

**ENVIRONMENTAL VALUES EDUCATION
IN SCHOOL CURRICULA**

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IN SCHOOL CURRICULA**

By

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ABSTRACT

Environmental education is ultimately concerned with changing the behaviour of learners so that decisions that they make throughout life are made after consideration of the effects of acting on these decisions. This report offers a conceptual model adapted from Ajzen and Fishbein (1980), and Hungerford and Volk (1990). This model attempts to explain behaviour and shows that the values that an individual holds are one of the variables that influence behaviour. This project describes the reforms that are taking place in education in Ontario and the potential they have to marginalize environmental education, and specifically environmental values education (EVE), in the curriculum of our schools.

As a means of resisting this, the project describes tools that were developed for assessing changes in values that have an influence on the development of positive environmental behaviours. The hypothesis central to this effort is that if environmental educators can show that EVE programs are necessary and effective, then a place for EVE programs may be assured. To do this, environmental educators will need to develop quantitative assessment tools since these are perceived by the public to be more valid and reliable than qualitative assessment.

An analysis of a trial of the assessment tools developed by the author revealed no statistically significant changes in the values espoused by students, either as members of a group, or as individuals. However, this points to defects in the expectations and administration of the assessment rather than in the tools themselves. These findings were the basis for recommendations made by the author. In response to the defects that

were uncovered in the analysis, modifications to the assessment tools and their administration are recommended. Along with this are recommendations regarding both pre-service and in-service teacher education.

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INTRODUCTION

This project is an attempt to gain an understanding of the place of environmental values education (EVE) in the curriculum of schools in Ontario, both present and future, and to suggest steps which might ensure that there is a place for EVE in the curriculum of the late 1990s and beyond. The suggested steps centre around communicating to the public the necessity for and effectiveness of EVE programs. Since the public prefers to receive their information on such topics in quantitative terms, this project focuses on developing quantitative tools for assessing student performance as part of an evaluation program. This project is an exploratory effort at developing these tools and through an analysis of the effectiveness of the use of these assessment tools, a number of recommendations relating to student assessment and program evaluation are offered. This effort is set within the context of a Grade 11 Environmental Studies (Geography) class.

The teaching of values in our schools has become a controversial issue over the last several decades. This, together with the fact that the environmental studies curriculum has been divided among several subjects areas, rather than being a discrete subject itself, has meant that EVE has not been strongly represented in the curriculum of schools in Ontario. Reform of education systems has become a way of life in Ontario with the most recent reforms being implemented before the level of success or failure of the last set of reforms has been assessed. Under the most current reforms there exists the

potential for the already precarious place of EVE in the curriculum to be further marginalized. Environmental studies and the promotion of positive environmental values deserve a prominent place in the school curriculum if we are to effectively address what many experts and lay people see as a looming ecological crisis. This is a belief that I hold deeply and, together with the potential for the marginalization of EVE in the curriculum, is what has led me to this topic.

In Chapter 1 the case for an EVE program within the curriculum of our schools, and in particular in the environmental education curriculum, is made. In doing so I outline a conceptual model for explaining the relevant human behaviour. This is the model that has been adopted as a framework for my explorations on this topic.

Chapter 2 is a summary of what the major reforms are that are taking place in education, particularly in but not exclusive to Ontario. In outlining the reforms, the reasons for them, and how they are being carried out the chapter will explain what I feel are the potential effects of the reforms on EVE, and subsequently, what needs to be done to ensure a place for EVE in the curriculum.

Chapter 3 is a summary of my research on what constitutes an effective EVE program, both in terms of the values to be taught in such a program, and the strategies for teaching these values.

Issues surrounding student assessment and the uses that assessment tools could be put to are the focus of Chapter 4. They are especially important because of the focus on accountability in the recent wave of educational reforms.

Chapter 5 describes the unit that was developed for the Grade 11 Environmental Studies class. This unit was designed to assess growth in environmental values. The

assessment tools that were developed for the unit and their administration are also explained.

Chapter 6 starts with the presentation of the data collected in the assessment. An analysis of the data collected and the interpretation of this data follows. The chapter concludes by discussing the significance of these findings in ensuring the place of EVE in the curriculum.

CHAPTER 1

THE NEED FOR ENVIRONMENTAL VALUES EDUCATION IN THE CURRICULUM

The Severity of the Environmental Crisis

Many of the pressing issues that humans as a species will face as we enter the 21st century are environmental or have environmental ramifications. Many issues that are directly environmental have been identified in the media in the early 1990s. These include global warming, ozone layer depletion, toxic waste, deforestation, acid rain, soil degradation, endangered species, and waste management (Chasty, Palmer and Spencer, 1991, p. 11). The highlighting of these issues in the media reflects the public's recognition of the severity of our environmental problems. In a 1991 public opinion poll, 85% of the industrialized world's citizens believed the environment was the number one issue (Chasty, Palmer and Spencer, 1991, p.9).

More specifically, in the late 1980s Canadians for the first time placed the environment at the top of the list of policy problems requiring government action, ahead of issues such as the state of the economy and the possibility of nuclear war (Dunlop and Jackson, 1991, p.3). As economic conditions have changed, the economy has moved above the environment in the public's priority list but, even in tough economic times with the focus on deficit reduction, environmental considerations rank high relative to other issues with decision-makers (Greenspan, 1995, p. A6).

One of the greatest threats to people around the globe is the threat to national, regional and international security. The Cold War is over, yet at a time when one would think that the world should be entering a period of relative peace, news of conflict around

the globe reaches us daily and military spending increases rather than decreases.

Factors related to the environment play an important role in this and these factors are in turn affected adversely by an increase in conflict.

Environmental stress is both a cause and an effect of political tension and military conflict. Nations have often fought to assert or resist control over raw materials . . . and other key environmental resources. Such conflicts are likely to increase as these resources become scarcer and competition for them increases. (World Commission on Environment and Development [WCED], 1987, p. 290)

The World Resources Institute, which collects and analyses data on resources on a yearly basis, reiterates this in stating that, “global environmental problems can be as serious a threat to national security and prosperity as military conflicts.” (1992, p.9)

The Canadian government, in a review of its foreign policy recognizes this. “Competition for resources, environmental degradation, and declining living standards are sources of instability and potential conflict.” (Special Joint Committee Reviewing Canadian Foreign Policy, 1994, p. 4) The document later contains the assertion: “Internal conflict is likely to spread for two main reasons — the continuing income disparity between rich and poor, and the pressure of population on resources.” (p. 11)

It is clear that because of the seriousness of the threats to our biosphere and the corresponding threats to human security, we as a species need to address the threats collectively and immediately. In order to do this we should first understand the root causes of our environmental crisis.

The Causes of the Environmental Crisis

A comprehensive reading on this topic reveals that there is a general consensus that the direct cause of our environmental crisis is human behaviour. This includes both

individual and collective human behaviour and the economic, social, and political systems which result from the interaction of people with each other and their environment. The relationship of people to nature which has evolved over the millennia has served us well. For most of human history the biosphere provided us with what we needed to survive as a species and in fact, if judged only by our numbers, we have prospered. Unfortunately, we have prospered to the extent that we have such huge numbers of people on the planet and we have developed such consumptive behaviours that the biosphere will not be able to sustain itself or us as a species. It has long been recognized that the root of environmental problems is human behaviour (Newhouse, 1990, p. 26). Whether it is our pattern of consumption or reproductive behaviour, it is our habits which make our species the leading contributors to resource depletion and environmental degradation.

Adherents to our technological paradigm which has served the industrial world to date would advocate that time and human ingenuity will give us a technical fix to many of our environmental problems. However, history should teach us that access to the technical means to solve problems does not guarantee action. Technology exists for reducing pollution, for creating more energy-efficient vehicles, for building more energy-efficient homes, and for addressing a multitude of environmental problems. Yet, these problems persist and their cumulative effects continue to grow.

Despite these advances there is a growing recognition that technology alone cannot solve environmental problems. Maloney and Ward (1973) describe the ecological crisis not as a technical problem but as a crisis of maladaptive behaviour. (Newhouse, 1990, p. 26)

In order to address the crisis, action needs to be taken to change human behaviour. This has to occur at two different levels. Changes in the behaviour of individuals are important because it is the cumulative effect of the world's individuals that makes the scope of our environmental problems so great. The second level at which

changes in behaviour must occur is at a political level. In their final report, the World Commission on Environment and Development stated that, "hope for the future is conditional on decisive political action now to begin managing environmental resources to ensure both sustainable human progress and human survival." (WCED, 1987, p. 1)

The goal of environmental educators, given the causes of the ecological crisis, should be to influence behaviour. We should be attempting to shape students' behaviour so that it is more environmentally positive. The importance of this is reflected in the definition of environmental education put forth by William Stapp, an often quoted and influential American environmental educator:

In developing EE programs . . . a teacher's or leader's role should be to assist learners in:

1. acquiring environmental information;
 2. recognizing and clarifying values concerning the environment; and
 3. developing attitudes, values, action skills and a commitment that will enable them to live harmoniously and to survive in the environment.
- (Stapp, 1975, p. 57)

Implicit in this definition is the recognition that environmental educators should focus on the learning that will produce the desired change in the behaviour of students. In order to carry this task out educators need to have an understanding of what determines behaviour so that effective programmes can be devised which will ultimately lead to an appropriate behavioural change.

The Role of Environmental Values Education: A Conceptual Model for Behavioural Change

Fundamentally, I am interested in defining the relationship between environmentally positive behaviour and what has been put forth in popular environmental literature as positive environmental values. This is because, as noted by other authors in

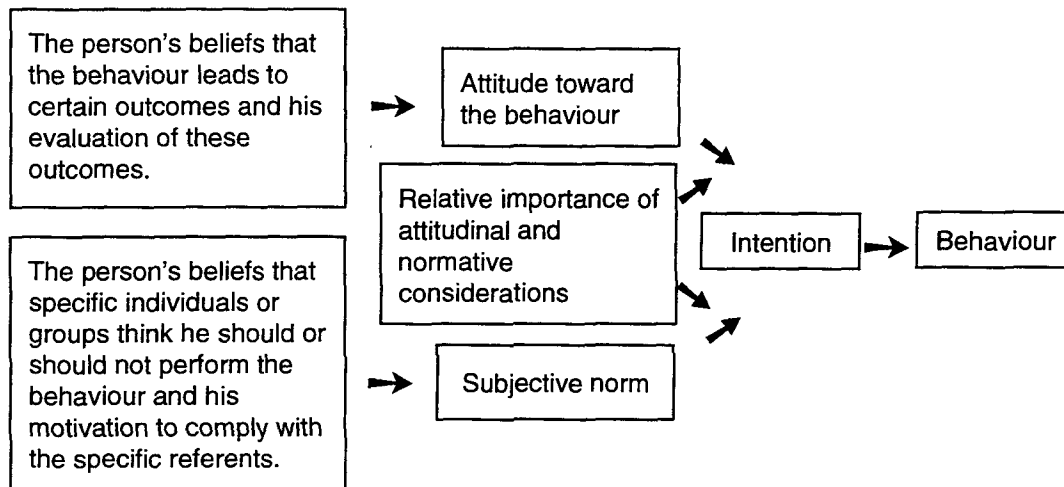
the preceding discussion, behaviour underlies the causes of the ecological crisis and it is central to my thesis that affecting change in the values of students as they relate to the environment may lead to more environmentally positive behaviours. The field of social psychology is helpful in developing a conceptual model which can be used to guide the development of this thesis because it involves trying to understand and explain behaviour. One of the most widely utilized theories in this field is the theory of reasoned action first outlined by Icek Ajzen and Martin Fishbein in 1967. This theory is particularly useful because it helps to explain the relationship between attitude, intention, and behaviour with the recognition that broader values underlie these.

The theory of reasoned action is so named because its basic assumption is that humans are usually quite rational and make systematic use of the information available to them. The theory assumes that people consider the implications of their action before they decide to engage or not engage in a given behaviour. Ajzen and Fishbein recognize that there are some behaviours which are automatic but for my purposes, since I believe that the behaviours that are most damaging to the environment are not automatic (e.g., purchasing practices), I am not concerned about the exclusion of these automatic behaviours from this model.

Figure 1 on the following page outlines Ajzen and Fishbein's theory.

In this theory, the intention to behave in a certain way is the single best predictor of behaviour. This intention is formed through the interaction of two variables. The first is the person's attitude toward a particular behaviour which in turn is influenced by the person's beliefs about the consequences of this behaviour. Attitude is defined by Fishbein as, "a learned predisposition to respond to an object or class of objects in a consistently favorable or unfavorable way." (Fishbein, 1967, p.477) The second variable

Figure 1: Factors determining a person's behaviour



Note: From Ajzen, I. and Fishbein, M. (1980). *Understanding Attitude and Predicting Social Behaviour*. Englewood Cliffs, N.J.: Prentice Hall.

influencing intention is termed the subjective norm. This norm is shaped by the person's beliefs that people or groups of people think he should behave in a certain way, and the motivation provided to act in this way.

From individual to individual, the attitudinal and normative components carry differing relative weights. Two individuals may hold the same attitudes and normative beliefs about a behaviour but, because of the differing relative importance of these from one individual to the other, their intentions and ultimate behaviour may differ. For example, two individuals may hold equally negative attitudes toward smoking. They may also both be a part of a group of people which openly encourages smoking, and the normative beliefs of both may be that their acceptance into the group may be contingent upon their smoking. Both individuals hold the same set of beliefs, but one may smoke and the other might not. The explanation would be that for the smoker the normative belief carries more weight than the attitudinal belief, and for the nonsmoker, the opposite is true.

Given that this paper focuses on environmental values it is necessary to understand how values fit into this conceptual model.

Values have been defined as, "those qualities that the individual, the society, or both consider important as principles for conduct and as major aims for existence. " (Glew, 1987, p. 16) The characteristics of values have been outlined by Kazepides (1977, p. 100). In order for something to be a value it must be;

1. chosen freely;
2. chosen from alternatives;
3. chosen after consideration of the alternatives;
4. prized and cherished;
5. publicly affirmed;
6. acted upon; and
7. acted upon repeatedly, in some pattern of life.

If an action meets only some of the criteria it is a value indicator. Kazepides (1977, p. 100) lists goals, purposes, aspirations, attitudes, interests, feelings, activities, problems, worries, and obstacles as value indicators. By definition values do fit into a conceptual model explaining behaviours since they are general principles that guide behaviour.

The place of values in Ajzen and Fishbein's model is within what they term external variables. They acknowledge that external variables such as demographic variables, attitudes toward targets, and personality traits have an influence on beliefs and on the relative importance of the attitudinal and normative components. They see the links between these external variables and behaviour as indirect but nonetheless, they are still important. Ajzen and Fishbein give two examples of attitudes toward targets. They are attitudes toward people and attitudes toward institutions. It is my contention that these can actually be considered part of a person's value structure since they are more generalized rather than situational and they play an important role in shaping a person's beliefs. A person with certain values about the importance of relationships with others is going to shape their beliefs and evaluations within this particular value structure.

