey also identifies that:

- 92% of Canadians agree that Canada should phase in mandatory energy efficiency standards within the construction industry;
 - 83% of Canadians agree that Canada should reduce current taxes and replace these with specific taxes on pollution and resource consumption;
- and

- 82% of Canadians agree that Canada should introduce laws to promote more efficient and sustainable urban planning and development.

Most interestingly, the survey reports that more than 70% of Canadians agree that, “if everyone in the world lived the consumer lifestyle we enjoy in North America, we would destroy the planet” (2006, p. 2). More than 90% of Canadians believe that the lack of governmental leadership on this issue is the biggest cause of the problem.

For those who continue to ascribe to the ‘myth of limitlessness’ (Catton, 1980, p. 29), including many elected and business officials, an ecologically aware public could represent a threat to maximizing economic growth. There is a real need for official leadership able to see both the urgency and the potential of sustainability education – innovation, job creation, market leadership in sustainable technologies and designs, health promotion, energy conservation and, ultimately, a chance to allow whole societies to participate in a safer and gentler transition to a conserving, lower-energy, localized future. Without leadership to promote mainstream awareness of both ecological considerations and the means to move towards existing solutions, societies are in danger of confrontation with the ecological tipping points of climate change, biodiversity loss and energy price and supply (Houghton and White; 2006, in press).

Education is about walking the talk. It permeates everything in which we are involved. Therefore, it follows that everything possible should be done to maximize the educational experience – providing opportunities for cognitive, affective and psychomotor learning. From an environmental education perspective, this has implications in the interconnections between education and distance education, in the design and delivery of courses, in the training and

selection of course developers and facilitators, as well as in the human and technical support infrastructure of the institution itself.

RECOMMENDATIONS

The opening quotations from Ghandi and Welton truly sum up the work done in this thesis. Education is all about learning new ways to see the world and to being an agent of change within it. Environmental literacy provides us with an agenda for the change in order to meet the challenges of the future. Distance education is one conduit for delivery of the message and is, as I have argued, a viable and productive means to do so.

As a culminating result of this lengthy discussion, itself an example of distance learning, the following recommendations serve to begin the development of a distance education action plan to bridge the gap between the environmental literacy baseline that has been established and the sustainable vision of our future we hope to achieve.

Recommendation 1: Walk the Talk – Promote Environmental Literacy

Environmental literacy is not a social attribute that affects only isolated parts of our world. It is broad with respect to its impact and touches everything in our lives. Therefore, promoting literacy should become a global activity in which we engage in order to help reduce our ecological footprint. In an educational environment, this can be achieved through promoting distance learning by:

- Encouraging collectivism and societal learning;
- Allowing learners to gather together online, thereby reducing traffic congestion greenhouse gas emissions;
- Reducing resource consumption through the creation of virtual campuses and online resources;
- Providing information that can be transmitted quickly and inexpensively over great distances using an online infrastructure that is already in place; and
- Facilitating the exchange of worldviews through online discourse, thereby encouraging the sharing of ideas, best practices and improving global tolerance and understanding.

Recommendation 2: Promote the Environment

As outlined in the Ontario Environmental Literacy Audit and other survey sources discussed, Ontarians and Canadians expect their governments to take a leading role with respect to environmental protection. Governments can achieve this by:

- Adopting the belief of their constituents that environmental protection is more important to human well-being than economic development;
- Establishing partnerships with local and national media and coordinating the delivery of a more ecocentric message that engages the public, facilitates discourse and encourages social action and change;

- Enacting more legislation to protect the environment, even if it infringes on individuals' rights to make their own decisions; and further to this point
- Enacting legislation, similar to Manitoba's Sustainable Development Act, requiring ministries associated with education and education service providers to incorporate sustainable learning initiatives within all curricula.

Recommendation 3: Reinstate Environmental Curricula

Environmental and sustainability education should permeate teaching curricula. Opportunities to reflect on real life environmental issues should materialize, for example, as environmental prose and poetry incorporated in the language arts curriculum, environmental problems incorporated into math and science curricula, and as debates on socio-environmental dilemmas in the social studies curriculum. The use of distance education as a mode of delivering such curricula expands the positive impact of curriculum change through the gathering of learners from diverse backgrounds and locations, each participating from within their own ecosystem and sharing their respective experiences and opinions. Such an approach would help to bridge social gaps, such as that exemplified by the producer-consumer dichotomy. In this example, distance education has the ability to foster solidarity between the urban and rural public – a key concept in the furtherance of positive social change.

Recommendation 4: Promote Interdisciplinarity

Specialization in education leads to transmissive learning, which results primarily in knowledge acquisition. An interdisciplinary approach facilitates learner understanding of global issues, those that extend beyond the boundaries of specific subjects. In turn, this produces a citizenry more capable of understanding social issues and making informed choices and decisions for the future. In order to achieve interdisciplinarity, those engaged in planning for distance education should be actively:

- Thinking and functioning across, not within, disciplines;
- Identifying and addressing barriers to interdisciplinarity (such as program-specific requirements and the accumulation of specific credits);
- Establishing a culture of sharing (purpose, best practices, ideas, innovations); and
- Brainstorming means by which to reward faculty and staff for collaboration.

Recommendation 5: Implement a Systems Approach

Adopting a systems approach to learning supports interdisciplinarity and, at the same time, provides learners with the opportunity to appreciate the linkages, interconnections and cause/effect scenarios that exist in the world of decision making. It accomplishes this by allowing people to:

- Focus on holism rather than reductionism;

- View relationships that exist between objects;
- Understand the process arising from the structure;
- Shift from analytical to contextual thinking; and
- Discover patterns from content.

Distance education design practices should incorporate the model for distance education and sustainable learning (Figure 10). This would provide content researchers, course developers and instructional designers with a standardizing tool that would drive educational development with sustainability in mind.

Recommendation 6: Capitalize on the Use of Technology

Computers and the Internet exist. More importantly, their use is prevalent in developed countries including the very parts of the world generating the greatest ecological footprint. Clearly, educational work is needed in this area. At the same time, green social movements and NGOs are utilizing Internet-based technologies, through blogs, chat rooms and listservs, for example, to engage an increasingly active and activist public. Such public participation promotes democracy, peace and freedom. Consequently, opportunities for distance education, through formal and informal means, abound in this area. While the necessary support infrastructure might not exist in all countries, the use of distance education technology and initiatives, such as Ontario's general education program, to help address the immediate problem associated with

footprint and to promote the democratization of society is entirely appropriate. The use of technology in this manner to support distance education promotes peer-to-peer communication on a global scale.

Recommendation 7: Continue Research and Debate

No research should turn out to be an end in itself. Instead, each thesis should be a stepping stone and provide a means for considering and, possibly, pursuing further research. This thesis is no different. Recommended research ideas emerging from this thesis include:

- Research to conduct both national and provincial environmental literacy audits in order to compare findings with the baseline established in this thesis;
- Debate regarding the model of distance education for sustainable learning (illustrated in Figure 10) in order to refine its efficacy as a tool for distance education instructional design;
- Research related to the domains of learning in order to investigate the relative strength and significance of cognitive, affective and psychomotor learning in the learning process, especially as it relates to environmental literacy; and
- Research related to the role of bias, especially bias regarding the media, and its impact on and public perceptions about environmental movements,

environmental educators and NGOs.

Recommendation 8: Continued Public Dialogue

The academic community, as well as the general public, should continue to engage in a dialogue about this topic, arguably the most important and critical challenge that modern society has ever faced.

In order to meet this challenge, all educators and those associated with education (including politicians, educational administrators, and business and industry leaders) must adjust their worldviews to incorporate our new reality. Education must provide learners with the opportunity to prepare for their future – not for our present. It is utterly irresponsible and temporocentric for us to proceed otherwise.

