Educating for the 21st Century:

Advancing an Ecologically Sustainable Society

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Dedication

To Peter, Alysia, Nicholas and Annie and all those like them who dare to dream of a better world, and have the initiative to do something about it.

Abstract

Through case study research, two pioneering schools in Canada that developed whole-school approaches to education for sustainability were investigated to illuminate how conceptual root metaphors resonate with ecological philosophy and educational practices. The study considers philosophy, policy formation, organization/ management structures, buildings/ grounds and resources, curriculum development, and teaching and learning practices at each of these schools. The findings are highlighted and further informed by what the administrators, teachers, community volunteers, parents, and students perceive to be the successes, obstacles and needs they faced in trying to establish their pioneering approaches. These insights provided methodological triangulation as they reinforced the literature review and analysis of findings.

The case study includes an Independent school founded and designed specifically around bioregionalism so as to promote sustainability, and a government-run elementary school that decided to teach and model sustainability. The analysis reveals differences in the underlying conceptual metaphors and the significant extent to which these metaphors resonated with practice.

This research suggests that root conceptual metaphors are significant and can be associated with various intentions and enactments of the whole curriculum. Ecological and mechanistic metaphorical perspectives have been found to be associated with policy formation, organization and management structures, decision-making and communication; curriculum development; community involvement; changes to the buildings and grounds; and teaching/ learning practices.

Although this research suggests that where ecological metaphors were in play school practices were more strongly associated with an ecological model in education for sustainability, it has also shown that this may not be sufficient. Being aware of the underlying conceptual root metaphors in all aspects of the educational approach is also a critical step. The context within which a school operates may preclude or act as a strong obstacle to change. Simply grafting a sustainability program imbued with ecological metaphors onto the accepted educational system, one founded on contradictory 'mechanistic' metaphors, may not be as effective as intended as metaphors seem to seep into the school's culture and systems.

This, however, implies that there needs to be freedom and room to challenge significant systemic obstacles. There would need to be noteworthy changes in the socio-political structure that is in play. Accordingly, for schools to lead the change towards an ecological worldview or paradigm shift, schools would need to be free to adopt an alternative vision of education, ethos and particular organizational structures.

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Acknowledgement

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Part One – Literature Review
Chapter 1 – The Dominant Cultural Paradigm

1.1 Introduction

At the start of the new millennium there are many exciting challenges ahead of us. How we adapt our society so that it becomes ecologically sustainable is likely to be the most pressing challenge of all. The environmental problems facing society from a personal/ local to an international/ global scale have been well documented over the past forty years (Carson, 1962; UNESCO, 1977; Worldwatch Institute, 2000). In response to the growing awareness of these problems, environmental education developed and gained attention in the 1970s with various educational applications ranging from United Nations directives (UNESCO, 1977; UNCED, 1992), national curriculum guidelines (Engleson, 1985; Education Department of South Australia, 1991; SCCC, 1993), specific courses and week-long outdoor/environmental education immersion experiences to a variety of integrative curriculum projects such as Project Wild and Project Learning Tree, special units and lessons.

Many of these curriculum projects and materials rely on incorporating environmental education material into the existing school curriculum. Many new curriculum initiatives continue to be developed, particularly with corporate sponsorship and interests (e.g. Shell's Tidy Britain Group manage the Eco-Schools Programme as well as the Keep Britain Tidy Campaign, www.eco-schools.org.uk). These tend to be short-term projects based on environmental issues such as transportation, recycling or energy use, for example. Van Matre (1990) amongst others is quite critical of these efforts feeling they promote a very narrow perspective of a variety of issues rather than a broad-based

understanding and appreciation. He also feels that environmental education is often co-opted by the very agencies and industries that have contributed so much to the problem. Given the work that has gone into environmental education since the 1970s and now education for sustainability, one questions whether these initiatives are sufficient and whether they address the underlying root causes so that lasting changes will be realized.