Other research in the field of predicting environmental behaviour has been carried out and is pertinent to this model. One particular research project that has been widely utilized in environmental education was carried out by Hungerford and Volk (1990). They have termed the concept of environmentally responsible behaviour "citizenship behaviour" (Hungerford and Volk, 1990, p. 11). Their model evolved from the work of Hines and his associates wherein they conducted a meta-analysis of environmental behaviour research. In this research, the following variables were found to be associated with responsible environmental behaviour: knowledge of issues, knowledge of action strategies, locus of

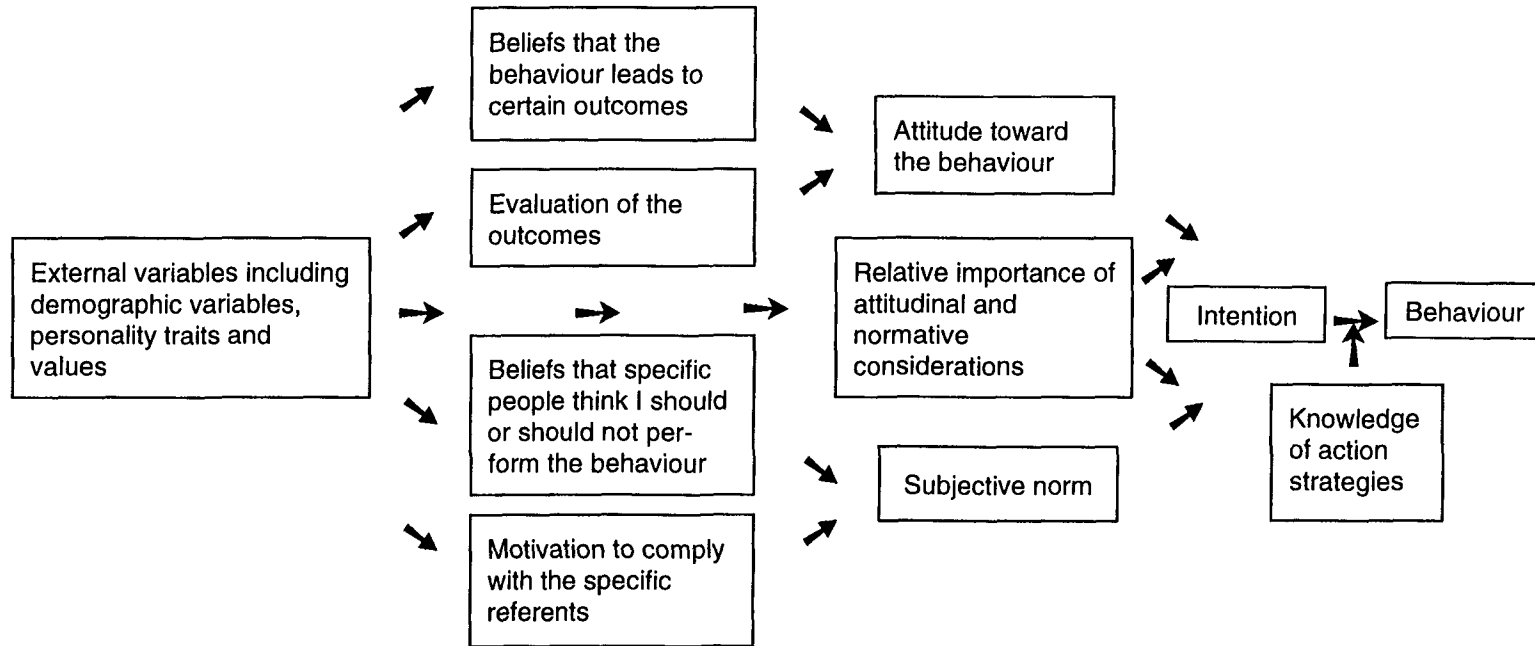
control, attitudes, verbal commitment, and sense of responsibility (Hungerford and Volk, 1990, p. 10). } Many of these variables can be placed into Ajzen and Fishbein's theoretical framework. For example, sense of responsibility and locus of control would be external variables. One variable which should be added into the already developed framework is knowledge of action strategies. It may be that people formulate a particular intention to carry out a behaviour but if they do not have the knowledge or skills required to carry out the behaviour then this intention is without effect.

The conceptual model that will be used to guide my explorations on this topic is a synthesis of Ajzen and Fishbein's model with the knowledge of action strategies component explicitly added. I depart somewhat from the original conceptual model in that I see more importance being attached to the influence of what Ajzen and Fishbein have termed external variables, and to the inclusion of the knowledge of action strategies within the model. Figure 2 outlines this synthesized conceptual model.

Fishbein (1967) has concluded that after 75 years of attitude research, there is still little, if any, consistent evidence supporting the hypothesis that knowledge of an individual's attitude toward some object will allow one to predict the way that he or she will behave with respect to the object. However, this does not invalidate the conceptual framework that has been adopted. It merely focuses attention on a couple of issues arising from the use of the model.

Attitudes are merely indicators of values and it may be that espoused attitudes are different from a person's actual attitude. This should be considered when looking at how attitude assessment devices are developed and administered. By definition, values are principles that guide conduct and attitudes can be used as indicators of these values. Researchers need to recognize that these measures of values are indirect and that care

Figure 2: A Synthesized Conceptual Model to Explain Environmental Behaviour



Note: Adapted from Ajzen, I. and Fishbein, M. (1980). *Understanding Attitude and Predicting Social Behaviour*. Englewood Cliffs, N.J.: Prentice Hall; and Hungerford, H. R. And Volk, T. L. (1990, Spring) "Changing learner behaviour through environmental education", *Journal of Environmental Education*, 21(3), 8-21.

should be taken in their development and interpretation. These issues will be dealt with more fully in Chapter 4.

Another consideration is that values and attitudes are only one component of this model. Skills, knowledge, and the interaction of these with values and subjective norms all combine to influence behaviour. One should not attempt to explain or predict behaviour without attention to all components of the conceptual framework.

What then is the role of environmental educators? There is a general consensus in the field that our role is in educating students to be responsible environmental citizens. What this means will be more fully discussed in Chapter 3 but first a more immediate question must be dealt with; should environmental values education be part of the school curriculum or put another way, should we as educators be trying to influence our students' behaviour vis-a-vis the natural environment?

Should Environmental Values Education Be Part of the School Curriculum?

Environmental values education (EVE) should be an important component of the school curriculum for a number of reasons.

Thomas Lickona notes that the great questions that face both individuals and the human race for the future are moral or value-based. They are: "How can we live with each other?" and, "How can we live with nature?" (1991. p.21) This echoes the previous point that the ecological crisis demands our immediate attention and that values education is an important component of this attention. For history has shown that a society can make substantial advances in knowledge but without an appropriate values framework within which this is used, the society may be heading toward self-destruction.

I am a survivor of a concentration camp. My eyes saw what no man should witness:

Gas chambers built by learned engineers;
Children poisoned by educated physicians;
Infants killed by trained nurses; and
Women and babies shot and burned by high school and college graduates.

So. I am suspicious of education.

My request is:

Help your students become human. Your efforts must never produce learned monsters, skilled psychopaths, educated Eichmanns. Reading writing, arithmetic are important only if they serve to make our children more human.

(A holocaust survivor in Ontario Royal Commission on Learning, 1994, v. 1, p. 61)

The teaching of EVE is consistent with what should be the philosophical goals of education, particularly in a democratic society. Certainly we need to train students in the skills that will permit them to function in society. These include literacy skills and job-readiness training. But, students not only will live within a society; they also are transformers of that society. If they do not have the values base with which to make positive transformations then their actions will be counterproductive to the rest of society. Democracies allow for this transformative process, and thus have a special need for values education. Lickona outlines his reasoning for this as follows;

Democracy is government by the people; the people themselves are responsible for ensuring a free and just society. That means the people must, at least in some minimal sense, be good. They must understand and be committed to the moral foundations of democracy; respect for the rights of individuals, regard for law, voluntary participation in public life, and concern for the common good. (1991, p. 6)

Another reason for EVE being a part of the curriculum is that millions of children receive little values guidance from traditional sources such as the home or church. In the last census, 12.4% of Canadians identified themselves as having no religious affiliation, up 5% from 1981 (Ontario Royal Commission on Learning, 1994, v. 1, p. 29). Children

seem to be getting their values from television as evidenced by viewing patterns and shifts in behaviour. By the end of high school, children have spent 15,000 hours watching television and 11,000 hours in the classroom. Studies have shown that parents on average talk seriously to their children less than three minutes per day. Twenty-two percent of juvenile offenders confessed to learning their criminal techniques from television shows (Glew, 1987, p. 14).

Whether teachers wish to acknowledge it or not, education is a value-laden enterprise rather than value-free. The behaviour that we model and encourage in our classrooms sends a message to students about what we value and what we expect students to value. This is a good reason for educators to become more aware of their own values and to be well versed in strategies for values education, and the issues surrounding the use of these various strategies. If educators are teaching values simply by being in the classroom, they should be conscious of the values that they are encouraging in the classroom, and the values education program should be a planned, explicit effort. A further reason for teaching EVE is that it is mandated in government policy documents. For example, the curriculum guideline for intermediate and senior level geography (Ontario Ministry of Education, 1988a, p. 12) addresses affective development of students. It calls for the development in students of environmental responsibility and humanitarianism. In doing this, the document attempts to deal with one of the Ministry's stated goals of education which is that each student should be helped to, "develop respect for the environment and a commitment to the wise use of resources." (Ontario Ministry of Education, 1988a, p.4)

If we are truly to educate students to be productive, contributing members of a democratic society, values education, and in particular EVE, will have to be an important

part of the curriculum. Unfortunately, at a time when the need for this is most pressing, reforms that are taking place in education have the potential to marginalize EVE within the curriculum. I now turn my attention to describing these reforms and analysing their potential effects.

CHAPTER 2

REFORMS IN EDUCATION AND THEIR SIGNIFICANCE FOR ENVIRONMENTAL VALUES EDUCATION

In Chapter 1, the case for a strong environmental values component in the curriculum of schools was made. Although there appears to be a good case for according it greater attention, the relative importance of EVE in the curriculum has the potential of being downgraded because of current reforms in education in Ontario. This chapter will describe how these reforms are being played out and through an analysis of the reasons for them, will outline what I believe needs to be done to counter this potential trend.

Reforms in Education: A Synopsis

Reforms in education are being carried out in nearly every jurisdiction of Canada. Task forces, reviews, and royal commissions have been established in nearly every province and territory in the last half decade (Barlow and Robertson, 1994, p.14). In Ontario, recent reforms have included the Transition Years initiative which is to be fully implemented by 1996, the development of The Common Curriculum (Ontario Ministry of Education and Training, 1995a), and the reforms that are now coming about as a result of the release of the Royal Commission on Learning's final report (Ontario Royal Commission on Learning, 1994). Although there has been a diversity of approaches taken in the review of education from jurisdiction to jurisdiction, each review makes a special effort to respond to stakeholders and each concludes that, "measuring and reporting on the performance of schools is a vital component of accountability and future

prosperity.” (Barlow and Robertson, 1994, p.14) This focus on accountability is reflected in both The Common Curriculum (1995a), the document which guides curriculum from Grades 1 to 9 in Ontario, and in the Royal Commission on Learning’s report. The Common Curriculum explicitly states that one of its key features is, “a focus on accountability and standards.” (Ontario Ministry of Education and Training, 1995a, p.9) The Royal Commission has based many of its recommendations on the finding that, “there was near consensus from those outside the system that . . . greater attention should be paid to ensuring accountability.” (Ontario Royal Commission on Learning, 1994, v. 1, p.47)

At this point it is relevant to note where the impetus for these reforms is coming from. Barlow and Robertson have outlined their thoughts on this in their book Class Warfare (1994). This is a thought-provoking account of the attacks on the education system and an analysis of the implications of these reforms written by authors with extensive experience in social policy analysis and education, respectively.

The calls for reform are heard from nearly every segment of society but it is Barlow’s and Robertson’s contention that the calls are spearheaded by large business groups and the religious right. Critics of the education system see three major problems with the education system, according to these authors. First of all, they contend that the system is producing a poor product. In supporting this criticism they contend that 25% of Canadians are illiterate and that Canada has a very high dropout rate.

Powerful business supported groups, such as the Conference Board of Canada and the Corporate-Higher Education Forum, a Montreal-based lobby group, have repeatedly used the 32% figure (dropout rate) as proof that the education system is in complete shambles. (Barlow and Robertson, 1994, p. 29)

Another criticism advanced against the education system is that in terms of the amount of money spent on education, the system operates very inefficiently. "Seventy-five percent of surveyed CEOs agreed that there are many ways to significantly reduce costs without affecting the quality of education." (Barlow and Robertson, 1994, p. 15)

The third major criticism is that because of our broad curriculum mandate, our standards are compromised. In an article in the Brantford Expositor regarding a group of parents seeking to set up a Christian High School, one of the parents, Barbara Dix, states, "it is important to teach kids morals, basics, and the fundamentals of life. So many of them are missing out on that." (Beatty, 1995, p.1) The business community is also an advocate for a streamlining of the curriculum. The Conference Board of Canada has developed an Employability Skills Profile which summarizes the critical skills required of the Canadian workforce (and thus, graduating students). It focuses on academic skills, personal management skills, and teamwork skills (Midwood, O'Connor, and Simpson, 1993, p.12).

The criticisms advanced by these groups are picked up by the media, government and broad sectors of our society. The influence that these groups, particularly large business groups, have is considerable. Lindblom, in his book The Policy-making Process (1980) points out the reasons for this. First of all, they have easy access to government officials because government relies on business to perform certain roles proficiently in order to stave off political ruin. The demands of business groups therefore hold more leverage with policy-makers. Business groups also have greater influence because first of all, they have relatively large sums of money at their disposal, and secondly, organizations that they can utilize to support their lobby efforts are already in place.

Wherever the impetus is coming from, reforms with a focus on accountability are upon us. As an educator, accountability makes sense to me. Education is a huge enterprise in terms of the amount of money spent and the public should know whether the money is being spent wisely and to what extent the system produces graduates that have an education suited to the needs of the society. However, in analysing the implications of these reforms, one needs to take a close look at the tools and strategies being used to implement these reforms.

Strategies for Improving Accountability

A number of tools or strategies are currently being used or developed in Ontario, all with the intent of increasing accountability.

First of all, there is a shift underway in curriculum development toward the use of outcomes rather than the traditional aims or objectives. Outcomes can be described as, “the observable results of the knowledge, skills, and values that students have acquired.” (Midwood, O’Connor, and Simpson, 1993, p.19) The shift here is that outcomes state clearly what students should demonstrate in clear, measurable terms, rather than what teachers should do as was the case with objectives. For example, curriculum guidelines for high school geography courses in Ontario, when listing objectives, start with the statement that, “students shall be provided with opportunities to . . .” (Ontario Ministry of Education, 1988a).

Many individuals and groups see that the most direct route to ensuring accountability is through standardized testing. In a standardized test the format, the procedure by which the test is put together and the conditions under which people take

the test are all supposed to be standardized and the scores are all standardized in terms of the norms (Midwood, O'Connor, and Simpson, 1993, p.19). International testing of math and science programs has been carried out and the results, usually with a high media profile, are often used as ammunition, particularly by people unhappy with the education system.