Houghton & White, 2006

REFERENCES

- Åhlberg, M. (1997). Improvement of Environmental Education as a Tool for High Quality Lifelong Learning. In W. Leal Filho (Ed.), *Lifelong Learning and Environmental Education* (pp. 135-148). Frankfurt: Peter Lang.
- Aderinoye, R., & Ojokheta, K. (2004). Open-distance education as a mechanism for sustainable development: Reflections on the Nigerian experience. *International Review of Research in Open and Distance Learning*, 5(1), pp. Retrieved March 21, 2005 at http://www.irrodl.org/content/v5.1/aderinoye_ojokheta.html.
- Armstrong, J. B., & Impara, J. C. (1991). The Impact of an Environmental Education Program on Knowledge and Attitude. *Journal of Environmental Education*, 22(4), 36-40.
- Athabasca University. (2005) Facts and Statistics. Retrieved April 30, 2006 at <http://www.athabascau.ca/newsroom/press/facts.php>.
- Atkinson, R. C. (2001). The globalization of the university. Retrieved March 18, 2005 at <http://www.oap.ucsb.edu/diversity/docs.mitsuta.html>.
- Banathy, B. H. (1995, June). Developing a Systems View of Education. *Educational Technology*, 35(3), 53-57.
- Bates, A. W. (2000). *Managing Technological Change: Strategies for College and University Leaders*. San Francisco, CA: Jossey-Bass.
- Bates, T. (2001). The Continuing Evolution of ICT Capacity: The Implications for Education. In G. Farrell (Ed.), *The Changing Faces of Virtual Education* (pp. 29-46). Vancouver, BC: Commonwealth of Learning.
- Bélanger, P. (2003). Learning Environments and Environmental Education. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change* (pp. 79-88). San Francisco, CA: Jossey-Bass.
- Berkowitz, A. R., Ford, M. E., & Brewer, C. A. (2005). A Framework for Integrating Ecological Literacy, Civics Literacy, and Environmental

- Citizenship in Environmental Education. In E. Johnson & M. Mappin (Eds.), *Environmental Education and Advocacy: Changing Perspectives of Ecology and Education* (pp. 227-266). Cambridge, UK: Cambridge University Press.
- Blackman, D. A., & Fleming, T. G. (1998). Environmental Education: Where Does it Fit in Decision-Making? In P. D. Park, D. A. Blackman, & G. Chong (Eds.), *Environmental Education and Training* (pp. 82-92). Aldershot, UK: Ashgate.
- Blackmore, C. (1998). Environmental Education through Distance Education and Open Learning in the UK. In W. Leal Filho, & F. Tahir (Eds.), *Distance Education and Environmental Education* (pp. 21-42). Frankfurt: Peter Lang.
- Blewitt, J. (2004). Sustainability and Lifelong Learning. In J. Blewitt, & C. Cullingford (Eds.), *The Sustainability Curriculum: The Challenge for Higher Education*, (pp. 24-42). London, UK: Earthscan.
- Bloom, D. E. (2002). Mastering globalization: From ideas to action on higher education reform. Conference paper for the conference Globalisation: What issues are at stake for universities? Laval, QC: Université Laval.
- Bowers, C. A. (1995). *Educating for an Ecologically Sustainable Culture: Rethinking Moral Education, Creativity, Intelligence, and Other Modern Orthodoxies*. Albany, NY: SUNY.
- Bowers, C. A. (2001). *Educating for Eco-Justice and Community*. Athens, GA: University of Georgia Press.
- Bowers, C. A. (2003). *Mindful Conservatism: Rethinking the Ideological and Educational Basis of an Ecologically Sustainable Future*. Lanham, MD: Rowman & Littlefield.
- Boyd, D. R. (2004). *Sustainability within a Generation: A New Vision for Canada*. Vancouver, BC: David Suzuki Foundation.
- Brewer, C. (2001). Cultivating Conservation Literacy: "Trickle-Down" Education is Not Enough. *Conservation Biology*, 15(5), 1203-1205.
- Brindley, J. E. (1995). Learners and Learner Services: The Key to the Future in Open Distance Learning. In J. Roberts, & E. Keough (Eds.), *Why the Information Highway? Lessons from Open & Distance Learning* (pp. 102-125). Toronto, ON: Trifolium Books.

- British Columbia Ministry of Education (1995). *Environmental Concepts in the Classroom: A Guide for Teachers*. Retrieved September 18, 2004 at http://www.bced.gov.bc.ca/environment_ed/environmental_ed.pdf.
- Brothers, C. C., Fortner, R. W., & Mayer, V. J. (1991). The Impact of Television News on Public Environmental Knowledge. *Journal of Environmental Education*, 22(4), 22-29.
- Brown, O. (2005). Environment and Peace: Steady Progress Since 1972. Paper presented at the International Conference on Environment, Peace and Dialogue among Civilizations, Tehran, Iran.
- Bullen, M. (1998). Participation and Critical Thinking in Online University Distance Education. *Journal of Distance Education*, 13(2), 1-32.
- Catton, W. R. (1980). *Overshoot: The Ecological Basis of Revolutionary Change*. Chicago, IL: University of Illinois Press.
- Clover, D. E. (1995). Theoretical Foundations and Practice of Critical Environmental Adult Education in Canada. *Convergence*, 28(4), 44-54.
- Clover, D. E. (2000). Community Arts as Environmental Education and Activism: A Labour and Environment Case Study. *Convergence* 33(4), 19-30.
- Clover, D. E. (2003). Environmental Adult Education: Critique and Creativity in a Globalizing World. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change* (pp. 5-15). San Francisco, CA: Jossey-Bass.
- Clover, D. E., & Follen, S. (2004). The Nature of Transformation: Developing a Learning Resource for Environmental Adult Education. In D. E. Clover, & S. Tan (Eds.), *Global Perspectives in Environmental Adult Education*, (pp. 193-213). New York, NY: Peter Lang.
- Coppola, N. W. (1999). Greening the Technological Curriculum: A Model for Environmental Literacy. *Journal of Technology Studies*, 25, 39-46.
- Corcoran, P. B., & A. E. J. Wals. (2004a). The Problematics of Sustainability in Higher Education: A Synthesis. In P. B. Corcoran, & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice*, (pp. 87-88). Dordrecht: Kluwer.

- Corcoran, P. B., & A. E. J. Wals. (2004b). The Problematics of Sustainability in Higher Education: An Introduction. In P. B. Corcoran, & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice*, (pp. 3-6). Dordrecht: Kluwer.
- Corcoran, P. B., & A. E. J. Wals. (2004c). The Promise of Sustainability in Higher Education: A Synthesis. In P. B. Corcoran, & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice*, (pp. 223-225). Dordrecht: Kluwer.
- Council of Ministers of Education, Canada. (n.d.). *Educating for Sustainability: The Status of Sustainable Development Education in Canada*.
- Cullingford, C. (2004a). Conclusion: The Future – Is Sustainability Sustainable? In J. Blewitt, & C. Cullingford (Eds.), *The Sustainability Curriculum: The Challenge for Higher Education*, (pp. 245-252). London, UK: Earthscan.
- Cullingford, C. (2004b). Sustainability and Higher Education. In J. Blewitt, & C. Cullingford (Eds.), *The Sustainability Curriculum: The Challenge for Higher Education*, (pp. 13-23). London, UK: Earthscan.
- Cupp, E., Danchak, M. M., Foster, K., & Sarlin, D. (2001). The RSVP Unibrowser: Bringing Interactivity to e-Learning. Paper presented at the International Conference on Advanced Learning Technologies, Madison, WI.
- Daly, H. E., & Farley, J. (2004). *Ecological Economics: Principles and Applications*. Washington, DC: Island Press.
- Danchak, M. M. (2001). Bringing Affective Behavior to WebCT. Paper presented at the WebCT User Conference, Vancouver, BC.
- Daudi, S. S. (2001). Environmental Education and Communication: Applying Systems Thinking Approach to Earth Systems Education. In G. E. Lasker, & S. Bastianoni (Eds.), *Advances in Ecosystem Research Volume VI: Environmental Sustainability and Environmental Education*, (pp. 18-22). Windsor, ON: International Institute for Advanced Studies in Systems Research and Cybernetics.
- Davis, J. M. (2003). *Innovation Through Action Research in Environmental Education: From Project to Praxis*. Unpublished doctoral dissertation, Griffith University, Brisbane, Queensland, Australia.