Rather than abating, environmental problems are continuing to increase at an alarming rate. The Worldwatch Institute, in *State of the World 2001*, shows how the economic boom of the last decade has damaged natural systems and there is an increasingly visible evidence of environmental deterioration. The Worldwatch Institute (2001) documents the trends that have put the global economy on a collision course with the Earth's ecosystems. They maintain the way forward is to develop an environmentally sustainable society. This is supported by numerous United Nations declarations such as The Belgrade Charter (UNESCO, 1975), The Tbilisi Report (UNESCO, 1977), The World Conservation Strategy (IUCN, 1980), and The Rio Summit (UNCED, 1992) over the past twenty-five years. However, in order to develop a more ecologically sustainable society we need to recognize that *how* people are being educated as well as what they are being taught will have a direct influence on our present and future society. David Orr (1992) has summarized that the environmental crisis is first and foremost a crisis of the mind, perception and values and hence a challenge to those institutions presuming to shape minds, perceptions and values. It is an educational challenge.

1.2 Scientific Underpinnings

In looking seriously beyond what we teach to how we educate, to understand the extent and depth of this challenge, it is necessary to look not only at our present educational approach but also at the underlying societal paradigm that shapes our perceptions, values and guiding (often taken-for-granted) metaphors. These in turn will shape and direct our educational efforts. Many recent authors have done just that. Roots of the dominant scientific, technological paradigm that governs our Western society can be traced to Rene Descartes in the 17C, as well as thinkers such as Newton, Bacon and Locke who furthered Descartes' ideas.

Rene Descartes is usually regarded as the founder of modern philosophy. He did not accept any traditional knowledge, but set out to build a whole new system of thought. (Capra, 1982). Capra goes on to describe Descartes method and its influence in our society:

> Descartes method is analytic. It consists in breaking up thoughts and problems into pieces and arranging these in their logical order. This analytic method of reasoning is probably Descartes' greatest contribution to science. It has become an essential characteristic of modern scientific thought and has proved extremely useful in the development of scientific theories and the realisation of complex technological projects...On the other hand, overemphasis on the Cartesian method has led to the fragmentation….the belief that all aspects of complex phenomena can be understood by reducing them to their constituent parts. (Capra, 1982, p. 44)

Descartes also concluded that mind and matter were separate. He asserted that: 'there is nothing included in the concept of body that belongs to the mind; and nothing in that of mind that belongs to the body' (quoted in Capra, 1982, p. 45). This separation of mind and matter was to become a major factor in Western thought, opening the door to a less spiritual, more objectified view of life. For Descartes, and for Newton after him, that which is not mind is machine. The human body, animals, plants and the natural world were seen as mechanical and as such they are perfectly understandable by reducing them to their separate component parts. Wholes were seen to be made up of separate parts; the whole being no more or less than the sum of its parts. Connections and interactions were not considered important. Once viewed as a machine the non-human world could then be utilised and manipulated to extend our control over the Earth believing this would lead to a 'Better' future (Capra, 1982).

This mechanistic view of the world was very different from the medieval view up until then. Capra (1982, p. 38) notes:

> The nature of medieval science was very different from that of contemporary science. It was based on both reason and faith and its main goal was to understand the meaning and significance of things, rather than prediction and control... The medieval outlook changed radically in the sixteenth and seventeenth centuries. The notion of an organic, living, and spiritual universe was replaced with that of the world as a machine, and the world-machine became the dominant metaphor of the modern era.

The drastic change in the image of nature from organism to machine had a strong effect on people's attitudes towards the natural environment. The organic view of the Middle Ages had implied a value system conducive to ecological behaviour. In the words of Carolyn Merchant:

> The image of the earth as a living organism and nurturing mother served as a cultural constraint restricting the actions of human beings. One does not readily slay a mother, dig into her entrails for gold, or mutilate her body...As long as the earth was considered to be alive and sensitive, it could be considered a breach of human ethical behaviour to carry out destructive acts against it (quoted in Capra, 1982, p. 46).