Ontario uses several approaches to assess student and program achievement that do not follow a strict standardized approach. Provincial reviews have been carried out in the province for the Grade 8 Mathematics program and in 1993 and 1994 for the Grade 9 English program. In the English review, a framework and activities for a unit were provided to English teachers who taught the unit and then submitted the students' material to the Ministry of Education. This material was then graded by independent assessors on a seven-point scale and the results were sent back to individual schools and school boards. These results were then released and publicized in the local newspapers showing school to school results.

Ontario Benchmarks describe student outcomes in terms of what all students will do, what most students will do, and what some students will do (Midwood, O'Connor, and Simpson, 1993, p.383). For example, in Mathematics for each strand of the program, a set of example problems is provided under each category.

The Ministry of Education recently has released documents that set out standards of performance for students at the end of Grades 3, 6, and 9 in English (Ontario Ministry of Education and Training, 1995b) and Mathematics (Ontario Ministry of Education and Training, 1995c). These standards are descriptions of performance at four levels (limited,

adequate, proficient, and superior) for each strand of the Mathematics and English programs.

Another strategy for increasing the accountability of schools is to give more direct involvement to parents in educational decision-making. In Ontario, as a result of the recommendations of the Royal Commission on Learning, parent councils have been mandated for all schools for the fall of 1995. It is still unclear as to the exact role and makeup of these councils but they are likely to have at least some influence on curriculum, programming and budget administration. In Alberta, this concept has gone at least one step further. Legislation now allows for the setup of charter schools: schools that can be set up by a group of like-minded parents who run most aspects of the school (including programming and staffing) and are publicly funded (Ontario Secondary School Teachers' Federation, 1995, p.3).

These strategies have been put in place in order to increase accountability. The next section is an analysis of the strategies and their effects to see if there are good grounds for believing that they do have this effect.

An Analysis of the Effectiveness of Strategies for Improving Accountability

Wiggins states that "accountability exists when the service provider is obligated to respond to criticism from those whom the provider serves." (1993, p. 257) One of the outstanding issues relating to accountability and the strategies for achieving it, is just who do we as educators serve. I believe that in Canada, schools function in order to meet collective goals and for our pluralistic, multicultural society, this is especially necessary.

Public education has not been intended to serve the particular priorities of parents, teachers or future employers — or even those of the government

of the day. Public education is intended to balance the interests of all citizens, since we all stand to profit — or lose — from the skills, knowledge and attitudes acquired by children at school. (Barlow and Robertson, 1994, p.112)

In Class Warfare, Barlow and Robertson very convincingly argue that much of the impetus for education reform comes from big business groups but that their rationale for reform is based on figures and an interpretation of these figures that is flawed. Barlow and Robertson argue that business continues to advance myths such as a high dropout rate, high illiteracy rates and huge economic inefficiencies because it serves their purposes. They feel that the underlying agenda for the business lobby is to turn schools into, "pre-employment centres for pre-adults" (Barlow and Robertson, 1994, p. x). The Business Council on National Issues has called for a "basic employability skills test" (Barlow and Robertson, 1994, p.46), and advocate for the active involvement of its members in setting it up (Barlow and Robertson, 1994, p.15). Surely, future employability of our students is a worthwhile goal; but focusing on this relegates many other pursuits that are relevant to my previously outlined philosophy of the purpose of education, to a second class. This serves the purposes of the business community but not necessarily the broader segment of society that should be served by schools. The focus on accountability is being spearheaded by groups such as large business groups and I suggest that if their motives are suspect then we should take a second look at strategies that are being developed to increase accountability as a result of pressure from such groups.

A focus on outcomes in curriculum writing is a focus on being able to observe what students know, can do, and value. One of the problems with this is that in terms of EVE, the development of values can be a very slow process and meaningful development

may not be readily observable in a student even over the period of a school year. Also, values tend to manifest themselves in different ways than do skills or knowledge and are not as easily observable or measurable. This is an issue for environmental educators but for the public or educational policy-makers this may be used to justify the exclusion of values from the curriculum since these people are interested in immediate, short-term results.

The business community and many parents are clamouring for the widespread use of standardized tests in order to assess the achievement of students and the effectiveness of program and instruction. Although Ontario's reviews and standards may not be standardized in the strictest sense, they are certainly moving to that end of the testing continuum and many of the criticisms of standardized tests are relevant to Ontario's strategies.

The criticisms of standardized testing are generally criticisms of the use of the results rather than of the tests themselves (Worthen and Borg, 1993, p.411). Many of these criticisms are unfounded but research findings have shown that:

High stakes use of standardized test scores seems to interfere with good curriculum and instruction. Surveys of Arizona teachers also showed that pressure on educators to produce high test scores was resulting in a variety of doubtful practices teachers were using to achieve high scores. (Worthen and Borg, 1993, p.412)

As well, at a time when curriculum documents and even heads of business groups are advocating the teaching of complex skills such as problem-solving, it should be pointed out that it is very difficult to reduce such complex performances to a single number.

It is ironic that many of those who call for increased standardized testing also talk about the need for students to acquire the skills of working with

others and to solve problems creatively, apparently unaware of the contradictions inherent in their demands. There is little motivation for students to develop the skills of group problem-solving, or to hone their abilities to think critically, if their success is to be measured exclusively by the extent of their personal possession of easily measured facts and competencies. In a test-driven system, if it doesn't count it doesn't matter. Nor is there much motivation to teach anything beyond facts and techniques, when teachers are told that it is only test results that count. (Barlow and Robertson, 1994, p.119)

Standardized tests are only tools for improving accountability. Having the results of standardized tests at one's disposal, even if they are valid and reliable, does not automatically lead to greater accountability. Well-meaning legislators driven by political pressure or motivation rather than sound pedagogical philosophy may mandate the use of the results of standardized tests that result in unfair conclusions.

One of the most immediate uses of standardized test results is in comparing schools. This is dangerous for a couple of reasons. First of all, even when test results are released with other data such as a demographic profile of the school as was done in North York, Ontario (Lewington, 1995, p. A8), the results tell us nothing about the quality of curriculum, teaching or leadership in the school. Regardless, parents are drawn to the test results as a simplistic summary of a school's performance, and may use this to choose a school for their children. In most cases, including North York, transportation is not provided to students who attend schools outside of their home school area. Thus, only parents at a higher socioeconomic level may be able to afford this privilege. This in turn leads to what is termed the "ghettoisation" of the school system, a result which runs counter to the stated political agenda of equity and equal access.

Wiggins (1993) addresses this issue in her discussion on accountability. She notes that in schools, the quality of the inputs has a great deal to do with the quality of

the outputs and that when you toss student mobility and the socioeconomic profile of the school or community into the mix, standardized tests have little credibility and usefulness in increasing the degree of accountability. Instead, she advocates a value-added approach to ensuring accountability. In this approach standards would be locally set and accountability would be improved through mechanisms that improve the degree of responsiveness to client concerns. Setting higher standards and making the system more responsive to meeting these standards will increase accountability as opposed to ensuring that students reach a certain score on a test. The standards must be set in the context of the local situation.

We surely do not need a single set of mandated academic standards (and pressure to meet them). I watched sixteen students build a beautiful \$250,000 house to contract and code at a Finger Lakes-area vocational high school. But all the students were academic 'failures' in New York's Regents-syllabus-and-exam system and in terms of the national standards debate laid out by the governors and the President a few years ago. This makes little sense and causes much harm. We turn the proper relationship between accountability and education upside down if we assume that everyone must have the same education — if what we are really doing is designing a system that makes it merely easier for us to hold students and schools accountable on the basis of comparability. (Wiggins, 1993, p.283)

How then, given the issues considered above, should accountability be improved?

First of all, policy-makers must be clear on whom it is that the education establishment serves. Once they have done this they can then involve all stakeholders in developing standards, as has been done already for Mathematics and English. I do not believe as Wiggins does that standards should be locally set. This can be a huge duplication of activity from jurisdiction to jurisdiction. Instead, administrators should recognize that there are local variations and in doing so, set the standards as goals to strive for and assess movement toward these goals rather than simply use the tests to provide

snapshots that are used to compare schools. The data collected through standardized tests should be used only to frame questions in policy analysis. Senior administrators in school boards should set plans for long-term assessment of student achievement against the standards and should develop programs and incentives that will increase achievement.

Environmental educators will have to watch closely the trends that emerge and act in a pro-active manner to ensure that EVE does not lose ground in the curriculum.

The Role of Environmental Educators in Improving Accountability

Environmental values are difficult to assess and are also very difficult to report in quantifiable terms, the preferred language of the public. But a move to such language is the direction that is clearly being taken in order to increase accountability. Environmental educators need to find a form of program evaluation that is acceptable to themselves as well as educational policy-makers so that EVE is not relegated to the periphery of the curriculum.

What has been and will be tested becomes a priority, not just in the public mind or Ministry policy, but in time and attention in the classroom. Other instructional priorities recede, thus shifting curriculum balance effortlessly and without debate. (Barlow and Robertson, 1994, p.412)

In order to combat this shift in curriculum balance, teachers need to become involved, both as individuals and professional groups, in the political and media debate through which education policy is set. Environmental educators need to focus attention on the need for EVE and how they might show that many supposed critical outcomes can be met in an environmental education program.

Like it or not, accountability in terms of being able to report on student achievement is upon us and environmental educators must adapt to this reality. Environmental educators need to be involved in setting clear standards of achievement for values as well as skills and knowledge in their field. Thus, they need to be well versed in assessment tools for measuring achievement against such standards. This is the focus of much of the rest of the project — developing and evaluating tools for measuring the development of values in students in an EVE program. But, first it is necessary to clarify issues regarding the content of an EVE program and the various instructional strategies that could be used in such a program.

CHAPTER 3

CONTENT AND INSTRUCTIONAL ISSUES IN AN ENVIRONMENTAL VALUES EDUCATION PROGRAM

Unfortunately, values education is often neglected in most EE curricula. There is an inherently controversial element involved when addressing personal values in the context of instruction that puts a heavy emphasis on objectivity. Many teachers will aspire to the laissez faire (hands-off) approach to the problem. However, it is not possible for any teacher to provide value-free instruction. Through the simple acts of setting an example that students will tend to follow (modelling) and establishing rules for conduct that are considered right or wrong (moralizing), teachers are making implicit value statements. (Caduto, 1985, p. 2)

This statement by Michael Caduto, a prolific writer in the environmental education field, emphasizes that educators are involved in values education, consciously or unconsciously. As stated in Chapter One, if this is the case then educators should be making a conscious effort to deliver a planned values education program or they may be encouraging values in students that they do not intend to encourage. At this point, it is important to consider issues relating to the content of an EVE program (what values to teach), and relating to the instructional strategies within an EVE program. One particularly controversial question related to these issues is whether in fact there are certain values that ought to be taught in schools.

Issues Relating to Instructional Strategies in an Environmental Values Education Program

A great deal of controversy has been generated on the issue of whether or not there exists a common set of values that educators should be promoting. At one end of a

continuum are the people advocating a subjectivist philosophy and at the other end are the values objectivists.

Frank Glew, after an extensive literature review, has summarized the various EVE strategies and their positive characteristics. This summary is provided on the following page in Table 1. It shows that a person's orientation on the philosophical continuum influences their choice of teaching strategies. At one end of the continuum are teachers who would advocate strategies of inculcation and at the other are those who would advocate strategies of values analysis and clarification. The summary also clearly shows that the choice of strategy can depend on the level of moral development of the students and that each strategy has positive characteristics associated with its use. The importance of this is echoed by Clifford Knapp when he states that:

All of these stated approaches . . . can and should be integrated into a curriculum model. The strengths of each approach can be combined to produce an effective and coordinated values education program. (Baer, R.A. Jr., 1985, p. 34)

In order to support this position of an integrated approach, it is necessary to highlight some of the arguments for and against the approaches which are at opposite ends of the philosophical continuum.

Some educators argue that promoting the adoption of certain values is a form of indoctrination and that schools should restrict themselves to encouraging critical thinking about values. Others challenge this by posing the rhetorical question: "Would we be satisfied to produce students who can think critically about a value such as honesty but nevertheless choose, in their own lives, to lie, cheat, and steal?" (Lickona, 1991, p. 37) In order to support this statement of Lickona's it is necessary to distinguish between two types of values — moral and non-moral values. As Caduto notes, "Beauty may exist in

Table 1:

CRITERIA THAT AFFECT THE DEVELOPMENT OF EVE CURRICULUM MODEL			
Summary of the positive characteristics of present EVE strategies			
Strategy	Orientation	Level	Positive Characteristics Promoted
1. Modelling	Subjective	MD	<ul style="list-style-type: none"> • relates to teachers, peers, parents, role models • shows example
2. Laissez Faire	Subjective	MD	<ul style="list-style-type: none"> • we need to be aware of the hidden messages that we expose to students • we need to be aware of our own value system
3. Inculcation	Subjective	MD	<ul style="list-style-type: none"> • some values are better than others • need to teach traditional values
4. Reflection C. Beck	Subjective	MD	<ul style="list-style-type: none"> • students learn own values and how to live by them • sharing openness
5. Action Learning D. Superka	Subjective	MD	<ul style="list-style-type: none"> • teaches to act on values • community oriented • students identify with nature
6. Behaviour Modification B. Skinner	Subjective	MD	<ul style="list-style-type: none"> • good for fast, necessary change • task oriented
7. Confluent S. VanMatre	Subjective	MD	<ul style="list-style-type: none"> • involves cognitive and affective domains • utilizes thinking skills • integrates curriculum
8. Values Analysis J. Coombs	Objective	MA	<ul style="list-style-type: none"> • rational decision making • scientific, logical • resolves conflict
9. Moral Development L. Kohlberg T. Lickona	Objective	MA	<ul style="list-style-type: none"> • backed by scientific research • determines level of morality • based on justice • female voice
10. Values Clarification H. Kirschenbaum J. Simon	Objective	MA	<ul style="list-style-type: none"> • popular with students • improves self-concept • deal with all problems • values are relevant

- MD - morally dependent, K-7,8,9
- MA - morally autonomous, 7,8,9-OAC

Note: From *The 5-Rs Process: A Curriculum Model for the Teaching of Environmental Values Education* (p. 84), By F. Glew, 1987, Waterloo, Canada: Waterloo County Board of Education. Copyright 1987 by the Waterloo County Board of Education. Reprinted with permission.

the eye of the beholder, but moral value does not.” (Caduto, 1985, p. 32) In helping to clarify the distinction, Caduto, (1985) offers the following example:

There is a crucial difference between two people expressing their feelings about the shade of green among the leaves that blanket a wooded hillside (aesthetic value) and a disagreement over whether the trees should be felled for use as firewood (moral value). The second case considers moral value because it involves our conduct toward the earth. (p. 32)

Lickona (1991, p. 38) states that moral values carry an obligation with them. They tell us what we ought to do and we must abide by them even when we would rather not. Non-moral values on the other hand, carry no obligation with them. Lickona further divides moral values into universal values, which are principles for conduct that individuals have a right and even a duty to insist that others behave in accordance with, and non-universal moral values. The latter values are ones for which the obligation is to oneself rather than society. For example as an individual I may feel a serious personal obligation to my religion but I may not impose this obligation on others. It is the moral, universal values that should be inculcated in students in our classrooms because it is these values that play a role in guiding the behaviour of individuals, behaviour which impacts on others in society.