- Devuyst, D., & Hens, L. (1992). Environmental Education at Tertiary Level. In W. Leal Filho, & J. A Palmer (Eds.), *Key Issues in Environmental Education* (pp. 45-53). London, UK: Horton.
- Eggins, H. (2004). Chapter 1: Globalization and reform: Necessary conjunctions in higher education. In H. Eggins (Ed.), *Globalization and Reform in Higher Education*, (pp. 1-8). Maidenhead, UK: Open University Press.
- Environment Canada. (2004). *Environment Canada's Sustainable Development Strategy 2004-2006*. (Catalogue No. En21-169/2006E). Gatineau, QC.
- Environmental Education and Training Partnership. (n.d.). Environmental Literacy. Retrieved November 10, 2004 at http://www.eetap.org/html/environmental_literacy.php.
- Environmental Education Ontario (EEON). (2003). *Greening the Way Ontario Learns: A Public Strategic Plan for Environmental and Sustainability Education*. Toronto, ON: Houghton, E, & O'Hara, E. (Eds.).
- Evans, T. (1995). Thinking globalisation: Issues for open and distance educators in Australia and the South Pacific. In. F. Nouwens (Ed.), *Distance Education: Crossing Frontiers* (pp. 312-316). Rockhampton, QLD: Queensland University Press.
- Farrell, G. (2001). Issues and Choices. In G. Farrell (Ed.), *The Changing Faces of Virtual Education* (pp. 141-152). Vancouver, BC: Commonwealth of Learning.
- Fein, J. (1993). *Environmental Education: A Pathway to Sustainability*. Geelong, Australia: Deakin University Press.
- Fleming, T. G., & Blackman, D. A. (1998). Why and How Organisations Provide Employees with Environmental Education. In P. D. Park, D. A. Blackman, & G. Chong (Eds.), *Environmental Education and Training* (pp. 101-113). Aldershot, UK: Ashgate.
- Freire, P. (2002). *Pedagogy of the Oppressed*. New York, NY: Continuum.
- Garland, D., & Martin, B. N. (2005). Do Gender and Learning Style Play a Role in How Online Courses Should be Designed? *Journal of Interactive Online Learning*, 4(2), 67-81.
- Gore, A. (1993). *Earth in the Balance: Ecology and the Human Spirit*. New York,

NY: Plume.

- Gorham, J. (1988). The Relationship between Verbal Teach Immediacy Behaviors and Student Learning. *Communication Education*, 37, 40-53.
- Gough, A. & Sharpley, B. (2005). Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools. Retrieved January 30, 2006 at <http://www.deh.gov.au/education/publications/pubs/sustainable-future.pdf>.
- Gough, S., & Scott, W. (2001). Lifelong Learning: Towards a Theory of Practice for Formal and Non-Formal Environmental Education and Training. *Canadian Journal of Environmental Education*, 6, 178-196.
- Government of Canada. (2002). *A Framework for Environmental Learning and Sustainability in Canada*. (Catalogue No. En40-664/2002). Ottawa, ON.
- Guy, R. (1991). Distance education and the developing world: Colonisation, collaboration and control. In T. Evans & B. King (Eds.), *Beyond the Text: Contemporary Writing in Distance Education* (pp. 152-175). Geelong, VIC: Deakin University Press.
- Habermas, J. (1996). *Between Facts and Norms: Contributions to a Discourse Theory of Law and Democracy*. Cambridge, MA: Polity Press.
- Haila, Y. (2000). Beyond the Nature-Culture Dualism. *Biology and Philosophy*, 15(2), 155-175.
- Hall, B. (2004). Towards Transformative Environmental Adult Education: Lessons from Global Social Movement Contexts. In D. E. Clover, & S. Tan (Eds.), *Global Perspectives in Environmental Adult Education*, (pp. 169-191). New York, NY: Peter Lang.
- Hill, L. H., & Johnston, J. D. (2003). Adult Education and Humanity's Relationship with Nature Reflected in Language, Metaphor, and Spirituality: A Call to Action. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change* (pp. 17-26). San Francisco, CA: Jossey-Bass.
- Hoggan, J. & Associates Inc. (2006). Nine in 10 Canadians Fear Our Lifestyle is Not Sustainable. Retrieved March 30, 2006 at <http://www.hoggan.com/files/HoggancommunicatingsustainabilityreleaseMarc>

h3006.pdf.

- Houghton, E. S., & White, L. A. (2006, in press). Environmental and Sustainability Education in Ontario: A Disorienting Dilemma. In W. Leal Filho (Ed.), *Innovation, Education and Communication for Sustainable Development*.
- Hsu, S. (2004). The Effects of an Environmental Education Program on Responsible Environmental Behaviour and Associated Environmental Literacy Variables in Taiwanese College Students. *Journal of Environmental Education*, 35(2), 37-48.
- Huckle, J. (2001). Education for Sustainability and Ecological Citizenship in Europe: A Challenge for Teacher Education in the 21st Century. Paper presented at a University of Thrace Conference, Alexandroupolis, Greece.
- Institute for Women's Policy Research. (2003, September). *Engaging Women in Environmental Activism: Recommendations for Rachel's Network*. (Publication No. I913). Washington, DC: Caiazza, A, & Barrett, A.
- Ison, R. (1999). Applying Systems Thinking to Higher Education. *Systems Research and Behavioral Science*, 16(2), 107-112.
- Jenkins, J. (2003). Classroom Open Learning: A Case of Old Wine in New Bottles? In J. Bradley (Ed.), *The Open Classroom: Distance Learning in and Out of Schools* (pp. 15-26). Sterling, VA: Kogan Page.
- Johnson, G. (2004). *Don't Be Fooled 2005: America's 10 Worst Greenwashers*. Boston, MA: The Green Life.
- Jucker, R. (2002). *Our Common Illiteracy: Education as if the Earth and People Mattered*. Frankfurt: Peter Lang.
- Kahn, R. (2003). Towards Ecopedagogy: Weaving a Broad-based Pedagogy of Liberation for Animals, Nature, and the Oppressed People of the Earth. *Animal Liberation Philosophy and Policy Journal*, 1. Retrieved September 18, 2004 at <http://www.animalliberationfront.com/Philosophy/Morality/Journal%20of%20Animal%20Liberation%20Affairs2.htm>.
- Karlovic, L., & Patrick, K. (2003). Environmental Adult Education: Women Living the Tensions. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental*

- Change* (pp. 59-68). San Francisco, CA: Jossey-Bass.
- Keegan, D. (1996). *Foundations of Distance Education*. London, UK: Routledge.
- Kellner, D. (1999). New Technologies: Technocities and the Prospects for Democratization. In J. Downey & J. McGuigan (Eds.), *Technocities* (pp. 186-204). London, UK: Sage.
- Kibert, N. C. (2000, u.p.). *An Analysis of the Correlations Between the Attitude, Behavior, and Knowledge Components of Environmental Literacy in Undergraduate University Students*. Unpublished Masters thesis, University of Florida, Gainesville, Florida, USA.
- Kuhn, R. G., & Jackson, E. L. (1989). Stability of Factor Structures in the Measurement of Public Environmental Attitudes. *Journal of Environmental Education*, 20(3), 27-32.
- Leal Filho, W. (1997). The Environment: A Unifying Theme for Lifelong Learning and Environmental Education. In W. Leal Filho (Ed.), *Lifelong Learning and Environmental Education* (pp. 21-30). Frankfurt: Peter Lang.
- Leal Filho, W. (1998). Environmental Education and Distance Education. In W. Leal Filho, & F. Tahir (Eds.), *Distance Education and Environmental Education* (pp. 9-20). Frankfurt: Peter Lang.
- Lovelock, J. (1988). *The Ages of Gaia: A Biography of Our Living Earth*. New York, NY: Norton.
- Mancl, K, Carr, K, & Morrone, M. (1999). Environmental Literacy of Ohio Adults. *Ohio Journal of Science*, 99(3), 57-61.
- Mappin, M. J., & Johnson, E. A. (2005). Changing Perspectives of Ecology and Education in Environmental Education. In E. Johnson & M. Mappin (Eds.), *Environmental Education and Advocacy: Changing Perspectives of Ecology and Education* (pp. 1-27). Cambridge, UK: Cambridge University Press.
- McKeown, R. (2002). *Education for Sustainable Development Toolkit*. Knoxville, TN: University of Tennessee.
- McSporran, M., & Young, S. (n.d.). Does Gender Matter in Online Learning? Retrieved April 30, 2006 at http://hyperdisc.unitec.ac.nz/research/ALTJpaper_9.pdf.