The belief in the certainty of scientific knowledge lies at the very basis of Cartesian philosophy and of the worldview derived from it, and it was here, at the very outset, that Capra (1982) feels Descartes went wrong:

> Twentieth-century physics has shown us very forcefully that there is no absolute truth in science, that all our concepts and theories are limited and approximate. The Cartesian belief in scientific truth is still widespread today and is reflected in the scientism that has become typical of our Western culture. (Capra, 1982, p. 42)

> Descartes' method of thought and his view of nature have influenced all branches of modern science and can still be very useful today. But they will be useful only if their limitations are recognised. The acceptance of the Cartesian method as the only valid way to knowledge has played an important role in bringing about our current cultural imbalance. (ibid, p. 43)

Following in Descartes footsteps, Isaac Newton developed a mathematical foundation for the mechanistic view of nature. Through Newtonian physics Newton described the universe in its entirety as one huge mechanical system, operating according to exact mathematical laws. In Newtonian mechanics all physical phenomena are reduced to the motion of material particles, caused by their mutual attraction, the force of gravity. This provided a consistent mathematical theory of the world that remained the solid foundation of scientific thought well into the twentieth century.

Thinkers of the eighteenth century carried the mechanistic approach of Descartes further by applying the principles of Newtonian mechanics to the sciences of human nature and human society (Capra, 1982). Locke developed an atomistic view of society, describing it in terms of its basic building block, the human being. He believed that there were laws of nature governing human society similar to those governing the physical universe. These natural laws, according to Locke, included the freedom and equality of all individuals as well as the right to property, which represented the fruits of one's labour (Capra, 1982). Capra (1982, p. 56) details the influence this thinking had:

> Locke's ideas became the basis for the value system of the Enlightenment and had a strong influence on the development of modern economic and political thought. The ideals of individualism, property rights, free markets, and representational government, all of which can be traced back to Locke, contributed significantly to the thinking of Thomas Jefferson and are reflected in the Declaration of Independence and the American Constitution.

Although these major philosophical developments took place in the 16-18th centuries they have had a lasting influence right through to the 21st Century. Counter theories of evolution and electrodynamics that clearly went beyond the Newtonian model limited its role as the fundamental theory of natural phenomena but the basic underlying ideas were still believed to be correct (Capra, 1982). As a result, mechanism still remains in many underlying taken-for-granted metaphors that guide our thinking either consciously or unconsciously (Bowers, 1993; Smith, 1992). These authors summarized the generative root metaphors of the culture of modernism to include:

> (1) anthropocentrism, (2) the belief in unending progress, (3) the belief that linear, rational thought (neutral, natural, and culture free) is the epitome of intellectual achievement, (4) the belief in the dualisms of mind/body and humankind/nature, (5) the belief in humankind's right to exploit nature, (6) the belief in market economics (both capitalist and socialist), (7) the belief in the metaphor that society functions like a machine and that humans function as individual independent units of this machine, and (8) the belief that society is best controlled when power is centralized (Schwartz and Schwartz, 1995, p. 168).

In responding to the cultural biases of Western modernist culture Greig et al (1989. p. 9) feel:

> A shift is needed from such an anthropocentric (person-centred) philosophy with its built in 'biospheric inegalitarianism', to a biocentric (life-centred) philosophy which humbly recognises that we are within the environment; that reverence rather than ruthlessness is due to the natural world; that, however special and

significant, we are but one creature in an incredibly complex and seamless web of life.