A shift in values is necessary if we are to move people to more environmentally positive behaviour. Many authors have written on what changes are necessary and what values should be encouraged and some of these are moral and universal values. Thus, I believe that there are values that are universal and can be defended as legitimate in any environmental education curriculum. One reason for this is that I believe it is necessary in order to prolong our existence on earth. A second reason is that I feel that by teaching environmental studies, I have an obligation to extend my students' thinking toward a new

values structure. What exactly these values are will be outlined further in the next section of this chapter.

Opponents of inculcation often justify their position by claiming that values are subjective and that we should not be teaching particular values. I disagree with this in that as an educator I believe that I am trying to produce students who will be productive members of a society, and that for the benefit of society, these students should hold certain moral values. However, along with this is the realization that because I teach senior high school students, inculcation will not be a very effective values education tool. These students are beyond the morally dependent stage. They are capable of formulating moral viewpoints on their own rather than being dependent on the teacher for support or guidance in formulating a position. Techniques such as modelling, although not to be discounted, are not as effective with senior students as they might be with students who are younger and therefore, morally dependent. As well, motivation through strategies such as assigning marks for appropriate responses and actions may elicit these responses and actions, but they may not change the students' behaviour outside of the classroom. It is this behaviour outside of the classroom and beyond the time period in which the student is in the class which has the greatest potential impact on the environment and which environmental educators should consequently be very concerned with.

Thus, there are values that students in an EVE program should be encouraged to internalize. However, EVE is as much concerned with process as with content and although the adoption of a particular set of values suggests inculcation as an instructional strategy, the process of changing students' values suggests strategies that are at the other end of the continuum. There would seem to be a contradiction inherent in this

position but I have already outlined the arguments for teaching toward a particular set of environmental values. I propose now to summarize issues associated with how values might be changed in an EVE program in an effort to resolve this apparent contradiction.

I have already pointed out the need for changes in human behaviour if we are to address our looming ecological crisis. I believe that this behavioural change will only come about when people are able to clarify their values, analyse the effects of holding these values, reflect on these effects and understand the options available to them. Only when students internalize values through this process will they make changes in their behaviour that are consistently environmentally positive. This approach is consistent with the approach known as values analysis. Caduto (1985) has outlined the six basic steps of values analysis exercises. They are:

1. identifying and clarifying the value question by defining terms and providing examples;
2. assembling facts relevant to the value question;
3. assessing the truth of these facts;
4. clarifying the relevance of the facts to the value question;
5. arriving at a tentative value decision; and
6. determining whether or not the decision is acceptable. (pp. 23-24)

This approach implies that EVE is a process-driven endeavour and that it is closely linked to skills such as decision making, reasoning, information gathering and organization, and the critical analysis of information. This approach goes beyond the classic values clarification process. In values clarification, the teacher is a facilitator who, without making any judgements, has students clarify their values. In values clarification, the process of valuing is more important than the actual values. This is true as well for values analysis but with values analysis, students are encouraged to analyse and reflect on the impacts of their values in addition to clarifying them, and to determine whether or not their value decision is acceptable. It is this analysis and decision-making process

which could influence the behaviour of the students and lead them to act in a more environmentally positive manner.

Lester Milbrath, an American scholar who has written extensively on environmental values, comments on the importance of a values clarification approach. He notes that;

A clarified values structure provides a citizenry with a solid basis for policy analysis. We need to learn how to dissect policy proposals for their implicit values and examine them to see if they are the values that are really important. This examination may lead us to ask what other values in our structure are not being served by the proposed policy. Fundamental values often lie implicit but unanalyzed in policy proposals. Bringing them to public attention can clarify discussion and may even lead some individuals to change policy positions. (Milbrath, 1989, p. 84)

Values clarification as a foundation, with analysis built onto it, is much more appropriate to senior students and I have already pointed to the fact that techniques such as inculcation and modelling would likely have much less impact on senior students than on younger ones. This is because, as explained in Table 1, the younger learners are at a morally dependent stage while senior students may be at a morally autonomous stage. These terms stem from the work of Kohlberg on moral development (Glew, 1987, p. 57).

Kohlberg's theory developed from a study in which he presented moral dilemmas to young males in several countries and interviewed them over a 20-year period in order to ascertain their reasoning for their resolution to the dilemma. The theory contends that there are six stages that can be identified in moral development and that one can identify the stage a person is at by knowing the reasoning behind their resolution to a moral dilemma. Although Kohlberg's theory does have shortcomings, such as the fact that his study was done only on males (Glew, 1987, p. 70), it has relevance to my approach to EVE for two reasons. First of all, it is important to know where students are in terms of their moral development because, as is evident from Table 1, the choice of an EVE strategy is at least in part contingent upon the level of moral development typical of the

target group of students. Secondly, the development of students along the continuum from stages 0 to 5 (Kohlberg's six stages), in which stage 5 is one of principled conscience where students feel an obligation to all other humans, parallels the movement on a continuum toward being more environmentally conscious. The next section will outline the characteristics of the latter continuum and then will provide a synthesis of this material which shows how I have developed my position on how to teach EVE. Figure 3 is presented at the end of this chapter as a summary of the characteristics of the continua and how they parallel each other.

A Proposed Values Structure for a Sustainable Society

Since I am advocating that a certain set of values be promoted in the classroom, it is necessary that I outline what these values are. In this section I will outline the ethic and corresponding set of values that I believe will contribute to more environmentally positive behaviours.

In devising a new ethic to justify the embracing of a particular set of values, Caduto (1985) states that:

An act possesses positive moral value when it treats people, and the earth, including all living and non-living elements — the total human environment — in as loving and just a manner as possible. This act strives for justice in the distribution of the common good for all people involved and the preservation of the ecological integrity of Earth. It is based on the moral wisdom of the past combined with a person's lifelong experience and resulting knowledge. (p. 34)

The key components of this new ethic are a consideration for other species, a more just distribution of goods, and the view that our actions should be directed more toward common rather than individual human aspirations. Up until now, the ethic that has driven our society has been based on the importance of economic over other considerations

with the resulting inequities between individuals and societies and little consideration for a long-term future orientation.

Parts of this new ethic are echoed by others. The Brundtland Commission in defining sustainable development, makes explicit the need for us to concern ourselves with future generations (World Commission on Environment and Development, 1987). Indigenous cultures to which many environmentalists turn for direction, also reflect a view that other species should be respected and that actions should be carried out only after considering the effects upon generations to come (Callicott, 1982; Booth and Jacobs, 1990). Deep ecologists have used the term “biocentric equality” to express an ethic that reflects concern for other species and our biological as well as spiritual link to other species. They also see a central component of their ethic as the self-realization of individuals — more of a focus on quality of life rather than on the acquisition of material goods (Devall and Sessions, 1985).

This new ethic forms a framework in which we can give reasons for values and behaviours for a more sustainable future. The key outcome desirable under this ethic is a viable sustainable ecosystem in which all components are recognized as essential.

There is a great deal of literature on the shifts that are necessary in our society if we are to work toward a more sustainable future. These shifts in behaviour and decision-making are compatible with the proposed new ethic and in fact flow from it.

Yambert and Donow have devised a set of what they have termed ecological commandments that describe how we must modify our behaviour if we are to reestablish a harmonious ecological balance. The behavioural changes advocated are:

1. Consumption of resources should be geared more toward needs and less toward wants;
2. We should learn to derive satisfaction from non-consumptive uses of resources;

3. Consumption should be restricted to resources that are degradable;
4. Limit the demands that we place on decomposer systems to that which they can handle;
5. Limit our demands for external energy to realistic levels;
6. Develop energy sources that are most ecologically sensible;
7. Liberate ourselves from the habits, prejudices and customs that originated in our ecologically illiterate age and pose a threat to natural recycling processes;
8. Put as much effort into the salvage of non-renewable resources as into the consumption of them;
9. Strive to understand that society can be stable (in terms of population) and dynamic and act accordingly;
10. Emphasis on quality of life rather than on quantity. (1986, p. 16)

These commandments help to define what would be termed environmentally positive behaviour under a new environmental ethic. In Chapter One, I provided a conceptual model which outlined the links between values and behaviour. If the behaviours outlined above are the ones that we would like to encourage then it is necessary to outline a values structure that, if adopted by students, might be expected to lead to these environmentally positive behaviours.

Many authors have written on what constitutes a new values structure for a sustainable society. Robert Paehlke, of Trent University, has compiled a list of what he asserts has been consistently emphasized in the writings of environmentalists.

Environmentalists value;

1. all life forms;
2. humility in our view of human species in relation to other species and to the global ecosystem;
3. quality of human life and health;
4. a global rather than a nationalistic view;
5. political and/or population decentralization;
6. an extended time horizon;
7. a sense of urgency regarding the survival of life on earth;
8. simplicity;
9. the transitory nature of our way of life;
10. a revulsion of waste in the face of human need;
11. an aesthetic appreciation for season, setting, climate, and natural materials;
12. esteem, including self-esteem and social merit, in terms of non material values such as skill, artistry, effort or integrity; and
13. autonomy and self-management in human endeavours. (1989, pp. 144-145)

Lester Milbrath has proposed a new values structure for a sustainable future that encompasses these values. The structure of Milbrath's proposed values system is based on the characteristics of the new environmental ethic outlined previously in this section. The core value in his structure is a viable ecosystem for this is the most fundamental value that we must have if we are to survive as a species. His structure is based on a responsibility of all individuals to contribute to the common existence of our species, and thus speaks to what should be common, societal values.

Milbrath distinguishes between two types of values — fundamental values which are ends in themselves, and instrumental values which are means to the fundamental values which are;

1. quality of life;
2. justice;
3. compassion; and
4. security.

The instrumental values, which are not valued in themselves but, rather as vehicles to develop the fundamental values are: belongingness, participation, freedom, equality, order, peace, health, fulfilling work, variety and stimulation, powerful knowledge, and goods and services. A further set of instrumental values is made up of the societal systems which serve to support and provide for the other values. These are systems that provide for: safety, health, law, economic order, convenience, recreation, and education (Milbrath, 1989, chapter 4).

This values structure is useful in EVE because it provides a framework for curriculum design. The central core value of a viable ecosystem should be a goal of all environmental educators, and the structure provided by Milbrath provides environmental educators with a list of values that should be encouraged in students if we are to realize this goal.

Milbrath also recognizes that EVE is a process. He advocates the process of reasoning to ground within the values structure. This process involves evaluating environmental decisions and actions. The way in which we structure our support systems or conduct ourselves in the context of any of the instrumental values can be reasoned back to the core value — life in a viable ecosystem. When a policy or issue decision violates the core value it should not be tolerated, based on the life ethic. This reasoning to ground process provides a useful method which enables students to assess the impact of their own behaviours and the values implicit in these behaviours, as well as providing a basis on which requisite changes to their values and behaviours can be identified.

A Synthesized Approach to Environmental Values Education

At this point I will summarize what approach I will take in my classroom, an approach that comes from a synthesis of the material summarized thus far in this chapter.

I believe that because of the urgency of the matter, and the links outlined in the conceptual model in Chapter One between values and behaviour, teachers should be inculcating certain values in students. The values that we should be inculcating are those that are outlined in Milbrath's proposed structure. For me, inculcation does not imply that students must leave the program with these values and that whatever steps are necessary should be taken to achieve this result. Rather, it means that teachers must choose materials, topics and strategies that will lead students to adopt these values. Adopting these values means that students will have internalized them so that they guide behaviour outside of the classroom.

The strategies chosen at a senior high school level should allow students to clarify their values, but should go beyond this so as to encourage students to analyse and reflect

on the impact of these values on their behaviour. This is consistent with Milbrath's own proposal wherein the students are encouraged to reason to ground within the values structure proposed. The goal of an EVE program should be to change behaviour and this process of values analysis through reasoning to ground provides a strategy for changing students' values and therefore, potentially changing their behaviours.

Students' ability to carry out this values analysis is enhanced as they move from a lower to a higher stage of moral development and Glew (1987, p. 159) notes that movement along Kohlberg's continuum from Stages 0 to 5 has characteristics, in terms of the students' values and concept of justice, that parallel the movement along a continuum from shallow to deep ecology (see Figure 3). The similarities between the two continuums will be drawn upon heavily in the development of assessment tools and program evaluation since growth along one continuum is compatible with, and can be encouraged by growth along the other continuum. The goal of EVE should be to encourage in students the growth in this environmental ethic and the choice of materials and strategies in the classroom should be guided by this purpose.

Once materials and strategies are chosen, and there is a plethora of both, it is necessary to try to assess whether there has been any change in students' environmental ethic as indicated by their level of moral reasoning and their perception of the role of people in relationship to nature.) The means for identifying such change will be the topic of discussion in the next chapter.

Figure 3:

ENVIRONMENTAL ETHIC					
STAGES OF MORAL REASONING					
STAGE 0	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
EGOCENTRIC • own way • avoid punishment • get rewards	OBEDIENCE • do what told • stay out of trouble	FAIRNESS • look out for self • self interest	CONFORMITY • be nice • live up to others' expectations	SYSTEM • responsible to society • self respect	CONSCIENCE • rights, dignity of others • act on values • justice for all
ROLE OF MAN IN RELATIONSHIP TO NATURE					
SHALLOW ECOLOGY <			> DEEP ECOLOGY		
DOMINANCE • exploitation • dualism	MANAGER • harvest • interfere to preserve	CONSERVER • help nature to help man	PRESERVER • hands off • save for future	REFORMIST • short term • prevention • responsible actions	REVOLUTIONARY • change values • new way of thinking • all species have rights
VALUES					
DOMINANT AGGRESSIVE VIOLENT	DISTANT JUSTICE SELF INTEREST	ASSERTIVE SELF SERVING RIGHTS	OPEN SELF SACRIFICING INTERDEPENDENT	COMPASSION MERCY GIVING NURTURING	CARING COOPERATIVE NON VIOLENT
SOCIAL PARADIGM					
VALUATION ON MATERIAL WEALTH <			> VALUATION ON SAFE CLEAN ENVIRONMENT		
REAR GUARD • Capitalists • traditional • resisters to social change • Communists • valuation of material wealth • want social change	NATURE CONSERVATIONISTS • politically conservative • resist social change • believe in science and technology	DEEP ECOLOGY • uninvolved politically • strong advocate for social change	VANGUARD • environmental reformers		
ENVIRONMENTAL ETHIC GROWTH >					

Note: From *The 5-Rs Process: A Curriculum Model for the Teaching of Environmental Values Education* (p. 159) by F. Glew, 1987, Waterloo, Canada: Waterloo County Board of Education. Copyright 1987 by the Waterloo County Board of Education. Reprinted with permission.