- Meadows, D. H., Randers, J., & Meadows, D. (2004). *Limits to Growth: The 30-Year Update*. White River Junction, VT: Chelsea Green Publishing.
- Mezirow, J. (1991). *Transformative Dimensions of Adult Learning*. San Francisco, CA: Jossey-Bass.
- Miller, M. (2005). Learning and Teaching in the Affective Domain. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. Retrieved May 1, 2006 at <http://www.coe.uga.edu/epltt/affective.htm>.
- Mittelstaedt, M. (2006, April 1). Ottawa Stops Funding One Tonne Challenge. *Globe and Mail*. Retrieved April 30, 2006 at <http://www.theglobeandmail.com/servlet/story/RTGAM.20060331.wxchallenge01/BNStory/National/home>.
- Middleton, C. D. (2001). Place and Peace: Education for Sustainable Co-Existence with the Environment. In G. E. Lasker, & S. Bastianoni (Eds.), *Advances in Ecosystem Research Volume VI: Environmental Sustainability and Environmental Education*, (pp. 23-28). Windsor, ON: International Institute for Advanced Studies in Systems Research and Cybernetics.
- Milbrath, L. W. (1989). *Envisioning a Sustainable Society: Learning Our Way Out*. Albany, NY: State University Press.
- Milbrath, L. W. (1996). *Learning to Think Environmentally While There is Still Time*. Albany, NY: State University Press.
- Minnesota Office of Environmental Assistance. (2000). *A GreenPrint for Minnesota*. St. Paul, MN: Ledermann, J.
- Minnesota Office of Environmental Assistance. (2002a). *Environmental Literacy: Scope and Sequence*. St. Paul, MN: Landers, P., Naylor, M., & Drewes, A. (Eds.).
- Minnesota Office of Environmental Assistance. (2002b). *The Minnesota Report Card on Environmental Literacy: A Benchmark Survey of Adult Environmental Knowledge, Attitudes and Behavior*. St. Paul, MN: Murphy, T. P. (Ed.).
- Minnesota Office of Environmental Assistance. (2004). *The Second Minnesota Report Card on Environmental Literacy: A Survey of Adult Environmental Knowledge, Attitudes and Behavior*. St. Paul, MN: Murphy, T. P. (Ed.).

- Molero, F. M. (1998). Environmental Education in Distance Education. In W. Leal Filho, & F. Tahir (Eds.), *Distance Education and Environmental Education* (pp. 114-125). Frankfurt: Peter Lang.
- Moore, M. G. (1996). Is There a Cultural Problem in Distance Education? In M. M. Thompson (Ed.), *Internationalism in Distance Education: A Vision for Higher Education* (pp. 187-194). University Park, PA: Pennsylvania State University.
- Moore, M., & Kearsley, G. (1996). *Distance Education: A Systems View*. Belmont, CA: Wadsworth.
- Muirhead, B. (2002). Integrating Critical Thinking into Online Classes. *USDLA Journal*, 16(11). Retrieved April 28, 2006 at http://www.usdla.org/html/journal/NOV02_Issue/article03.html.
- Murray, S., & Mwanzia, K. (2005). Open Universities: Raising Access, Reducing Barriers. Retrieved April 30, 2006 at http://www.ousa.on.ca/uploaded_files/pdf_files/Policy%20Papers%20and%20Statements/OpenUniversityfinal.pdf.
- National Environmental Education & Training Foundation (2004, draft). *Understanding Environmental Literacy in America: And Making It a Reality*. Washington, DC: Coyle, K. J. (Ed.).
- Neuman, W. L. (2003). *Social Research Methods: Qualitative and Quantitative Approaches*. Boston, MA: Allyn and Bacon.
- Newman, D. R., Webb, B., & Cochrane, C. (1995). A Content Analysis Method to Measure Critical Thinking in Face-to-Face and Computer Supported Group Learning. *Interpersonal Computing and Technology Journal*, 3(2), 56-77.
- Nielson, L. B. (1999, September). *Shades of Green: Integrating Environmental and Economic Attitudes*. Paper presented at the meeting of the American Political Science Association, Atlanta, GA.
- Novo, M. (1998). Environmental Education at Distance: A Tool for Sustainable Development. In W. Leal Filho, & F. Tahir (Eds.), *Distance Education and Environmental Education* (pp. 43-69). Frankfurt: Peter Lang.
- Orivel, F. (2000). Finance, Costs and Economics. In C. Yates & J. Bradley (Eds.),

- Basic Education at a Distance* (pp. 138-151). London, UK: RoutledgeFalmer.
- Orr, D. W. (1992). *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany, NY: State University Press.
- Orr, D. W. (1994). *Earth in Mind: On Education, Environment, and the Human Prospect*. Washington, DC: Island.
- Orr, D. W. (2000). Transformation or Irrelevance: The Challenge of Academic Planning for Environmental Education in the 21st Century. In W. Leal Filho (Ed.), *Sustainability and University Life* (pp. 219-232). Frankfurt: Peter Lang.
- OntarioLearn. (2006). About OntarioLearn. Retrieved February 11, 2006, from http://www.ontariolearn.com/about_ol.htm.
- Ontario Secondary School Teachers Federation. (1998). Issues in Ontario Education: Underfunding of Public Education. Retrieved March 12, 2006 at <http://www.osstf.on.ca/www/issues/edfi/underfunding.html>.
- Palmer, A. (2004). The Role of the Media in Environmental Protection. Retrieved April 30, 2006 at <http://forestry.msu.edu/China/New%20Folder/Ashley-ppt.pdf>.
- Palmer, C. (2004). Sustainability and Philosophy. In J. Blewitt, & C. Cullingford (Eds.), *The Sustainability Curriculum: The Challenge for Higher Education*, (pp. 232-244). London, UK: Earthscan.
- Palmer, J. A. (1998). *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise*. New York, NY: Routledge.
- Papen, U. (1997). Adult Learning: A Key for the 21st Century - Environmental Education in the Framework of the Fifth International Conference on Adult Education. In W. Leal Filho (Ed.), *Lifelong Learning and Environmental Education* (pp. 167-189). Frankfurt: Peter Lang.
- Pennsylvania Centre for Environmental Education (2001). The First Pennsylvania Environmental Readiness for the 21st Century Survey Report. Retrieved August 3, 2004 at http://www.pcee.org/Research/research_21stF_1Main.asp.
- Perraton, H. (2000a). Globalisation: And culture follows trade. In H. Perraton (Ed.), *Open and Distance Learning in the Developing World* (pp. 152-176). London, UK: Routledge.

- Perraton, H. (2000b). Political Economy: Who Benefits, Who Pays? In H. Perraton (Ed.), *Open and Distance Learning in the Developing World* (pp. 177-190). London, UK: Routledge.
- Pinero, E. (2001). Compilation of Baseline Reports, Indicator #17: Environmental Literacy of Pennsylvanians. Retrieved September 18, 2004 at <http://www.dep.state.pa.us/hosting/efp2/reports/statewide/indicator17.doc>.
- Pitt, D. C. (1999). Education. In C. Hernandez & R. Mayur (Eds.), *Pedagogy of the Earth: Education for a Sustainable Future* (pp. 219-226). Mumbai: International Institute for Sustainable Future.
- Pittman, J. (2004). Living Sustainably through Higher Education: A Whole Systems Design Approach to Organizational Change. In P. B. Corcoran, & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice* (pp. 199-212). Dordrecht: Kluwer.
- Prasad, V. (1997, June 2-6). Distance education in developing countries: Globalisation and new challenges in the new learning environment. Conference paper for the 18th ICDE World Conference. State College, PA: Pennsylvania State University.
- Princen, T., & Finger. M. (1994). *Environmental NGOs in World Politics: Linking the Local and the Global*. London, UK: Routledge.
- Rae, B. (2005, February). Ontario: A Leader in Learning – Report and Recommendations. Retrieved March 12, 2006 at <http://www.raereview.on.ca/en/report/>.
- RoperASW (2002). Louisiana RoperASW Study: Environmental Attitudes and Knowledge Survey 2002. Retrieved October 3, 2004 at <http://www.gov.state.la.us/enved/Fnlrpt02.pps>.
- Rumble, G. (2000). The globalisation of open and flexible learning: Considerations for planners and managers. *Online Journal of Distance Learning Administration*. Retrieved March 17, 2005 at <http://www.westga.edu/~distance/ojdla/fall33/rumble33.html>.
- Russell, C. L., Sarick, T., & Kennelly, J. (2002). Queering Environmental Education. *Canadian Journal of Environmental Education*, 7(1), 54-66.