In short there is a need to shift the cultural paradigm to one that is ecologically based and in the words of Stan Rowe (1992) 'geocentric', focusing on the life-giving matrix in which all organisms are imbedded. Equating life to Earth, the matrix that sustains all life is a more holistic metaphor, Rowe argues, than the more commonly held notion of 'life-equals-organism'. When considering what is the basic building block of life in the 'life equals organism' perspective, one tends to think in reductionist terms down to cell and molecular biology. In the 'life equals Earth' metaphor, thinking tends to be holistic considering the complex matrix that sustains all life. One thinks in terms of context, patterns, relationships and interdependencies rather than parts and specializations. By showing quite cogently how a bio-centric perspective that equates life with organism is actually very reductionist, Rowe (1992) identifies how pervasive reductionist thinking is while suggesting a more holistic ecologically appropriate metaphor for one of the most fundamental concepts - life.

1.3 Our Present Educational System

As David Orr (1992) has summarized that the environmental crisis is first and foremost a crisis of the mind, perception and values and hence a challenge to those institutions presuming to shape minds, perceptions and values, it is necessary to take a critical look at our present educational system. Is our present form and content of education bringing enlightenment and new insights or maintaining a mechanistic ethos? Being based on the

belief system developed by Descartes et al, our present form of education is imbedded with mechanistic thinking. In dividing the self from the world Descartes led Westerners to equate personal meaning and identity primarily with their mind rather than with their body, mind and environment in relationship. This established an inner hierarchy in which the rational mind was separate from and superior to the bodily, the spiritual, the emotional and the intuitive (Greig et al, 1989). John Huckle (1996) agreed when he noted that schools are modern institutions in a postmodern world.

Bowers (1993) and Smith (1992) evaluated the thinking of modern educational critics in light of the need for a new culture with a new worldview. Bowers (1993) examined the epistemological roots of technocratic liberals and emancipatory liberals. According to Bowers, technocratic liberals represent the epistemological framework associated with Cartesianism. Emancipatory liberals include the range of neoromanticists, critical theorists, child centred educators, Deweyans, and social reconstructionists. All share the belief in the progressive nature of social development, i.e., change is linear and the rational process enables the atomistic individual to be self-directed. Bowers feels these shared beliefs keep both groups in a conceptual double bind which prevents them from recognizing that our technocratic, consumer oriented culture is central to, and not the solution to the ecological crisis (Schwartz and Schwartz, 1995, p. 169).

John Dewey, Paolo Freire and Rousseau have been criticized for being entrenched in a mechanistic worldview. Dewey adopted the scientific method of problem solving, the method that views "as backwards and prescientific the cultural ways of knowing that are

distinctly different from Western anthropocentrism" (Bowers, 1993a, p.97). Schwartz and Schwartz (1995) feel Dewey did not fully understand the ways in which the epistemological basis of Western science contributes to ecological degradation. Although Dewey and Rousseau emphasized experiential education in line with the development of the whole child and education as a medium between nature and society (Oelkers, 2002; Boyles-Deron, 2006), they encouraged the development of individualistic trends (Gilead, 2005) and instrumentalism (Boyles-Deron, 2006). Paulo Friere's work is similarly criticized for its anthropocentrism focussing on child-centeredness and the student's immediate experience, and neglect of the ecological crisis (Bowers, 1993). For Friere, rational thought, in the form of critical reflection, is the only source of authentic, legitimate knowledge. Friere's pedagogy essentially liberates by displacing non-Western cultural patterns of thought with a distinctly Western mode of thinking (Bowers, 1993).

Bowers (1993) furthers his critique of modern educational critics noting how a double bind, in which the ability to understand the crisis is dependent upon the same patterns of thought which have contributed to the problem, constrains critical theorist and pedagogues. Functioning within the Western paradigm of modernism they continue to view the individual as central and independent of the natural environment. "Change is still understood in human and culturally specific terms that equate progress only with an expansion of the individual's sense of freedom. The advocates of critical pedagogy, unfortunately, are not radical enough to consider the ideological framework they inherited from Dewey and Freire" (Bowers, 1993a, p. 115). "Critical theorists, for the most part, neglect to take the ecological crisis into consideration." (Ibid, p. 111).