CHAPTER 4

EVALUATION OF ENVIRONMENTAL VALUES EDUCATION PROGRAMS

In Chapter Two it was shown that accountability is the driving force behind current reforms in education in Ontario. The outcome of this is that educators are being asked to show that their programs lead to successful student achievement as measured against stated outcomes. Educators are being asked to report the results of this student assessment and consequent program evaluation, preferably in quantified terms.

Dean Bennett has defined evaluation as, “a systematic method of judging the worth or value of an educational program. It is a method for finding answers to the following questions about a program:

1. What happened?
2. How did it happen?
3. Under what conditions did it happen?” (1989, pp.14-15)

Part of an evaluation program involves assessing student performance in terms of the stated outcomes. This assessment is the gathering of information concerning the students' performance. Evaluation is, in part, the interpretation of the information gathered in the assessment. This interpretation is carried out for a number of reasons and educators need to be clear about the purpose of their evaluation program in order to design one that is effective. This is one issue that will be discussed in this chapter.

In order to protect and enhance the status of EVE in the school curriculum it is necessary that environmental educators have the expertise to carry out an evaluation of their EVE program. This chapter is a summary of the more important issues relating to student assessment and program evaluation in an EVE program.

The Purpose of Evaluation

Bennett acknowledges four apparent benefits from evaluating a program. He states that these benefits relate to:

1. improving the effectiveness and efficiency of teaching methods, the learning environment, and the use of instructional resources;
2. growth in student learning through better diagnosis of student needs and measurement of student achievement;
3. improved assessment of the impact of educational programs on environmental protection; and
4. educators being in a better position to gain support for their programs from students, parents, administrators, and the general public. (1989, p. 15)

This last benefit is especially relevant to the purpose of this paper. It is necessary for environmental educators to show the necessity of and gain support for EVE programs and this will only come about by showing that these programs do develop certain values in students. I believe that the main purpose of the evaluation of an EVE program is to judge the effectiveness of the program itself. If a student displays values, attitudes and repeated patterns of behaviour that are inconsistent with the stated outcomes for that particular EVE program, it is the program in terms of resources, teaching strategies, and topics that should be changed. The results of the assessment of student performance with regards to them displaying particular environmental values have not been used, in my experience, to make decisions about passing or failing students in an environmental studies course. This is not likely in the future either given the controversial nature of EVE.

So, although I have stated that environmental educators should be inculcating certain values in students, this should be a goal of the program but cannot be used as a criterion for passing or failing students. Evaluation of an EVE program should be done to judge the success of the program in terms of instilling in students the values that are

consistent with positive environmental behaviour. This program evaluation should form the basis for identifying the changes that are required in the curriculum.

Characteristics of an Effective Environmental Values Education Evaluation Program

In developing an evaluation program within an EVE program, I believe that there are three major considerations that underlie the choice of strategies or approaches.

The first issue is the one of congruence between the outcomes stated for the program with the choice of strategy. In other words, do the assessment techniques actually measure student achievement or growth (and thus, the success of the EVE program)? This implies that the development of assessment approaches and tools is a necessary component of curriculum development at its earliest stages and cannot be left as an afterthought. It also implies that the first stage in curriculum development is in stating explicitly the outcomes for the course or unit, whether they are cognitive, skill, or affective outcomes. This should not imply that the curriculum is static once developed. Implementation of curriculum is a dynamic process and teachers need to recognize this in designing curriculum and allow for flexibility in altering outcomes throughout the delivery of the curriculum.

These outcomes also need to be stated up front because, if for example one of the stated outcomes of the program is to develop within students an internal locus of control, it does not make sense that assessment strategies be externally or teacher driven. May Pettigrew, who was involved in the Environment and School Initiatives Project with the Organisation for Economic Co-operation and Development, recommends that, "evaluation methodology be used to facilitate the development of persons, help us to understand and implement innovations and support democratic processes of decision making." (Pettigrew, 1993, p.45) These goals, which I believe are consistent with the

goals of most environmentalists, are not likely to be accommodated within a conventional evaluation program. However, if environmental educators can justify the use of unconventional assessment techniques because the techniques help to develop in students certain outcomes that can be shown to be important, they may be accommodated more easily by the public and educational policy-makers. Such outcomes might include the development of decision-making skills, or the development of an internal locus of control in students.

The second issue in setting up an evaluation program is whether the assessment should be diagnostic, summative or formative in nature.

Diagnostic assessment is usually planned for the beginning of a new unit or for when a new topic or skill is being introduced. It is used for assessing the level of skill or knowledge or the particular values that students have. Learning activities can then be modified to suit the needs of the class or of individual students. It is particularly useful in the evaluation of EVE programs in that it allows the teacher to assess the level of moral development that students are at, and thus activities can be modified for this level. It is also useful in that if we are trying to encourage growth on a continuum, teachers need to know where students are starting in order to evaluate the success of an EVE program.

Formative assessment takes place continually throughout a course or unit. Its purpose is to improve instruction rather than to rank or grade students. It is useful in determining how well a student is learning as a result of a program and to keep students and teachers aware of the stated outcomes and their progress toward achieving them.

Summative assessment is used at the end of a course or a unit and it may be the primary assessment tool used in assigning a grade and reporting to parents, students, and school officials. Its purpose is to measure student achievement in meeting the course objectives. Past practice indicates that since summative evaluation tends to be

used for reporting purposes, the end product of this type of assessment is usually quantified, either through a letter grade or a percentage.

The assessment of cognitive skills is generally more easily quantified and because of this, together with the tendency to heavy reliance on summative assessment for reporting procedures, the assessment in the affective domain is not carried out as often as it should. One reason for this is that it is more difficult due to the indirect nature of assessment in this area. The other is that growth in the affective domain is not nearly as noticeable and, therefore, measurable as in the cognitive domain.

Values education itself can be slow, at times a glacial process — it is building for future generations by creating people who are caring, concerned, and active in bringing about positive social and environmental change. In these times, progress is often thought of in terms of minutes, days, or months. Value shifts among people may be imperceptible during our lifetimes. Values education builds for the long-term future, not just for the present generations. (Caduto, 1985, p.50)

I have already discussed some of the problems with reducing the assessment of highly complex processes such as those in EVE to a simple number or grade. With a focus in EVE on processes it may be that the problems associated with quantitative assessment techniques render them of little use in the evaluation of EVE programs.

Educational activities are social processes and to reduce them to quantified outputs or targets is to engage in mechanistic simplification. Perhaps this may yield generalised indicators of what happened but it will tell you little about why. In order to understand why and how innovations are realised, and how they may be supported, you have to look at processes, at people, what they are trying to achieve, their values in relation to a programme such as ENSI, and their judgements. (Pettigrew, 1993, p.45)

Without tests and measurement data, educators would rely on professional judgement. The problem with this, as Worthen, Borg and White (1993) point out, is that it is not always professional and the judgement is not always sound. Such judgements, when made without measurement data, are subjective. Conversely, measurement

instruments are used in an effort to provide valid and reliable judgements. Worthen, Borg and White have an excellent discussion of the balance to be sought between objective and subjective judgements in evaluation. They state:

Combining objective measurement data with educators' professional judgement allows the best of both worlds. Objective test data offer protection against the pressures, politics, and presuppositions that often result in weak, capricious judgements when subjectivity is left to carry the burden alone. And the teacher's subjective, common sense awareness and knowledge are often vital in counterbalancing skewed or misleading test results. In our view, objective measurement data and less objective professional judgements are necessary partners in an effective educational assessment program. (1993, p.6)

Elliot Eisner (1993), in an article titled "Reshaping assessment in education," echoes the thoughts of Worthen, Borg and White in his call for what is termed "authentic assessment". This type of assessment is characterized by increasingly interpretive appraisals and is, "less amenable to reductive measurement and comparison of student learning, experience and performance." (Eisner, 1993, p. 232) Eisner sees these assessment practices as necessary for two reasons. The first is that conditions in schools under which quantitative measurement tools proliferated, have changed. Studies based on observations in classrooms concluded that:

The early 20th-century ideal of achieving scientific efficiency in the management of classrooms and teaching by following standardized procedures designed to - eliminate wasted motion seemed quaint, indeed at odds with the unpredictable character of eight- or even 18-year olds. The game was considerably more complicated. (Eisner, 1993, p. 222)

The second reason is that the reasons for assessment have changed. Assessment used to be used primarily to measure student performance, but now this information is used increasingly for teacher and program evaluation. The increasing complexity of relationships and demands in the classroom, together with the changing

uses of assessment information point to the need for assessment techniques which more authentically capture the essence of learning and performance in schools. And according to Eisner, quantitative measures for assessing achievement fall short in this task. However, Eisner does not appear to be too optimistic about the chances of more authentic assessment techniques being adopted by the education establishment. In ending his article, Eisner leaves the reader with the question: "Will the reductionist testing practices that now prevail marginalize the newer assessment as parents and others in the community continue to seek 'the bottom line'?" (Eisner, 1993, p. 232)

Although I am in agreement with the previous statements regarding the shortcomings of quantitative assessment techniques, I am not confident that alternative assessment techniques would be accepted by the public and, therefore, educational policy-makers. For this reason, it is important that environmental educators become familiar with or develop assessment tools, the results of which can be reported quantitatively. If environmental educators are trying to communicate to the public the worth of EVE programs, the communication will be more effective if educators are able to speak in the language that the public prefers. The next section of this chapter is a summary of some of the tools that have the potential to assess to what extent positive environmental values are developed in students as a result of an EVE program.

Assessment Tools with Potential for Evaluating an Environmental Values Education Program

This section provides a sample of the types of assessment tools that can be used in the evaluation of an EVE program and some guidelines on how they should be implemented. It is organized so that each area of the EVE program that I have noted

needs attention is addressed separately. These areas are the development of moral reasoning ability in students, the development of skills necessary for carrying out values analysis, and the development of values consistent with positive environmental behaviour.

Assessing moral development

In Kohlberg's study he used moral dilemmas to diagnose the level of moral development of his subjects. The same tool can be used by teachers in the classroom to assess their students' level of moral development. Pozarnik has written on the utility of this approach based on the results of a study which used moral dilemmas. He concluded that, "the method seems to be promising as a basis for analysing pupils' moral reasoning and for helping them to raise its level." (Pozarnik, 1993, p.20)

In Pozarnik's study, four dilemmas were presented to students in written form. They were encouraged to make a choice and to justify their choice. The justification for the choice was then classified into one of five levels that showed an increasing level of sophistication of reasoning as one moves up the scale.

A similar approach can be tried in a senior environmental studies class using the continua shown on Figure 3. The type of decision made by a student can be classified on the shallow-deep ecology continuum and the reasoning behind the decision can be used to classify it on the moral development continuum. Doing this diagnostically at the beginning and then again at the end of a unit may provide information on the effectiveness of a program in developing moral reasoning in students.

Assessing the development of skills in values analysis

I have stated that a values analysis approach is my preferred approach to EVE, and that, although the stated outcome is the development of an environmental ethic and corresponding values, attitudes, and behaviours, the development of certain skills is absolutely necessary in this approach. These skills, cognitive in nature, include decision-making, information acquisition, organization and assessment, and action skills.

Assessment tools for these particular skills have been traditionally utilized to a much greater degree in the classroom than for the evaluation in the affective domain. Since the latter is the focus of this exploratory work, suffice it to say that the development of these skills is a necessary component of an EVE program but there is much existing literature that the reader can turn to for direction on this.

Assessing changes in values

This is the most important but least understood component of an EVE evaluation program. The greatest difficulty in measuring changes in values, aside from the fact that changes in values occur over a long period of time, is that values cannot be measured directly. They must be inferred from other measures, and for this I turn back to the conceptual model I outlined in Chapter One. From the model it is seen that a person's values may be expressed in one or more of: beliefs, attitudes, intentions, or actual behaviour. Measurement that indicates changes in any of these may signify a shift in values.

Behaviour can be directly observed by a teacher in the classroom, but if a goal of EVE is to develop autonomous decision-making that reflects an environmental ethic, then

it is impossible for the teacher to directly observe this aspect. Indicators of the decisions made may be obtained by asking the student to report on behaviour, or talking to parents and others that students are associated with. However, such evidence is inherently problematic in that inaccurate or incomplete observations may be made. Despite these shortcomings, behavioural changes, if they are observed, can be important indicators of changes in values and can be used to bolster other assessment tools.

Assessing intentions can apparently be done easily by asking students what they will or would do, but this poses great problems for a teacher in an EVE program. The behaviours that environmental educators would like to encourage are those behaviours that take place both in and out of the classroom. Students may not report accurately their intentions because they may wish to provide the answer most likely to gain favour with the teacher (or to go against the perceived intentions of the teacher). Furthermore, student behaviours that we can check or inquire about are only short-term; but it is the long-term behaviours that environmental educators would most like to influence.

Generally, assessment of values has been carried out mostly by assessing attitudes. Attitudes are indicators of values and are expressions of preference for or against an object or class of objects. This preference is at least in part shaped by the values structure that a person has. Attitudes can be measured by observation, in a number of different situations, of overt behaviour. "You cannot see prejudice but you can observe the behaviour of one who is prejudiced." (Mehrens, 1973, p.427) However, as I have already pointed out, there are problems with observing behaviour. Thus, the most consistently utilized measure of attitude is through the use of an attitude scale. The most

commonly used attitude scales are the Thurstone, Likert, Guttman, and Semantic Differential methods.

Tittle and Hill (1967) carried out a study wherein they used various measures of attitude to see which was the best predictor of behaviour. They found that the Likert scale was the best predictor and exhibited the greatest reliability. This scale seems to have found its way throughout the field of attitude measurement as evidenced by the fact that the greatest majority of studies that measured attitude utilized Likert scales (see Thompson and Gasteiger, 1985; Armstrong and Impara, 1991; Ryan, 1991; Shepard and Speelman, 1986). As well, two scales that have been widely used in measuring environmental attitudes — the New Environmental Paradigm Scale (see Shetzer, Stackman and Moore, 1991) and the Environmental Response Inventory (McKechnie, 1974) -- utilize Likert-type scales.

Likert scales consist of a collection of belief or intention statements with which respondents indicate a measure of agreement or disagreement. They are usually 5-point or 7-point scales ranging from strongly agree to strongly disagree. Fishbein (1967) outlines the steps in constructing a scale.

First, a large pool of items that are statements of beliefs or intentions is collected. For each item, one must decide if it indicates a favourable or unfavourable attitude toward an object. If the statement reflects a neutral attitude or is ambiguous, it is discarded. Strong agreements with favourable items are scored 5 (on a 5-point scale), and the scoring is reversed for unfavourable items. A person's preliminary score is obtained by summing across all item scores. The higher the score, the more favourable the attitude.

In putting together the items on the scale some caution is needed. First of all, favourable and unfavourable items should be randomly ordered so that respondents do not sense a pattern and tailor their response to the pattern rather than to the question content. Secondly, there should be an equal number of favourable and unfavourable items. Third, vocabulary and concepts used in the statements need to be familiar to the students so that their responses accurately reflect beliefs or intentions rather than the degree of understanding of these terms or concepts.

Expression of attitudes in quantitative terms is most appealing for the purpose of reporting the success of EVE programs to the public. However, qualitative measures do show some potential for use.