- Russo, T., & Benson, S. (2005). Learning with Invisible Others: Perceptions of Online Presence and their Relationship to Cognitive and Affective Learning. *Educational Technology & Society*, 8(1), 54-62.
- Sanders, J. A., & Wiseman, R. L. (1990). The Effects of Verbal and Nonverbal Teacher Immediacy on Perceived Cognitive, Affective, and Behavioral Learning in the Multicultural Classroom. *Communication Education*, 39, 341-353.
- St. Clair, R. (2003). Words for the World: Creating Critical Environmental Literacy for Adults. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education: Ecological Learning, Theory, and Practice for Socioenvironmental Change* (pp. 69-78). San Francisco, CA: Jossey-Bass.
- Salmon, J. (2000). Are We Building Environmental Literacy? *Journal of Environmental Education*, 31(4), 4-10.
- Saul, D. (2000). Expanding Environmental Education: Thinking Critically, Thinking Culturally. *Journal of Environmental Education*, 31(2), 5-8.
- Schindler, F. H. (1999). Development of the Survey of Environmental Issue Attitudes. *Journal of Environmental Education*, 30(3), 12-16.
- Schmitz, S. (1999). Gender Differences in Acquisition of Environmental Knowledge Related to Wayfinding Behavior, Spatial Anxiety and Self-Estimated Environmental Competencies. *Sex Roles*, 41(1/2), 71-93.
- Schuett, M. A., & Ostergren, D. (2003). Environmental Concern and Involvement of Individuals in Selected Voluntary Associations. *Journal of Environmental Education*, 34(4), 30-38.
- Second Nature. (2005). Education for Sustainability. Retrieved March 24, 2006 at <http://www.secondnature.org/efs>.
- Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York, NY: Doubleday.
- Seymour, M. (2004). Educating for Earth: Future Generations and All of Life. In M. Seymour (Ed.), *Educating for Humanity: Rethinking the Purposes of Education* (pp. 133-144). Boulder, CO: Paradigm.
- Sharma, M. (1998). Environmental Education through Distance Education in a

- Perspective From Developing Countries. In W. Leal Filho, & F. Tahir (Eds.), *Distance Education and Environmental Education* (pp. 71-85). Frankfurt: Peter Lang.
- Smith, M. K. (2005). Paulo Freire. Retrieved May 3, 2006 at <http://www.infed.org/thinkers/et-freir.htm>.
- Smith, P. L., & Ragan, T. J. (1999). *Instructional Design*. Hoboken, NJ: Wiley.
- Statistics Canada. (2004, September 30). The People: Education. Retrieved March 24, 2006 at http://142.206.72.67/02/02c/02c_000_e.htm.
- Statistics Canada. (2006). *Participation in Adult Schooling and It's Earnings Impact in Canada*. (Catalogue No. 11F0019MIE – No. 276). Ottawa, ON.
- Sterling, S. (1992). Mapping Environmental Education: Progress, Principles and Potential. In W. Leal Filho, & J. A Palmer (Eds.), *Key Issues in Environmental Education* (pp. 1-15). London, UK: Horton.
- Sterling, S. (1996). Education in Change. In J. Huckle, & S. Sterling (Eds.), *Education for Sustainability*, (pp. 18-39). London, UK: Earthscan.
- Sterling, S. (2001). *Sustainable Education: Re-visioning Learning and Change*. Bristol, UK: Green Books.
- Sterling, S. (2003, u.p.). Whole systems thinking as a basis for paradigm change in education: Explorations in the context of sustainability. Unpublished doctoral thesis, University of Bath, Bath, UK. Retrieved November 3, 2005 at <http://www.bath.ac.uk/cree/sterling.htm>.
- Sterling, S. (2004). An Analysis of the Development of Sustainability Education Internationally: Evolution, Interpretation and Transformative Potential. In J. Blewitt, & C. Cullingford (Eds.), *The Sustainability Curriculum: The Challenge for Higher Education*, (pp. 43-62). London, UK: Earthscan.
- Sullivan, E. O. (2004). Sustainability and Transformative Educational Vision. In P. B. Corcoran, & A. E. J. Wals (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice* (pp. 163-180). Dordrecht: Kluwer.
- Sumner, J. (2003). Environmental Adult Education and Community Sustainability. In L. H. Hill & D. E. Clover (Vol. Eds.), *Environmental Adult Education:*

- Ecological Learning, Theory, and Practice for Socioenvironmental Change* (pp. 39-45). San Francisco, CA: Jossey-Bass.
- Suzuki, D. (1998). *Earth Time*. Toronto, ON: Stoddart.
- Suzuki, D. (2002). *The Sacred Balance: Rediscovering Our Place in Nature*. Vancouver, BC: Greystone.
- Suzuki, D., & Dressel, H. (2004). *From Naked Ape to Superspecies: Humanity and the Global Eco-Crisis*. Vancouver, BC: Greystone Books.
- Swan, J. A. (1974). Some Human Objectives for Environmental Education. In J. A. Swan, & W. B. Strapp (Eds.), *Environmental Education: Strategies Toward a More Livable Future* (pp. 25-41). New York: Wiley.
- Thomashow, M. (1995). *Ecological Identity: Becoming a Reflective Environmentalist*. Cambridge, MA: MIT.
- Tsaliki, L. (2003). Electronic Citizenship and Global Social Movements. *First Monday*, 8(2). Retrieved April 30, 2006 at http://firstmonday.org/issue/issue8_2/tsaliki/index.html.
- UNESCO. (2002). Why Link Gender and Sustainable Development? Retrieved April 30, 2006 at http://portal.unesco.org/en/ev.php-URL_ID=5150&URL_DO=DO_TOPIC&URL_SECTION=201.html.
- Volk, T. L., & Cheak, M. J. (2003). The Effects of an Environmental Education Program on Students, Parents, and Community. *Journal of Environmental Education*, 34(4), 12-25.
- Wackernagel, M., & Rees, W. (1996). *Our Ecological Footprint: Reducing Human Impact on the Earth*. Gabriola Island, BC: New Society.
- Wals, A. E. J., & de Jong, F. P. M. C. (1997). Community-Based Environmental Education, School Culture and Lifelong Learning. In W. Leal Filho (Ed.), *Lifelong Learning and Environmental Education* (pp. 121-133). Frankfurt: Peter Lang.
- Weil, S. (1999). Re-Creating Universities for 'Beyond the Stable State': From 'Dearingsque' Systematic Control to Post-Dearing Systemic Learning and Inquiry. *Systems Research and Behavioral Science*, 16(2), 171-190.

- Wigley, T. M. L. (2005). The Climate Change Commitment. *Science*, 307(5716), 1766-1769.
- Wikipedia. (2006). Greenwash. Retrieved May 3, 2006 at <http://en.wikipedia.org/wiki/Greenwash>.
- Wilson, E. O. (1984). *The Biophilia Hypothesis*. Cambridge, MA: Harvard University Press.
- Wittmer, C., & Johnson, B. (2000). Experience as a Foundation of Environmental Adult Education: The Audubon Expedition Model. *Convergence* 33(4), 111-122.
- Woods, R., & Ebersole, S. (2003). Becoming a 'Communal Architect' in the Online Classroom – Integrating Cognitive and Affective Learning for Maximum Effect in Web-Based Learning. *Online Journal of Distance Learning Administration*, 6(1), 52-67.
- World Commission on Environment and Development. (1987). *Our Common Future*. Oxford: Oxford University Press.
- Yates, C. (2000). Outcomes: What Have We Learned? In C. Yates & J. Bradley (Eds.), *Basic Education at a Distance* (pp. 229-247). London, UK: RoutledgeFalmer.

APPENDIX A

SCRIPT FOR THE ONTARIO ENVIRONMENTAL LITERACY AUDIT

Good morning/afternoon. My name is _____ and I am calling from Opinion Search on behalf of Larry White, a graduate student at Athabasca University who is conducting research regarding environmental literacy amongst adults in Ontario. May I please speak with the individual in your home who is aged 18 or older and whose birthday is coming up next?

[Repeat the first two sentences if a new respondent comes on the phone, or continue if the respondent acknowledges that they are the person to whom we wish to speak.]

The purpose of the survey is to help identify the level of environmental literacy among adults in Ontario. Environmental literacy is a measure of peoples' environmental knowledge, attitudes and behaviours. This information will be important in order to help plan for the future, especially in the delivery of education in Ontario.

The survey will take approximately 15-20 minutes. You are under no obligation to respond and may choose either not to answer a particular question or to stop the survey at any time. However, if you choose to answer, I ask that you do so as honestly as possible.

All of your answers will be treated confidentially, and final reporting will be grouped to provide anonymity to all participants. The record of your individual answers will be destroyed after the final report is written, anticipated in May 2006.

At the end of the survey, I will ask you if you wish to receive a copy of the results once they are completed later in the year. Should you wish to receive the results, your name and delivery instructions will not be connected to the answers you have provided on the survey.

If you would like more information about this research study, you can contact the researcher, Larry White at larry@environmental-ed.ca, or his supervisor, Dr. Mike Gismondi at mikeg@athabascau.ca.