Intelligence

Our dominant Western culture also holds deep cultural assumptions about the nature of

intelligence. Since these assumptions support and are reinforced by various educational

and classroom practices significant changes may be needed in order to develop an

ecologically sustainable culture. Our unsustainable, technological/materialist culture is

based on an individually centered view of intelligence and constructivist educational

practices (Bowers, 1995). The deep cultural assumptions of intelligence need to be

recognized for they directly affect how we educate as well as how we choose the

curriculum content in trying to develop 'intelligent', well educated people. Bowers

(1995, p. 106) elaborates on the dominant cultural assumptions that guide our present

educational system as well as many of the 'progressive' educational movements:

> The deep cultural assumptions essential to an individually centered
> view of intelligence include representing the individual as the
> primary social unit, associating intelligence with processes occurring
> within the brain (mind) of the individual, and change as inherently
> progressive.

Since intelligence is so closely tied to culture, Bowers (1995) suggests the word

"intelligence" is too general for illuminating both the cultural and more individualised

forms of expression. In stating that cultural evidence derived from comparative studies

appears to overwhelmingly support the argument that *as individuals think within the*

language of their culture their language thinks them, he suggests three categories that can

be used to account for difference in human intelligence. These will account for different degrees of cultural influence and the individualisation of thought and intentionally expressive behaviour. These three categories are intentional intelligence, tacit intelligence, and embodied intelligence. The three categories do not represent distinct boundaries but designate special characteristics on a continuum that stops short of representing intelligence as an attribute of the autonomous individual.

Bowers (1995) explains these categories in the following way:

- Intentional intelligence involves relatively more explicit awareness, deliberate reflection, and conscious choice about mind/body expression and behaviour. It is also a way of recognizing the more individualized (sometimes even creative) expressions of intelligence.

- Tacit intelligence is based on the individual's natural attitude both toward the more individualized understandings that have become routinized over time and to the cultural patterns that have been unconsciously learned. Tacit intelligence always comes into play as part of the unexamined background that serves as the context for the more intentional expressions of intelligence.

- Embodied intelligence refers more to the cultural/individualized intelligence that constructed a certain style of building, for example. This category can be extremely helpful in sustainable/ecological education since:

  Recognizing this intelligence brings into the foreground that the material/symbolic cultural environment embodies the cultural intelligence of the past that continues to act on individuals' more

> intentional efforts to make intelligent choices about relationships and problem solving situations…The presence of embodied intelligence is all around us, and in Foucault's sense of the power/knowledge connection, continually acts upon our actions and thought processes in ways that we are generally not aware of (Bowers, 1995, p. 125).

In considering intelligence Orr (1994) tends to measure it against standards of ecological diversity and human longevity on Earth. Orr feels what we call intelligence and what we test for and reward in schools and colleges is something else, more akin to cleverness. Although he does not feel it is possible to give an adequate definition of intelligence, it is possible to describe four characteristics of it:

- First, people acting or thinking with intelligence are good at separating cause and effect;

- A second and related characteristic of intelligence is the ability to separate "know-how" and "know-why".

- Wendell Berry (1983) suggests a third characteristic of intelligence: the "good order or harmoniousness of his or her surroundings"; and

- A fourth characteristic of intelligent action and thought is that it does not violate the bounds of morality. It does not, in the name of some alleged higher good, demand the violation of life, community, or decency (Orr, 1994, p. 49/50).

By taking an ecological perspective Orr feels we should not only rethink intelligence, but the whole of education. He sees that if you look beyond computers and a few new

courses and programs, we are still educating children much the same as we did in the 1950's. However,

> Those now being educated will have to do what we, the present generation, have been unable or unwilling to do: stabilise world population; stabilise and then reduce the emission of greenhouse gases, which threaten to change the climate, perhaps disastrously; protect biological diversity; reverse the destruction of forests everywhere; and conserve soils. They must learn how to use energy and materials with great efficiency. They must learn how to utilise solar energy in all its forms. They must rebuild the economy in order to eliminate waste and pollution. They must learn how to manage renewable resources for the long run. They must begin the great work of repairing as much as possible, the damage done to the earth in the past 200 years of industrialisation. And they must do all this while they reduce worsening social and racial inequities. No generation has ever faced a more daunting agenda (Orr, 1994, p. 26).