Qualitative observations or information can be used to augment the quantitative measures described. This information may include observations of behaviour or responses by students in the classroom, perhaps during discussion, simulations or in their interaction with others in the class. Or, it may be information that comes to the teacher in writing — for example, in a creative story with an environmental theme, or in a letter to the editor regarding an environmental issue.

One of the primary considerations in developing an evaluation program in an EVE program is in the choice of the number of assessment tools. It is critical that a number of different types of assessment tools are used in conjunction with one another rather than relying on one tool. This is an approach that I have taken in my classroom during my explorations, and I now turn my attention to providing specific examples of the tools that I used.

CHAPTER 5

ASSESSMENT TOOLS AND THEIR APPLICATION TO EVALUATING ENVIRONMENTAL VALUES EDUCATION PROGRAMS: THE CASE OF A GRADE 11 ENVIRONMENTAL STUDIES COURSE

This chapter will describe the specific assessment tools that were developed for use within the Grade 11 Environmental Studies course. This course is offered at my particular school at an “advanced” level and guidelines for it are contained in Part E of the Geography curriculum document (Ontario Ministry of Education, 1988). But first the chapter will make clear the outcomes for the particular unit that were developed and will identify the topics and concepts in the unit.

Unit Outcomes

The unit focuses on the conservation of natural areas, specifically of the Carolinian forests of southern Ontario. It is a unit which integrates skills, concepts and attitudinal objectives from several of the prescribed units in the Ministry guideline. This issues approach makes for a dynamic curriculum and classroom, and provides for many opportunities to discuss issues and, therefore, attitudes. In this approach an issue, such as the conservation of a particular resource or ecosystem, is used as the content. The teaching strategies incorporate this content in working toward the outcomes stated at the beginning of the unit.

The following are the attitudinal objectives chosen from the Ministry guideline:

Students shall be provided with opportunities to:

- distinguish between people’s wants and needs;

- assess the relative importance of economic and aesthetic objectives in the use of distinctive ecosystems;
- reflect on their attitudes towards their personal consumption of renewable resources;
- evaluate their attitudes towards the consumption of non-renewable resources;
- evaluate concepts and principles associated with environmental planning in urban places;
- evaluate the arguments for and against the retention of wilderness areas;
- propose principles and concepts on which the management of natural environments should be based;
- propose or defend a specific principle or principles as a basis for decision-making and action; and
- assume and defend a position on a proposed action to change some part of the local environment. (Ontario Ministry of Education, 1988b)

These particular objectives were felt to be relevant to the topic of Carolinian forest conservation. This is because they correspond to the environmental values that were outlined in Chapter Three or they involve the skills such as clarification and reasoning that have been put forth as important to the process in EVE.

I then synthesized the above list from the Ministry guidelines with the beliefs and values that were relevant from Milbrath's proposed values structure and from this, developed a list of outcomes for the unit. I have listed the cognitive, affective (values), and skill outcomes for the unit in Table 2.

A Unit Plan

Table 3 is a description of the sequence of topics, activities and strategies that were developed for this unit. The unit was planned as a two to three week unit of study for a semestered school. Table 3 is presented as a summary for two reasons. First of all, because the focus of this paper is on program evaluation I do not think it is relevant to expand on the activities and resources utilized in this unit. I will, however provide

Table 2: Outcomes for Unit on Conservation of Carolinian Forests

1.	Students will value:
1.1	nature for its own sake
1.2	the right of all species to exist
1.3	ecosystems for non-consumptive uses
1.4	environmental protection over economic growth
1.5	public good over private rights
2.	Students will know:
2.1	major ecological components of a local ecosystem and links between these components
2.2	the nature of present urban planning practices
2.3	alternative urban planning practices
2.4	the significance of the Carolinian forest in Ontario
2.5	reasons for the loss of Carolinian forest in Ontario
2.6	present uses of the forest resource
2.7	alternative forest uses
2.8	the role of regulation in environmental management
3.	Students will (skills):
3.1	carry out ecological inventorying, observation, and mapping activities
3.2	develop a plan for a plot of land at the edge of town
3.3	conduct field surveys to determine urban land use patterns
3.4	develop skills related to reasoning

detail on the evaluation tools that I used. The second reason that I have not included worksheets is that the unit's activities and resources were designed for a very localized situation and the material would not be of much use to other teachers. It is relevant however, given the importance that has been attached to EVE as a process, to outline the strategies that were deemed to be important in the delivery of the unit. These strategies serve as the means by which the content found in Table 3 is used to attain the outcomes found in Table 2.

Table 3: The Unit Plan

Activity	Key concept/skill
Planning exercise A and follow-up conference	Diagnostic evaluation
Dilemma #1	Diagnostic evaluation
Dilemma #2	Diagnostic evaluation
Field activity — Telfer Woods	Mapping of major features
Field activity — Telfer Woods	Ecological inventory
Survey #1	Measure of attitudes toward forest conservation
Brainstorming	Traditional uses of the forest
Bird-watching, poetry, music, confluent activities at Telfer Woods	Alternative uses of the forest
Library research	Characteristics of Carolinian forests, extent of loss, reasons for loss
Redo survey #1	Measure of changes in attitudes toward forest conservation since Survey #1
Survey #2	Measure of attitudes toward public good vs. private rights
Field activity — Paris	Mapping and charting of existing urban land use patterns
Discussion	Define needs vs. wants and the effect satisfying them has on the environment
Discussion	Introduce proposed value structure and using examples, reason to ground
Newspaper articles	Alternative planning practices
Redo Survey #2	Measure of changes in attitudes toward public good vs. private rights since Survey #2
Planning exercise B	Redo planning exercise to see if plan changed and to find out why
Introduce sub-division plan for Telfer Woods	
Brainstorm	Possible courses of action to protest building of sub-division

Teaching Strategies for the Unit

The ideal goal of this unit was to have each student in the class attain the outcomes listed in Table 2. Values analysis was identified in Chapter 3 as an appropriate EVE teaching strategy for senior level high school students. Other EVE strategies outlined in Table 1, such as values clarification and confluent education, are also used but these are included to augment certain aspects of the values analysis approach rather than as distinct strategies. The steps involved in values analysis were described in Chapter 3. This approach has been advocated by others and adopted by myself because students are likely to change their values only when they can clarify their values, analyse the effect of acting on these values, develop alternatives, and be offered options for acting on these alternatives. These value changes could, according to the conceptual model described in Chapter One, contribute to the development of more positive environmental behaviours.

Carolinian forest conservation was chosen as the topic for this unit because of the proximity of a tract of undeveloped Carolinian forest to the school. This proximity allowed for the use of teaching strategies that would get students into direct contact with the environment that they were studying, and would therefore ground their thoughts in experience. It was also chosen because it is a topic which is current and appears occasionally in local media articles.

In the unit students were to develop skills such as natural resource inventorying and mapping. In order to do this they carried out exercises in the Carolinian woodlot and from this were becoming, consciously or not, more aware of the components of this ecosystem and the relationships between the components. Library research and reading

assignments helped to clarify the reasons for the loss of Carolinian forests, the extent of the loss and efforts to preserve the forest.

One of the primary reasons for the loss of the forest in the area of the school is the threat from urbanisation. In studying current urban land use practices through field surveys, students were able in class discussions to clarify the links between satisfying needs vs. wants, urban land use practices and urban encroachment on natural areas. In these discussions students were encouraged to clarify their values and to analyse the potential effect on Carolinian forests of acting in accordance with these values.

Exposure of students to music and poetry with a forest or conservation theme, as well as the use of confluent activities designed to heighten the students' sensory awareness of their surroundings while in the forest, were done to develop an intrinsic appreciation of the forest in students. Outcomes 1.1 through to 1.4 (Table 2) were addressed by these activities.

Milbrath's proposed values structure for a sustainable society was presented to the students as a positive values structure that is consistent with an environmental ethic. Using behaviours such as the development of nuclear energy or the clear-cutting of Clayoquot Sound, the class was introduced to the concept of reasoning to ground. If the behaviour violated the core value of life in a viable ecosystem, the students were asked to reject the behaviour because it was inconsistent with the proposed values structure. This discussion was carried out in order to introduce students to a set of values that might promote environmentally positive behaviour if acted upon in a consistent manner. This process was introduced so that students could make explicit to themselves the links between their espoused values and behaviour. In doing this, the students had a method

for analysing the potential effects of their actions and could use this as a basis for revising their values.

Students were introduced to alternative planning practices through printed material and field excursions. These alternatives were offered so that when the students were presented with the sub-division plan for the tract of land, they had knowledge of alternatives that could be offered to decision-makers. Options in terms of action that could be taken in an effort to conserve the forest were brainstormed by the class.

These strategies were adopted because they develop in students the knowledge, skills and values that are needed for the values analysis approach. Placing the content of the unit into these strategies was to lead to the students' attainment of the unit outcomes. The relevant question at this point then is: Did the curriculum and strategies lead to the attainment of the outcomes by the students?

Assessment Tools for the Unit of Study

At this point I will elaborate on each of the tools that I used for assessment purposes in the unit of study. But first, the purpose of the development of these tools needs to be made clear. It was pointed out in Chapter Four that values education can be a very-slow process and that changes in an individual's values may be imperceptible, even over a long period of time. Thus, it is not likely that an evaluation of this unit, in terms of student performance relative to the affective outcomes, will show that the unit was responsible for moving students toward adopting more positive environmental values. The development of these assessment tools is an exploratory effort which is to lead to recommendations concerning the evaluation of EVE programs. The

recommendations are to be based on an analysis of the success of the assessment tools developed in this exploratory effort. This analysis, together with observations on problems encountered in applying the assessment tools, is contained in Chapter 6.

Planning exercise A and B

The purpose of this exercise was to provide information on the students' level of moral development and their reasoning abilities. In Chapter Three the strong link between a student's level of moral development and their place on the environmental ethic continuum was described. This link is shown in Figure 3. Because of the importance of this moral development and its link to growth in an environmental ethic, skills associated with reasoning and moral development are included as unit outcomes (see Table 2; Outcome 3.4). Exercise A (Appendix A) is a diagnostic tool and the intention was that I could compare the information from this with that obtained from Planning Exercise B (Appendix B). The latter was given near the end of the unit, to see if it would provide evidence that growth had taken place in the students' level of moral reasoning and in the environmental ethic they explicitly endorse.

Planning Exercises A and B were both given to groups of three or four students to complete. They were asked to come to a consensus about their decisions and the rationale for them but I also stated that if they could not, they could do one on their own. The main reason for administering it in this way was to save time in the process of my gathering the information, compiling it and interpreting it.

Following the completion of the exercise by the students I circulated between the groups and held a conference with them. Armed with the sheet Planning Exercise:

Anecdotal Reporting from Conference (Appendix C) I tried to have students clarify the reasons for their planning decisions and made brief notes on how effectively each group was able to do this and what their decision was based on.

I then turned to the Evaluation Form (Appendix D) on which I had developed two continua adapted from Figure 3 that showed development in moral reasoning, and secondly, development from shallow to deep ecology. Based upon the group's decision I rated them by circling a number beside the appropriate activity for the continuum titled "Role of People in Relationship to Nature". The same was then done for the moral reasoning continuum based on their rationale for the decision. These decisions were made based on trying to match the characteristics shown by the students' responses to the characteristics that are described on the continua.

Dilemmas 1 and 2

Dilemmas 1 and 2 (Appendices E & F, respectively) were also diagnostic tools that were meant to assess the group's place on the continua describing level of moral reasoning and the role of people in relationship to nature. They were designed to augment the assessment information collected during the Planning Exercises.

- Students were presented with the dilemmas in written form and were asked to respond to them as a group (the same groupings as were used for the Planning Exercise). Their decision on the dilemma was made by choosing one of a number of options provided and I used this choice as the indicator of their place on the continuum describing their role in relationship to nature. This was plotted on the Evaluation Form (Appendix D). The students were then asked to provide a rationale for their decision and

this explanation was used as an indicator of their level of moral development which was also recorded on the Evaluation Form. The results of these are recorded in Table 4.

Surveys 1 and 2

Surveys 1 and 2 (Appendices G & I, respectively) are Likert scales that were designed to provide information about the students' attitudes toward forest conservation, and public good versus private right, respectively. Each survey was administered individually prior to the introduction of the relevant topic and then again after the topic had been covered in the classroom (Appendices H & J). Each had an equal number of favourable and unfavourable items and care was taken to ensure that terms and concepts were familiar to the students. Favourable items reflect a positive attitude toward forest conservation or toward public good (as opposed to private rights). Unfavourable items reflect a negative attitude toward forest conservation or toward public good (as opposed to private rights). As well, the order of the unfavourable and favourable items was randomized. In Survey #1 the favourable items are numbers 1, 2, 5, 6, 10, and 11. In Survey #2 the favourable items are numbers 1, 2, 5, 7, 8, 11, and 14.

Students scored their own surveys and these scores are recorded in Table 5 on page 69. This method of scoring was utilized as a means of reducing the amount of teacher time required to administer the assessment tools.

Following collection of this data, analysis was carried out to see if the class had in fact moved forward on the environmental ethic continuum between the beginning and end of the unit. It is this question that needed to be answered in order to

evaluate the effectiveness of this particular EVE unit. Chapter 6 provides this analysis and interpretation.

CHAPTER 6

ANALYSIS AND INTERPRETATION OF RESULTS

The ultimate goal of this project was to develop practical tools for detecting evidence of change in the environmental values of students. In earlier chapters I made the case for the necessity of doing so and dealt with general issues surrounding this assessment and evaluation. In Chapter 5, an outline of the unit of study was presented as well as the tools for assessing the changes in values. In this chapter I will analyse this data in order to answer the question of whether or not there was evidence of change in the values that students used to guide decisions. From this analysis I will outline my recommendations for an EVE evaluation program.

Presentation of Data

Two sets of data were collected. The first dealt with the changes in the environmental ethic and level of moral reasoning of groups of students. This data was drawn from an assessment of student responses to the Planning Exercises and the two dilemmas and is presented in Table 4. The other set of data collected dealt with shifts in attitudes of individuals as measured by the two surveys. This data is presented in Table 5. The data from Surveys 1 and 2 are presented in graph form in Figures 4 and 5, respectively.

Table 4: Summary of Results of Assessment of Growth in Environmental Ethic

Group #	Planning Exercise A		Dilemma 1		Dilemma 2		Planning Exercise B	
	M	R	M	R	M	R	M	R
1	3	3	3	4	3	6	3	3
2	3	3	3	4	4	4	4	4
3	3	3	4	5	4	3	3	3
4	3	3	3	3	3	3	3	3
5	3	3	2	2	5	6	3	3
6	4	3	4	4	4	6	4	4
7	4	4	3	4	4	6	4	4
8	4	4	3	4	4	6	3	3

Note: Results are transferred from Evaluation Forms (Appendix D) which recorded students' places on continuums of moral development (M) and the role of people in nature (R).