Would you like to continue?

[Yes...]

[If no...]

Thank you very much for your time today.

ONTARIO ENVIRONMENTAL LITERACY AUDIT

1. To begin with, in general, how much knowledge do you feel that you have in regards to environmental issues and problems?
 - a. a great deal of knowledge
 - b. some knowledge
 - c. not very much knowledge
 - d. no knowledge

The first set of questions will be a series of multiple-choice questions and you are asked to respond with the answer that you believe is correct.

2. What is the most common cause of pollution in streams, rivers, and oceans?
 - a. dumping of garbage by cities
 - b. surface water running off roads, yards, parking lots, and fields **
 - c. trash washed into the ocean from beaches or dumped from ships
 - d. industrial waste
 - e. don't know

Source: The Heartland Institute
<http://www.heartland.org/Article.cfm?artId=9699>

3. How is most of the electricity in Ontario generated?
 - a. by burning fossil fuels **
 - b. with nuclear power
 - c. through solar energy
 - d. at hydroelectric power plants
 - e. don't know

Source: World Resources Institute
http://earthtrends.wri.org/pdf_library/data_tables/ene2_2003.pdf

4. Which of the following is best at filtering (or cleaning) the water?
 - a. forests
 - b. sewage treatment plants
 - c. wetlands **

- d. lakes
- e. don't know

Source: Ducks Unlimited Canada
http://www.ducks.ca/conserve/wetland_values/index.html

5. There are many different kinds of animals and plants, and they live and interact in many different types of environments. What word would you use to describe this concept?
- a. multiplicity
 - b. biodiversity **
 - c. socio-economics
 - d. evolution
 - e. don't know

Source: Environment Canada
http://www.ec.gc.ca/soer-ree/English/Indicator_series/new_issues.cfm?issue_id=1&tech_id=1#bio_pic

6. What would you say is the most common reason that animal species become extinct?
- a. loss of habitat **
 - b. climate change
 - c. natural evolution
 - d. hunting and poaching
 - e. don't know

Source: Environment Canada
http://www.ec.gc.ca/soer-ree/English/Indicator_series/new_issues.cfm?issue_id=1&tech_id=1#bio_pic

7. Which of the following statements do you believe to be the most accurate?
- a. humans are a species that will survive indefinitely
 - b. the human species will soon become extinct, nothing we can do will prevent this
 - c. the human species will survive as long as there is a balanced ecosystem that will support human life **
 - d. there is no way of predicting what will happen to the human species
 - e. ecological principles do not apply to humans

Source: Boyd, D. R. (2004).
Sustainability within a Generation: A New Vision for Canada. Vancouver, BC: David Suzuki Foundation.

8. The process of photosynthesis in green plants:
- a. uses sunlight to burn energy in plants
 - b. changes light energy into chemical energy **
 - c. changes chlorophyll into sugar

- d. is a process used to burn sugar stored in plants so the plants can grow
- e. don't know

Source: Natural Resources Canada
http://www.cfl.scf.rncan.gc.ca/ecosys/dynamic/photosyn_e.htm

9. Chemicals in the environment are often found in body fat. Assume that a chemical contaminates an aquatic ecosystem. The highest concentration of this chemical would likely be in which group of organisms in the ecosystem?
- a. plant life
 - b. minnows
 - c. fish that eat insects and plants
 - d. fish-eating birds **
 - e. don't know

Source: U. S. Environmental Protection Agency
http://oaspub.epa.gov/trs/trs_proc_qry.navigate_term?p_term_id=18824&p_term_cd=TERM

10. Solid waste includes the trash and recyclables that we put out for collection, among other things. In the long term, which of the following would be the best way to address the problem of solid waste?
- a. burn waste materials
 - b. reduce the amount of materials being used **
 - c. reuse materials for other purposes rather than throwing them out
 - d. recycle materials that can be used again
 - e. don't know

Source: Boyd, D. R. (2004). Sustainability within a Generation: A New Vision for Canada. Vancouver, BC: David Suzuki Foundation.

11. Where does Canada rank among world countries in its quantity per capita of greenhouse gases produced?
- a. first
 - b. second
 - c. third **
 - d. fourth
 - e. fifth

Source: OECD
<http://www.environmentalindicators.com/htdocs/indicators/5gree.htm>

The next set of questions will be a series of multiple-choice questions and you are asked to respond with your opinion about the subject. Please indicate whether you strongly agree, agree, disagree or strongly disagree with each of the

following statements:

12. Humans depend on the health of the natural environment and the integrity of ecosystems for their own long-term health and well-being.
 - a. strongly agree
 - b. agree
 - c. no opinion / don't know
 - d. disagree
 - e. strongly disagree

13. The fact that Canada has signed the Kyoto Accord is good for the environment.
 - a. strongly agree
 - b. agree
 - c. no opinion / don't know
 - d. disagree
 - e. strongly disagree

14. I think most of the concern about environmental problems has been exaggerated.
 - a. strongly agree
 - b. agree
 - c. no opinion / don't know
 - d. disagree
 - e. strongly disagree

15. Ontario has an excellent set of environmental laws, regulations and policies to protect the health of the natural environment.
 - a. strongly agree
 - b. agree
 - c. no opinion / don't know
 - d. disagree
 - e. strongly disagree

16. Laws should be passed and enforced that protect the quality of life in the future even if it means that individual freedoms are limited.
 - a. strongly agree
 - b. agree
 - c. no opinion / don't know
 - d. disagree
 - e. strongly disagree

17. I believe that I can contribute to the solution for environmental issues through my daily choices and actions.

- a. strongly agree
- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

18. Genetically modified foods are good for the environment.

- a. strongly agree
- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

19. I would be willing to pay higher prices for products and services in order to protect the environment.

- a. strongly agree
- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

As a secondary question to this one, how much more (as a percentage) would you be willing to pay for products or services that protect the environment? _____

20. I would be willing to make changes to my lifestyle choices in order to help keep the environment healthy.

- a. strongly agree
- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

21. I would be willing to pay higher taxes in order to protect the environment.

- a. strongly agree
- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

22. Choose which most closely matches your opinion:
- a. Government should let ordinary people decide for themselves how to protect the environment, even if it means they don't always do the right thing
 - b. Government should pass laws to make ordinary people protect the environment, even if it interferes with people's right to make their own decisions
23. If we must choose between the environment and the economy, which do you believe is more important: economic development or environmental protection?
- a. economic development
 - b. environmental protection
 - c. it is important not to separate the two
 - d. depends on what the issue is
 - e. don't know
24. Maintaining a healthy environment depends on:
- a. government
 - b. experts
 - c. environmentalists
 - d. business and industry
 - e. everyone

The next set of questions ask you about some of the things you may do in your day-to-day life. For each of the following items, please indicate whether you never do it, sometimes do it, or frequently do it.

25. Recycle things (such as newspapers, cans, glass, etc).
- a. never do it
 - b. sometimes do it
 - c. frequently do it
26. Other than recycling, cut down on the amount of trash and garbage you create.
- a. never do it
 - b. sometimes do it
 - c. frequently do it
27. Turn off lights and electrical appliances when not in use.
- a. never do it

- b. sometimes do it
 - c. frequently do it
28. Reduce car use by using other types of transportation such as walking, biking, public transportation, or carpooling.
- a. never do it
 - b. sometimes do it
 - c. frequently do it
29. Donate money to a group or organization working to protect the environment.
- a. never do it
 - b. sometimes do it
 - c. frequently do it
30. Consider a political candidate's record or stance on the environment when voting.
- a. never do it
 - b. sometimes do it
 - c. frequently do it
31. Service your vehicle regularly.
- a. never do it
 - b. sometimes do it
 - c. frequently do it
32. Purchase products that are environmentally friendly first (such as organic foods, products with less packaging, etc.).
- a. never do it
 - b. sometimes do it
 - c. frequently do it
33. Participate in local/community environmental projects such as tree planting, stream clean-up, environmental fundraisers, committee work, educational activities, etc).
- a. never do it
 - b. sometimes do it
 - d. frequently do it
34. Participate in Canada's One Tonne Challenge.
- a. never do it
 - b. sometimes do it

- c. frequently do it

As a secondary question to this one, have you heard of the One Tonne Challenge? _____

[If asked: The One Tonne Challenge is a challenge presented by the Government of Canada to Canadians in March 2004 to reduce their greenhouse gas emissions by one tonne each year. More information is available at climatechange.gc.ca/onetonne.]

The next set of questions asks about your preferred method of learning about the environment and about environmental issues.

35. What is the best way for you to keep informed about the environment and environmental issues?
- a. continuing education courses
 - b. formal, post-secondary education
 - c. newspapers and magazines
 - d. television
 - e. through friends
 - f. from your children when they bring information home from school
 - g. Internet
 - h. it's not really that important
 - i. other? _____
36. For this question, please think about Ontario as a whole. What is the best way for the province to use to keep Ontario residents informed about the environment and environmental issues?
- a. continuing education courses
 - b. formal, post-secondary education
 - c. newspapers and magazines
 - d. television
 - e. through friends
 - f. from your children when they bring information home from school
 - g. Internet
 - h. it's not really that important
 - i. other? _____
37. Please indicate how you feel about the following sentence. I believe that it is important for Ontario residents to be well informed regarding environmental issues.
- a. strongly agree

- b. agree
- c. no opinion / don't know
- d. disagree
- e. strongly disagree

The last few questions help to ensure that we have a representative cross-section of Ontario residents. Please be assured that all of your answers will be treated confidentially, and final reporting will be grouped to provide anonymity to all participants.

38. Which age group do you fall into?

- a. 18 - 29
- b. 30 - 39
- c. 40 - 49
- d. 50 - 59
- e. 60 +

39. What is the highest level of education that you have completed?

- a. less than a high school diploma
- b. high school graduate or GED
- c. college diploma
- d. undergraduate degree
- e. graduate degree

40. Would you describe the area you live in as a:

- a. large city
- b. medium sized city
- c. small city
- d. suburban town
- e. small town
- f. rural or farm area

41. *[Do not read. Record.]*

- a. Male
- b. Female

CLOSING SCRIPT

Thank you very much for taking the time to participate in this survey. As I mentioned at the beginning, the information obtained in this survey will be

important in order to help plan for the future, especially in the delivery of education in Ontario.

In addition to the provision of a final report to participants who request it, the final results of the study will be published as a thesis available worldwide through the online holdings of the Athabasca University Library and made available as a planning tool for Environmental Education Ontario, a citizens' coalition promoting an environmentally literate and sustainable future seeking to make environmental literacy mainstream. Additionally, the results may also be disseminated through presentations at academic conferences and papers published in professional journals.

Would you be interested in receiving a copy of the final results by e-mail once they are completed later this year? Should you wish to receive the results, your name and delivery instructions will not be connected to the answers you have provided on the survey.

[If yes...]

May I please have your e-mail address?

The graduate student working on this research will send a copy of the results to you by e-mail.

Thank you once again for your assistance and time today. *[This line only 'If No.']*

APPENDIX B

ONTARIO ENVIRONMENTAL LITERACY AUDIT RESULTS

Q1. In general, how much knowledge do you feel you have in regards to environmental issues and problems?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A great deal of knowledge	10	13.2	13.2	13.2
	Some knowledge	53	69.7	69.7	82.9
	Not very much knowledge	13	17.1	17.1	100
	Total	76	100	100	

Q2. What is the most common cause of pollution in streams, rivers, and oceans?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dumping of garbage by cities	5	6.6	6.6	6.6
	Surface water running off roads/yards/parking lots/fields	25	32.9	32.9	39.5
	Trash washed into the ocean from beaches/dumped from ships	4	5.3	5.3	44.7
	Industrial waste	40	52.6	52.6	97.4
	Don't know/Refused	2	2.6	2.6	100
	Total	76	100	100	

Q3. How is most of the electricity in Ontario generated?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	By burning fossil fuels	15	19.7	19.7	19.7
	With nuclear power	17	22.4	22.4	42.1
	At hydroelectric power plants	44	57.9	57.9	100
	Total	76	100	100	

Q4. Which of the following is best at filtering (or cleaning) the water?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Forests	9	11.8	11.8	11.8
	Sewage treatment plants	31	40.8	40.8	52.6
	Wetlands	31	40.8	40.8	93.4
	Lakes	2	2.6	2.6	96.1
	Don't know/Refused	3	3.9	3.9	100
	Total	76	100	100	

Q5. Different kinds of animals and plants live and interact in different types of environments. What word would you use to describe this concept?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Multiplicity	2	2.6	2.6	2.6
	Biodiversity	47	61.8	61.8	64.5
	Socio-economics	5	6.6	6.6	71.1
	Evolution	12	15.8	15.8	86.8
	Don't know/Refused	10	13.2	13.2	100
	Total	76	100	100	

Q6. What would you say is the most common reason that animal species become extinct?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Loss of habitat	62	81.6	81.6	81.6
	Climate change	4	5.3	5.3	86.8
	Natural evolution	2	2.6	2.6	89.5
	Hunting and poaching	8	10.5	10.5	100
	Total	76	100	100	

Q7. Which of the following statements do you believe to be the most accurate:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Humans are a species that will survive indefinitely	3	3.9	3.9	3.9
	The human species will soon become extinct	2	2.6	2.6	6.6
	Humans will survive as long as there's a balanced ecosystem	57	75	75	81.6
	There's no way of predicting what will happen to humans	11	14.5	14.5	96.1
	Don't know/Refused	3	3.9	3.9	100
	Total	76	100	100	

Q8. The process of photosynthesis in green plants:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Uses sunlight to burn energy in plants	18	23.7	23.7	23.7
	Changes light energy into chemical energy	22	28.9	28.9	52.6
	Changes chlorophyll into sugar	18	23.7	23.7	76.3
	Is a process used to burn sugar stored in plants	8	10.5	10.5	86.8
	Don't know/Refused	10	13.2	13.2	100
	Total	76	100	100	

Q9. The highest concentration of a chemical that may contaminate an aquatic ecosystem would likely be in which group of organisms?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Plant life	16	21.1	21.1	21.1
	Minnows	3	3.9	3.9	25
	Fish that eat insects and plants	25	32.9	32.9	57.9
	Fish-eating birds	23	30.3	30.3	88.2
	Don't know/Refused	9	11.8	11.8	100
	Total	76	100	100	

Q10. In the long term, which of the following do you think would be the best way to address the problem of solid waste?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Burn waste materials	1	1.3	1.3	1.3
	Reduce the amount of materials being used	25	32.9	32.9	34.2
	Reuse materials for other purposes	11	14.5	14.5	48.7
	Recycle materials that can be used again	38	50	50	98.7
	Don't know/Refused	1	1.3	1.3	100
	Total	76	100	100	

Q11. Where does Canada rank among world countries in its quantity per capita of greenhouse gases produced?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First	7	9.2	9.2	9.2
	Second	9	11.8	11.8	21.1
	Third	30	39.5	39.5	60.5
	Fourth	9	11.8	11.8	72.4
	Fifth	12	15.8	15.8	88.2
	Don't know/Refused	9	11.8	11.8	100
	Total	76	100	100	

Q12. Agreement: Humans depend on the health of the natural environment and the integrity of ecosystems for their own long-term health/well-being.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	49	64.5	64.5	64.5
	Agree	26	34.2	34.2	98.7
	Strongly disagree	1	1.3	1.3	100
	Total	76	100	100	

Q13. Agreement: The fact that Canada has signed the Kyoto Accord is good for the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	19	25	25	25
	Agree	32	42.1	42.1	67.1
	Disagree	6	7.9	7.9	75
	Strongly disagree	5	6.6	6.6	81.6
	No opinion / Don't know	14	18.4	18.4	100
	Total	76	100	100	

Q14. Agreement: I think most of the concern about environmental problems has been exaggerated.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	3	3.9	3.9	3.9
	Agree	9	11.8	11.8	15.8
	Disagree	32	42.1	42.1	57.9
	Strongly disagree	31	40.8	40.8	98.7
	No opinion / Don't know	1	1.3	1.3	100
	Total	76	100	100	

Q15. Agreement: Ontario has an excellent set of environmental laws, regulations and policies to protect the health of the natural environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	5.3	5.3	5.3
	Agree	31	40.8	40.8	46.1
	Disagree	30	39.5	39.5	85.5
	Strongly disagree	5	6.6	6.6	92.1
	No opinion / Don't know	6	7.9	7.9	100
	Total	76	100	100	

Q16. Agreement: Laws should be passed/enforced that protect the quality of life in the future even if it means limited individual freedoms.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	8	10.5	10.5	10.5
	Agree	43	56.6	56.6	67.1
	Disagree	17	22.4	22.4	89.5
	Strongly disagree	8	10.5	10.5	100
	Total	76	100	100	