Table 5: Results from Surveys #1 and #2

Student #	Survey #1 Score		Survey #2 Score	
	Pre	Post	Pre	Post
1	42	39	43	47
2	NA	38	42	44
3	NA	38	37	22
4	40	42	42	48
5	51	52	46	40
6	25	51	42	38
7	53	52	45	49
8	55	44	44	41
9	23	45	33	51
10	46	NA	41	45
11	35	44	30	29
12	35	53	28	34
13	41	43	38	40
14	35	36	41	41
15	41	35	42	NA
16	47	36	40	42
17	44	46	40	43
18	44	40	36	37
19	45	45	40	43
20	NA	31	36	39
21	34	33	28	NA
22	21	42	39	43
23	41	40	42	38
24	56	NA	43	34
25	38	40	38	43
26	40	40	50	NA
27	43	41	37	40
28	37	40	42	44
29	18	21	40	39
30	46	46	46	41

 $\bar{x} = 39.0$ $\bar{x} = 41.8$ $\bar{x} = 39.7$ $\bar{x} = 41.8$

Note: Data not available for some students (NA)

Figure 4: Survey 1 Results

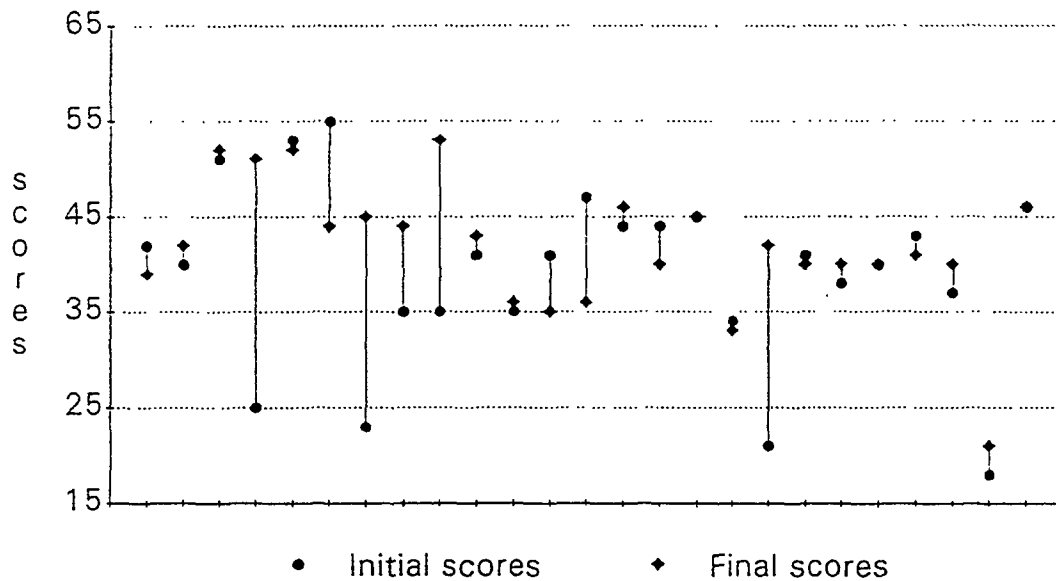
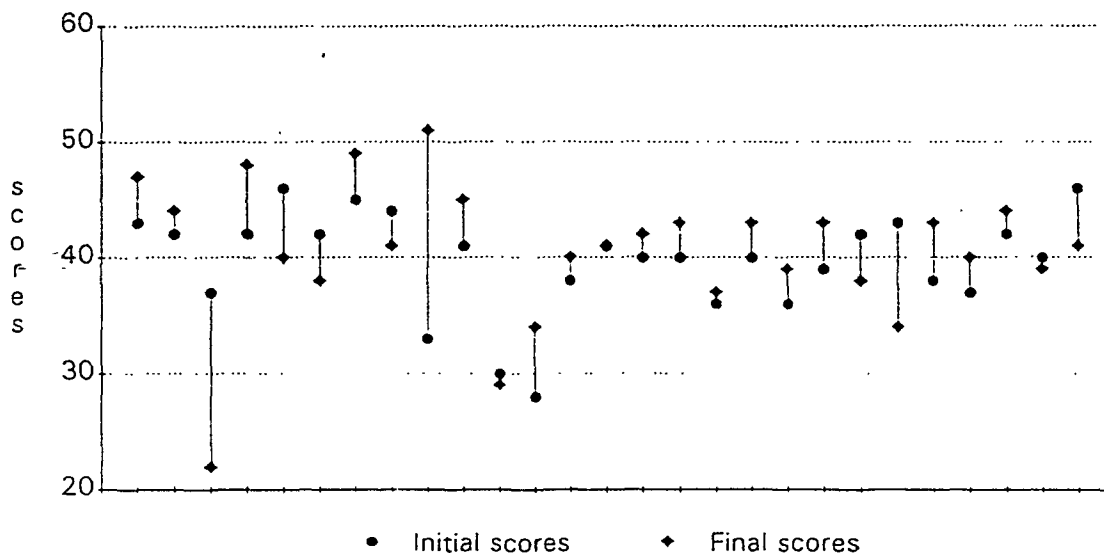


Figure 5: Survey 2 Results



Analysis of Data

The analysis will be dealt with in two major sections — one dealing with the change in environmental ethic of groups as measured by the Planning Exercises and the dilemmas, and the other dealing with shifts in attitudes of individuals as measured by the two surveys. The statistical analysis techniques utilized are intentionally quite simple because more rigorous techniques are generally beyond the expertise of most teachers.

Surveys 1 and 2 were administered to individuals initially as a diagnostic measure of their attitudes toward forest conservation, and public good versus private rights, respectively. The lessons appropriate to each topic were then taught and the surveys were administered again to the class. Scores for the initial and final surveys were then compiled and compared to see if there was an increase in positive attitudes which would have been indicated by higher scores.

Figure 4 shows the results for Survey 1 for each student. The scores of 13 of the students increased, while nine decreased and 3 remained the same. The mean score increased from the initial survey (39.0) to the final survey (41.8).

The results for each student for Survey 2 are shown in Figure 6. For Survey 2 the scores of 17 of the students increased, the scores of nine of the students decreased, and the score of one student remained the same. The mean increased from the initial survey (39.7) to the final survey (41.8).

A *t*-test was conducted for both Surveys 1 and 2. For the *t*-test the null hypothesis was that there was no significant difference (at a confidence interval of .05) between the means in the initial surveys and the means in the final survey. For both surveys, the calculated value of *t* (1.52 for Survey 1; 0.77 for Survey 2) did not exceed the critical value of *t* (1.71 for Survey 1; 1.706 for Survey 2) provided by statistical tables (Groninger,

1990, p. 318). Therefore, the null hypothesis could not be rejected. The inference from this is that there is not a significant difference between the means. Thus, it cannot be said that there was significant change in the attitudes of the students, based on their survey scores.

Change in the environmental ethic that was implicitly endorsed by the groups for making decisions was measured through the use of the Planning Exercises and two dilemmas. The change in the ethic was indicated by movement along a continuum showing the development of moral reasoning and the development of a more positive relationship between people and nature. The analysis of this data (presented in Table 4) was used to provide the answers to a couple of questions.

First of all, the use of the dilemmas was meant to provide data that could be compared with the data from Planning Exercise A. The numbers in Table 4 indicate where the students have been placed on the continuums with higher numbers indicating more desirable environmental values.

For the moral reasoning continuum, the scores between Planning Exercise A and the dilemmas are reasonably consistent. This consistency was expected given that both Exercise A and the dilemmas were supposed to be assessing the groups' level of moral development before exposure to the curriculum. Four of eight of the scores are the same between Planning Exercise A and Dilemma 1, and the other four scores are within one interval. Five of eight of the scores are the same between Planning Exercise A and Dilemma 2, two scores are within one interval of each other, and the remaining score is scored two intervals higher with Dilemma 2. Between the two dilemmas, four out of eight of the scores are identical, three are within one interval, and the remaining one is scored three intervals higher for Dilemma 2.

For the continuum describing the relationship of people to nature, there is less consistency. Between Planning Exercise A and Dilemma 1, three of eight groups are scored the same, four out of eight are scored within one interval from the one exercise to the other, and the remaining score was two intervals higher for Dilemma 1 than for Planning Exercise A. Scores for this continuum for Dilemma 2 were very high, and because of this, there is much less agreement between the scores of Dilemma 2 and Planning Exercise A. Two of eight of the scores were the same, one score was within one interval, two were within two intervals and the remaining three groups scored three intervals higher for Dilemma 2 than for Planning Exercise A. Once again, because this aspect of Dilemma 2 was scored so highly by myself in assessing the responses of the groups, the scores for Dilemma 2 on this continuum were generally higher than for Dilemma 1, with five of the groups scoring higher for Dilemma 2 than for Dilemma 1. This lack of consistency draws attention to some defects in the tools and methodology used to assess students' place on the continuum describing their perception of the relationship of people to nature. The character of these defects and recommendations for removing them will be dealt with in the next section of this chapter.

The second question is whether or not there was growth in moral reasoning as shown by rankings on the continuum between the diagnostic stage and the end of the unit at which point Planning Exercise B was done.

For growth in moral reasoning, six of the eight groups had the same score for the two activities, one group scored one higher and the remaining group scored one lower.

For the growth in relationship of people to nature, five of the groups' scores remained the same while one group's score increased one interval, and two groups' scores decreased one interval.

Interpretation of Results

The question to be answered in this section is whether or not the data shows evidence of the development of more positive environmental values in students. As well, observations relating to the development, administration, and analysis of the assessment tools and collected data will be shared as a basis for making recommendations.

First of all, does the data show any development in positive values in students? In both Surveys 1 and 2 the mean scores for the class increased slightly between the initial and final surveys. There appears to be a general shift in scores upward which indicates more agreement with belief statements consistent with positive environmental values. However, the results of the *t*-tests indicate that this change in means between the initial and final surveys was not statistically significant. But given that the initial and final surveys were given within one week of each other, and that attitudes are learned and shifts in them may be barely perceptible over a lifetime, this may not be considered surprising.

The continuums and associated exercises were developed to measure what I believe are two very important aspects of peoples' environmental ethic: their perception of their relationship with nature and their level of moral reasoning. The assumption was that a shift to a "higher" level in these areas would be indicative of a shift in values reflective of the development of an environmental ethic. Judging by the data provided by the assessment of the groups' responses to the Planning Exercises and dilemmas, there was no development of either aspect. Does this mean that the unit was a failure because the students showed no development in an environmental ethic? It is possible that the unit needs to be revised, and given that this is the first time I have taught this unit, or developed a unit with a focus on evaluating affective outcomes, this is

certainly needed. But, I also believe that there are issues regarding the development of assessment tools and their use that need to be addressed.

I believe that the concept of measuring the growth in moral reasoning and in the development of a more positive relationship with nature is a valid concept in EVE. However, the method for scoring groups on the two continuums for the Planning Exercises was a problem. The list of criteria that was supposed to allow me to place groups on the continuums (see Evaluation Form, Appendix D) was not very comprehensive, and as such I was forced to make very subjective decisions when I had meant them to be more objective. Clearly, I need to develop more expertise in this area so that more objective criteria can be used to score students. There will always be a degree of subjectivity to these decisions but by more clearly delineating the criteria for scoring responses, educators become more knowledgeable about the theory behind the practice and are better able to score and communicate the results of the assessment.

One group of tools that may be helpful in this endeavour has been developed by people with much greater expertise in the field than I. For example, Pozarnik (1993), in his study in which he utilised moral dilemmas in order to assess students' level of moral reasoning, provides a set of five categories of responses to the dilemmas he used, together with descriptions of the responses and examples. The use of these categories might have made it easier for me to score the students' responses more objectively. Another example of a tool that might be useful, specifically for measuring the students' development of a positive relationship to nature, is the New Environmental Paradigm Scale developed by Dunlap and Van Liere (Shetzer, Stackman and Moore, 1991). This particular measure, which is a Likert scale instrument, includes a subscale titled "Man over Nature." Change in this subscale score over time would be indicative of a change of

a person's perception of their relationship to nature. A final example of a potentially useful tool is the Environmental Response Inventory (McKechnie, 1974). This is an inventory which has been validated and used in a large number of studies and it includes scales which measure, amongst other dispositions, opposition to land development, modification of the environment to meet needs and desires, and preservation of natural resources. This tool has great potential for increasing the objectivity and validity of measures for scoring students on the environmental ethic continuum. It is objective because the scoring is carried out by scoring responses to statements. Subjectivity that potentially could enter into the scoring is removed from this process because there is no interpretation involved in the assessment of responses.

An issue concerning test administration and scoring is whether to assess growth in positive values within a group setting or on an individual basis. I did the assessment by groups for the planning exercises and dilemmas as a way of saving time. However, I found that students were telling me that in some cases they were forced to compromise. In carrying out the assessment on a group by group basis, I do not believe that the scores assigned to students as members of a group necessarily reflect the place on the continuum for each member of the group. Values and attitudes are highly personal, and although clarifying and developing them can be a very dynamic and social enterprise, scoring individuals on their values must be done separately for each individual.

Another defect that I perceived in my attempts to assess growth in values in this unit was the number of times that the students were asked to perform tasks that I could use to assess this growth. Through their comments and questions, students conveyed quite clearly to me that they wanted to do major exercises such as the Planning Exercises for marks (not personal development), and that they were getting tired of doing

surveys and scoring them. I had wanted to try a number of tools for assessing growth in environmental values and, unfortunately, had tried them all in this unit. Some of the students may have become so tired of doing the assessment tasks that they may not have put the time and thought into the exercises that would allow for an accurate portrayal of their values. This was certainly apparent in the quality of work, time put into and enthusiasm generated by Planning Exercise A as compared to Planning Exercise B. It may also be the reason that the one student's score on Survey 2 dropped from 37 to 22. These observed behaviours may indicate negative feelings about doing another of these exercises.

The Significance of Findings for the Evaluation of an Environmental Values Education Program

From my explorations into this topic and my attempts to develop and use assessment tools in the classroom come a number of recommendations about the evaluation of environmental values programs.

First of all, it is necessary to be very clear on what are taken to constitute positive environmental values. Teachers, in developing curriculum, need to make explicit what values they are trying to encourage in students. Together with this, teachers need to be well versed in a variety of EVE strategies so that they can choose from these in addressing different values. The material that teachers use in the classroom, together with the strategies, can be very powerful motivators in the classroom, and by being clear on the values that they are trying to promote, teachers can make informed choices.

Secondly, values education is a very slow process and changes in values and corresponding attitudes may not be reliably or readily measurable over the time span of a

unit or even a course. An evaluation program measuring growth in environmental values should be coordinated over the span of at least the length of one course, and preferably over a number of years. For example, growth in environmental values should be a goal of an entire geography department in a high school, and the program should be coordinated within this department, including an evaluation of the effectiveness of the program in moving students along an EVE continuum from Grades 9 to OAC. Even better would be an EVE program that cuts across departmental lines. Values consistent with the development of an environmental ethic are not confined to a geography curriculum. In fact, many of these values, such as compassion, should be the focus in developing a positive school social climate. A school-wide focus could enhance the development of these values in students and could ultimately contribute to more positive environmental values.