Q17. Agreement: I believe that I can contribute to the solution for environmental issues through my daily choices and actions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	31	40.8	40.8	40.8
	Agree	44	57.9	57.9	98.7
	Disagree	1	1.3	1.3	100
	Total	76	100	100	

Q18. Agreement: Genetically modified foods are good for the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	1.3	1.3	1.3
	Agree	11	14.5	14.5	15.8
	Disagree	36	47.4	47.4	63.2
	Strongly disagree	14	18.4	18.4	81.6
	No opinion / Don't know	14	18.4	18.4	100
	Total	76	100	100	

Q19. Agreement: I would be willing to pay higher prices for products and services in order to protect the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	13	17.1	17.1	17.1
	Agree	47	61.8	61.8	78.9
	Disagree	14	18.4	18.4	97.4
	Strongly disagree	1	1.3	1.3	98.7
	No opinion / Don't know	1	1.3	1.3	100
	Total	76	100	100	

Q19A. How much more (as a percentage) would you be willing to pay for products or services that protect the environment?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	7	9.2	11.7	11.7
	10	22	28.9	36.7	48.3
	15	4	5.3	6.7	55
	20	8	10.5	13.3	68.3
	25	4	5.3	6.7	75
	40	2	2.6	3.3	78.3
	50	4	5.3	6.7	85
	75	2	2.6	3.3	88.3
	100	1	1.3	1.7	90
	500	1	1.3	1.7	91.7
	Don't Know/Refused	5	6.6	8.3	100
Total	60	78.9	100		
Total	76	100			

Q20. Agreement: I would be willing to make changes to my lifestyle choices in order to help keep the environment healthy.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	27	35.5	35.5	35.5
	Agree	45	59.2	59.2	94.7
	Disagree	3	3.9	3.9	98.7
	No opinion / Don't know	1	1.3	1.3	100
	Total	76	100	100	

Q21. Agreement: I would be willing to pay higher taxes in order to protect the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	14	18.4	18.4	18.4
	Agree	30	39.5	39.5	57.9
	Disagree	23	30.3	30.3	88.2
	Strongly disagree	8	10.5	10.5	98.7
	No opinion / Don't know	1	1.3	1.3	100
	Total	76	100	100	

Q22. Please choose which of these two statements most closely matches your opinion:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government should let people decide how to protect the environment	24	31.6	31.6	31.6
	Government should pass laws to make people protect the environment	44	57.9	57.9	89.5
	Don't know/Refused	8	10.5	10.5	100
	Total	76	100	100	

Q23. Which do you believe is more important: economic development or environmental protection?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Economic development	19	25	25	25
	Environmental protection	50	65.8	65.8	90.8
	It is important not to separate the two	3	3.9	3.9	94.7
	Depends on what the issue is	1	1.3	1.3	96.1
	Don't know/Refused	3	3.9	3.9	100
Total	76	100	100		

Q24. Maintaining a healthy environment depends on:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Experts	2	2.6	2.6	2.6
	Business and industry	4	5.3	5.3	7.9
	All of the above	69	90.8	90.8	98.7
	Government	1	1.3	1.3	100
	Total	76	100	100	

Q25. How often do you...Recycle things (such as newspapers, cans, glass, etc).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	2	2.6	2.6	2.6
	Sometimes do it	5	6.6	6.6	9.2
	Frequently do it	69	90.8	90.8	100
	Total	76	100	100	

Q26. How often do you...Other than recycling, cut down on the amount of trash and garbage you create.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	6	7.9	7.9	7.9
	Sometimes do it	24	31.6	31.6	39.5
	Frequently do it	46	60.5	60.5	100
	Total	76	100	100	

Q27. How often do you...Turn off lights and electrical appliances when not in use.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sometimes do it	9	11.8	11.8	11.8
	Frequently do it	67	88.2	88.2	100
	Total	76	100	100	

Q28. How often do you...Reduce car use by using other types of transportation such as walking, biking, public transportation, or carpooling.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	22	28.9	28.9	28.9
	Sometimes do it	28	36.8	36.8	65.8
	Frequently do it	25	32.9	32.9	98.7
	Don't know/Refused	1	1.3	1.3	100
	Total	76	100	100	

Q29. How often do you...Donate money to a group or organization working to protect the environment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	28	36.8	36.8	36.8
	Sometimes do it	39	51.3	51.3	88.2
	Frequently do it	9	11.8	11.8	100
	Total	76	100	100	

Q30. How often do you...Consider a political candidate's record or stance on the environment when voting.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	11	14.5	14.5	14.5
	Sometimes do it	33	43.4	43.4	57.9
	Frequently do it	29	38.2	38.2	96.1
	Don't know/Refused	3	3.9	3.9	100
	Total	76	100	100	

Q31. How often do you...Service your vehicle regularly.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	4	5.3	5.3	5.3
	Sometimes do it	6	7.9	7.9	13.2
	Frequently do it	62	81.6	81.6	94.7
	Don't know/Refused	4	5.3	5.3	100
	Total	76	100	100	

Q32. How often do you...Purchase products that are environmentally friendly first, e.g., organic foods, products with less packaging, etc.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	5	6.6	6.6	6.6
	Sometimes do it	40	52.6	52.6	59.2
	Frequently do it	30	39.5	39.5	98.7
	Don't know/Refused	1	1.3	1.3	100
	Total	76	100	100	

Q33. How often do you...Participate in local/community environmental projects such as tree planting, stream clean-up, etc.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	32	42.1	42.1	42.1
	Sometimes do it	35	46.1	46.1	88.2
	Frequently do it	9	11.8	11.8	100
	Total	76	100	100	

Q34. How often do you...Participate in Canada's One Tonne Challenge.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never do it	41	53.9	53.9	53.9
	Sometimes do it	17	22.4	22.4	76.3
	Frequently do it	15	19.7	19.7	96.1
	Don't know/Refused	3	3.9	3.9	100
	Total	76	100	100	

Q34A. Have you heard of the One Tonne Challenge?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	31.6	54.5	54.5
	No	20	26.3	45.5	100
	Total	44	57.9	100	
Total		76	100		

Q35. What is the best way for you to keep informed about the environment and environmental issues?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Continuing education courses	3	3.9	3.9	3.9
	Formal, post-secondary education	3	3.9	3.9	7.9
	Newspapers and magazines	33	43.4	43.4	51.3
	Television	22	28.9	28.9	80.3
	Through friends	1	1.3	1.3	81.6
	From your children when they bring information home from school	3	3.9	3.9	85.5
	Internet	10	13.2	13.2	98.7
	Other (Specify)	1	1.3	1.3	100
	Total	76	100	100	

Q36. What is the best way for the province to keep Ontario residents informed about the environment and environmental issues?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Continuing education courses	1	1.3	1.3	1.3
	Formal, post-secondary education	1	1.3	1.3	2.6
	Newspapers and magazines	26	34.2	34.2	36.8
	Television	41	53.9	53.9	90.8
	From your children when they bring info. home from school	5	6.6	6.6	97.4
	Internet	2	2.6	2.6	100
	Total	76	100	100	

Q37. Agreement: I believe that it is important for Ontario residents to be well informed regarding environmental issues.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	52	68.4	68.4	68.4
	Agree	24	31.6	31.6	100
	Total	76	100	100	

Q38. Which age group do you fall into?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 - 29	13	17.1	17.1	17.1
	30 - 39	18	23.7	23.7	40.8
	40 - 49	16	21.1	21.1	61.8
	50 - 59	15	19.7	19.7	81.6
	60 +	13	17.1	17.1	98.7
	Refused	1	1.3	1.3	100
	Total	76	100	100	

Q39. What is the highest level of education that you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than a high school diploma	6	7.9	7.9	7.9
	High school graduate or GED	20	26.3	26.3	34.2
	College diploma	24	31.6	31.6	65.8
	Undergraduate degree	10	13.2	13.2	78.9
	Graduate degree	16	21.1	21.1	100
	Total	76	100	100	

Q40. Would you describe the area you live in as a:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Large city	21	27.6	27.6	27.6
	Medium sized city	15	19.7	19.7	47.4
	Small city	10	13.2	13.2	60.5
	Suburban town	9	11.8	11.8	72.4
	Small town	8	10.5	10.5	82.9
	Rural or farm area	13	17.1	17.1	100
	Total	76	100	100	

Q41. Gender:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	38	50	50	50
	Female	38	50	50	100
	Total	76	100	100	