The purpose of the evaluation of curriculum is increasingly to justify its effectiveness in terms of meeting stated outcomes. Given the current focus on accountability and the perception that this is served by providing quantitative data, environmental educators need to develop tools that can be used in classrooms to provide such data. In attempting to do this in my classroom I have shown that we first of all need to draw from the expertise of others outside the classroom who have much to offer in this field, and that environmental educators need to develop some of their own expertise in fields such as moral education and reasoning. Up until now I have had little exposure to or education in the fields of assessment and evaluation, or exposure to other relevant topics such as theory of moral development. This points to the need for pre-service and in-service opportunities for teachers in these areas.

There is a need for us to develop objective measurement tools for use in EVE. In assessing affective outcomes, teachers have generally relied on very subjective measures and reporting strategies. Environmental educators need to find a middle ground. We have a responsibility as educators to show the public that our programs are relevant and effective, but, as professionals, if we want the public to accept our evaluation of these programs we need to show them that our judgements are based on some level of objectivity and expertise. Once again, this points to the need for pre-service and in-service opportunities.

Unfortunately, as has been pointed out in this paper several times, accountability is seen to be ensured by the provision of quantitative data. The reliance on such data, and the perception that important judgements about student ability or program effectiveness can be made only with this quantitative information, is reflected by the fact that students are often motivated strictly by the possibility that they may gain marks. This is a problem that I noted in my discussion of some of the problems in conducting an evaluation program in my class. Students are not interested in developing their values or their moral reasoning skills unless they receive a mark for this effort. As a result of this, I would recommend that the assessment of affective outcomes be done as part of an overall assessment program, and that, where possible, the values education component be entrenched into a knowledge or skills component which I believe can be more legitimately graded. For example, assessment of a student's values or attitudes could be carried out by inferring these from comments that he or she makes in a simulation or a class discussion. At the same time, the students could be graded based on the knowledge or skills that they display during the activity. Purely affective evaluation

instruments should be carried out only as interest activities for the students or as unobtrusive observations.

In discussing my final recommendation, I turn back to the conceptual model which was outlined in Chapter 1. The superordinate goal of an EVE program should be to develop students who behave in more environmentally positive ways — termed environmental citizenship by Hungerford and Volk. The conceptual model shows that values education can have an effect on behaviour but that the link between these two is indirect. Although by definition, values guide conduct, for most people, values are only one component of what shapes their behaviour, and in recognizing this, environmental educators need to acknowledge the importance of other behavioural influences. These influences (e.g., knowledge of action strategies, peer pressure) need to be addressed in the classroom as well and certainly need to be a part of the evaluation program in an environmental education program. Focusing only on values education in an environmental education program will not lead to environmental citizenship.

CONCLUSION

Environmental educators have long recognized the importance of values education in developing citizens whose behaviours are environmentally positive. The need for this type of citizenship has become more pressing with population growth and as our behaviours become more environmentally damaging. But, as I have shown, in spite of this need and because of the potential effects of reforms in education, values education could become more marginalized from the mainstream curriculum. This is because the focus in reforms is on ensuring accountability, and this accountability, in the minds of the public, big business, and government, is ensured through means such as standardized tests and quantitative measurement. Unfortunately, the assessment of changes in students' values and the evaluation of values education programs as such, are difficult to do using such forms of evaluation and, consequently, EVE may be pushed out of its already tenuous place in the curriculum.

In recognizing this I have attempted in this project to develop tools for assessing change in students' values which would allow environmental educators to communicate the effectiveness of the curriculum to others in more objective terms. The first step in doing this was to state clearly what it was that students should value as a result of the curriculum.

The results of my explorations show that it is possible to measure growth in environmental values and to report this growth in quantitative terms. The most promising tools for doing so would seem to be Likert-type scales which can be used to measure

attitudes that are indicators of certain values. These types of scales have been widely used in fields such as psychology for some time and carry with them a good deal of reliability and validity.

Of course, developing these scales requires some expertise and teachers need to be provided with pre-service and in-service opportunities to develop this expertise. These educational opportunities need to extend to training teachers in general in other important topics such as general assessment and evaluation philosophies and practices, theory of moral development, and EVE strategies.

There is a good deal of potential for developing quantitative measurement tools within an EVE program. But, in this paper I have outlined some major criticisms of the use of quantitative data and its utility in assessing a student's ability to perform certain complex tasks or changes in a student's values. The intuitive judgement of a teacher who observes students daily over a significant period of time should not be discounted. However, teachers need to back up this judgement with some objective assessment which is perceived to be objective. This judgement needs to be based on a sound, clear and communicated values structure. The proposed values structure for a sustainable society developed by Lester Milbrath offers such a structure. This structure is part of a new environmental ethic which has been embraced by many environmentalists and for which considerable support has been obtained from the public and government. This support can be drawn upon by environmental educators to protect and enhance the place of EVE in the curriculum of our schools.

APPENDIX A

GNS 3A1 - PLANNING EXERCISE A

Group members: 1. _____
2. _____
3. _____
4. _____


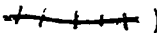

Materials required: Map provided by teacher
 Set of colouring pencils

Task

As a group of four town councillors on the town planning committee, you are to come up with a plan for the use of the parcel of land shown on your map to the northeast of Grand River St. North and Golf Links Road. Your plan will guide future development in the area.

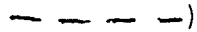
Procedure

1. Start by colouring in the following;

- roads (black )
- railroads (black )
- buildings (black )
- streams and rivers (blue)

} Show using a legend

2. Colour in the areas that you would use for;

- industry (brown)
- commercial/retail (purple)
- high or medium density residential (red)
- estate lots (orange)
- roads (black dashes )
- parks (green)
- agricultural (yellow)
- undeveloped (leave blank)

} Show using the legend

3. Answer the following questions after discussion in you group: 84

- a. What land use covers the most area in your plan?
- b. Why did you use so much land for this?
- c. Approximately what % of the land have you left undeveloped?
- d. What did you see this land being used for?
- e. Why did you make this decision?
- f. Are there any other uses for this parcel of land that have not been included in your plan? What are they?

APPENDIX B

GNS 3A1 - PLANNING EXERCISE B

Group members: 1. _____
2. _____
3. _____
4. _____

Materials required: Map provided by teacher
Set of colouring pencils

Task

As a group of four town councillors on the town planning committee, you are to come up with a plan for the use of the parcel of land shown on your map to the northeast of Grand River St. North and Golf Links Road. Your plan will guide future development in the area.

Procedure

1. Start by colouring in the following;

- roads (black —)
 - railroads (black —+—+—+—)
 - buildings (black ■)
 - streams and rivers (blue)
- } Show using a legend

2. Colour in the areas that you would use for;

- industry (brown)
 - commercial/retail (purple)
 - high or medium density residential (red)
 - estate lots (orange)
 - roads (black dashes — — — —)
 - parks (green)
 - agricultural (yellow)
 - undeveloped (leave blank)
- } Show using the legend

3. Compare this plan to the initial one that you did. Think about the types of land uses that you have planned, how much of the area is covered by each type of land use, where you have put the land uses and the reasons for your decisions.
 - a. How does this plan differ from the first plan?
 - b. Why did you make these changes?
 - c. If you reason to ground (to the core value of a viable ecosystem), is your plan a good one? Explain.

b:\planex

APPENDIX C

PLANNING EXERCISE

Anecdotal Reporting from Conference

Group #	Exercise A	Exercise A	Exercise B	Exercise B
	States rationale for decisions clearly	Rationale based on	States rationale for decisions clearly	Rationale based on

APPENDIX D

EVALUATION FORM

Name: _____

Stage of Moral Reasoning

STAGE 0	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
<p align="center">Egocentric</p> <ul style="list-style-type: none"> ● own way ● avoid punishment ● get rewards 	<p align="center">Obedience</p> <ul style="list-style-type: none"> ● do what told ● stay out of trouble 	<p align="center">Fairness</p> <ul style="list-style-type: none"> ● look out for self ● self interest 	<p align="center">Conformity</p> <ul style="list-style-type: none"> ● be nice ● live up to others' expectations 	<p align="center">System</p> <ul style="list-style-type: none"> ● responsible to society ● self respect 	<p align="center">Conscience</p> <ul style="list-style-type: none"> ● rights, dignity of others ● act on values ● justice for all

Role of People in Relationship to Nature

DOMINANCE	MANAGER	CONSERVER	PRESERVER	REFORMIST	REVOLUTIONARY
<ul style="list-style-type: none"> ● exploitation ● dualism 	<ul style="list-style-type: none"> ● harvest ● interfere to preserve 	<ul style="list-style-type: none"> ● help nature to help people 	<ul style="list-style-type: none"> ● hands off ● save for future 	<ul style="list-style-type: none"> ● short term ● prevention ● responsible actions 	<ul style="list-style-type: none"> ● change values ● new way of thinking ● all species have rights

ACTIVITY

EVALUATION

	<u>Moral Reasoning</u>	1	2	3	4	5	6
<u>Planning Exercise A</u>	<u>Role of People</u>	1	2	3	4	5	6
	<u>Moral Reasoning</u>	1	2	3	4	5	6
<u>Dilemma #1</u>	<u>Role of People</u>	1	2	3	4	5	6
	<u>Moral Reasoning</u>	1	2	3	4	5	6
<u>Dilemma #2</u>	<u>Role of People</u>	1	2	3	4	5	6
	<u>Moral Reasoning</u>	1	2	3	4	5	6
<u>Planning Exercise B</u>	<u>Role of People</u>	1	2	3	4	5	6

————— GROWTH IN ENVIRONMENTAL ETHIC —————>

APPENDIX E

DILEMMA #1

A developer has approached you - a town councillor - to ask for your support in voting at the next council meeting for a development that he is proposing. He points out that the additional property taxes that the development will generate will be an economic boom to the town. The next day the president of the local environmental group visits you and asks you to vote against the proposal. He points out that part of the area to be developed is a forest ecosystem that is found in few other areas of the province.

What will you do? Check off the option below that is most preferable to you.

- Allow the developers to develop the land in the way that they want.
- Allow the development but save the largest trees so that they can be sold to a local sawmill.
- Allow the development as long as the developer does not build on any sensitive parts of the ecosystem.
- Allow the development but not in or close to the ecosystem.
- Do not allow the development until the developer can provide studies showing that the development will not harm the forest ecosystem.
- Do not allow the development or any other development that goes beyond the currently developed urban area.

Explain the rationale for your decision.

APPENDIX F

GNS 3A1 - DILEMMA #2

A chemical factory owner approaches the town council with the request that she be allowed to locate her factory in your town. It would create 5 - 10 permanent jobs and increase the local tax base. The factory would discharge small amounts of toxins into the stream that flows through part of the town with some negative effects on the life in the stream.

As a resident of this town, what would you advise the council to do?

- Support the factory owner's request 100%.
- Support the request as long as there are no short term problems with human health noticed.
- Support the factory owner's request as long as the fishery in the stream is not harmed.
- Request a study showing long-term effects of these toxins on human and ecosystem health.
- No support for the request.
- Do not support the request. Also, ask the town to conduct a survey of current factories to see how much pollution they are discharging then look at ways of reducing this.

Explain the rationale for your decision.

b:\dilem2

APPENDIX G

GNS 3A1 - SURVEY #1

Circle the letter beside each statement that indicates how you feel about the statement.

- SA - strongly agree
- A - agree
- N - neutral
- D - disagree
- S - strongly disagree

- | | | | | | | |
|----|--|----|---|---|---|---|
| 1. | Non-consumptive uses of forests (hiking, birdwatching) should be considered when trying to establish a value for a forest. | SA | A | N | D | S |
| 2. | Forest animals have the right to exist without disruption from people. | SA | A | N | D | S |
| 3. | Lots of Carolinian forest exists in the U.S.A. so we shouldn't be concerned about losing it in Ontario. | SA | A | N | D | S |
| 4. | Uses of the land that do not have direct economic benefits should not be considered as important as other uses that do. | SA | A | N | D | S |
| 5. | We should encourage people to live on smaller lots so that there is less pressure on forests around our urban areas. | SA | A | N | D | S |
| 6. | Regulations and laws should be established that make private landowners preserve existing forest areas. | SA | A | N | D | S |
| 7. | If a forest is on my property I would cut it down if I needed the land for something like a swimming pool. | SA | A | N | D | S |

- | | | | | | | |
|-----|--|----|---|---|---|---|
| 8. | Satisfying my desires is more important than protecting endangered Carolinian species. | SA | A | N | D | S |
| 9. | Getting more tax dollars should be the first priority of planners in deciding how to develop around their towns. | SA | A | N | D | S |
| 10. | Existing Carolinian forests should be expanded by linking individual woodlots together in southern Ontario. | SA | A | N | D | S |
| 11. | Our quality of life is enhanced if we have a healthy Carolinian forest in our area. | SA | A | N | D | S |
| 12. | I would oppose a small rise in taxes to protect Carolinian forests in southern Ontario. | SA | A | N | D | S |

APPENDIX H

GNS 3A1 - SURVEY #1 FOLLOW-UP

Redo Survey #1 and rescore the survey.

Initial score _____

Follow-up score _____

1. Was your score higher or lower?
2. What does that change in score indicate about how your feelings changed?
3. Was this a minor or a significant change (or no change at all)?
4. What experiences do you think led to this change in score?

b:\survey2f

APPENDIX I

GNS 3A1 - SURVEY #2

Circle the letter beside each statement that indicates how you feel about the statement.

SA - strongly agree

A - agree

N - neutral

D - disagree

S - strongly disagree

- | | | | | | | |
|----|--|----|---|---|---|---|
| 1. | I am responsible to anyone that my actions affect. | SA | A | N | D | S |
| 2. | Property owners should make sure that their property is used in a way that benefits the whole community. | SA | A | N | D | S |
| 3. | Artists should be able to show whatever they want in art galleries. | SA | A | N | D | S |
| 4. | People should not blame what I do for their problems. | SA | A | N | D | S |
| 5. | My neighbours should have the same rights to enjoy their property as I do. | SA | A | N | D | S |
| 6. | I should be able to put whatever buildings I want to on my property. | SA | A | N | D | S |
| 7. | Governments should be able to pass laws regulating any behaviour that is not good for society. | SA | A | N | D | S |
| 8. | Artwork that might lead to antisocial behaviour should not be allowed. | SA | A | N | D | S |
| 9. | People should have the right to distribute literature saying whatever they want. | SA | A | N | D | S |

10.	I should be able to dump whatever I want on my property.	SA	A	N	D	S
11.	People should not be allowed to distribute literature that contributes to antisocial behaviour.	SA	A	N	D	S
12.	I should be able to sell my property only if I wish to.	SA	A	N	D	S
13.	I should be able to do whatever I want to with my property.	SA	A	N	D	S
14.	Government should be able to expropriate my land if it is needed for an expressway.	SA	A	N	D	S

APPENDIX J

GNS 3A1 - SURVEY #2 FOLLOW-UP

Redo Survey #2 and rescore the survey.

Initial score _____

Follow-up score _____

1. Was your score higher or lower?
2. What does that change in score indicate about how your feelings changed?
3. Was this a minor or a significant change (or no change at all)?
4. What experiences do you think led to this change in score?

b:\survey2f

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