The consequences of this in Orr's view are tragic for, "the great ecological issues of our time have to do in one way or another with our failure to see things in their entirety" (Orr, 1994, p. 94). The emphasis on specialized knowledge, so that we can gain greater control over our lives, has had just the opposite effect. With specialization comes hierarchies and inherent competition. Co-operation is secondary. Individual achievement is seen in relation to others so that competition for achievement and recognition can overshadow personal growth, satisfaction, and positive self-esteem. Our educational system fosters a real fear of failure, which in turn inhibits growth and expression (Goodlad, 1984).

Knowledge

This fragmented, mechanistic and Industrial Society furthered utilitarian thinking that

viewed humans as superior to all other life forms. Industrialization broke tasks and jobs

into bits and pieces for more 'efficient' production. Consequently, there was a greater

demand for knowledgeable, highly trained workers who could apply specialized

knowledge to increasingly intricate and fragmented applications.

'Knowledge' became associated with separate disciplines. To become 'educated' then,

was to grasp all the bits and pieces of separate disciplines. It was felt, and still is to a

large degree, that all these separate component parts within a discipline as well as the

disciplines themselves would be assimilated in the mind of the student to give a realistic,

comprehensive understanding of our world. The interconnections are given token

consideration because the 'system' that is designed along subject boundaries is structured

in such a way as to actively discourage interdisciplinary thinking and learning. Goodlad

(1984) identified the formal structure of the curriculum as a major factor that can limit the

effectiveness of pedagogical modifications. For example, the structure of the school, in

terms of learning and teaching through separate subjects, negates or hinders change.

Goodlad (1984) found this compartmentalized structure seems to foster a short-term

rather than a long-term view, thereby stressing topics and facts rather than concepts and

relationships.

Teachers have come through this very fragmented educational system, themselves, and

tend to specialize in their subject matter. The subjects and not the interconnections are

focused on throughout. As said so well by McInnis (1982, p. 210), "Our present educational system fosters a common intellectual skill: thinking the world to pieces". The danger is students gaining a very fragmented view of reality with little, if any, help in developing a more realistic, meaningful, holistic sense of the world.

Robottom and Hart (1993) note how the field of formal education is characterized by the materialistic Western worldview that developed from the scientific revolution and replaced intrinsic values with instrumental values. Palmer (1998, p.101) writes, "Positivistic approaches share a basically applied science approach to educational inquiry, seeking to apply standards and methods of the natural sciences to the problems of education." Hence, schools tend to quantify education and stress activities that are measurable.

Since specialised knowledge is seen as essential and imparted from others, people have come to rely and be dependent on authority and experts (Orr, 1994). This can often have a very debilitating effect on society. In terms of our environmental crisis this is very detrimental. Bonnett (2002) notes, a sustainable society will only evolve if people become reconnected to the environment, feel it is part of them, and as such, they have a responsibility, personally, to live sustainably. The notion of relying on the experts to come up with yet another 'technological fix' so that our unsustainable lifestyle can continue is not only proven to be a hollow hope but a dangerous one (Orr, 1991). Ability to act should be part of the individual rather than something that is left to the 'experts' who have a particular specialised knowledge. For specialised knowledge does not

necessarily see and understand the complex web of interconnections our world is made up of (Greig et al, 1989).

Orr (1994) points out that besides centering on the mechanistic approach of breaking knowledge into separate subject disciplines, so that the integrated nature of reality is ignored, the educational system is limiting an effective societal response to degraded ecologies and global imbalances in yet another way:

> Professionalized and specialized knowledge is not about loyalty to places or to the earth, or even to our senses, but rather about loyalty to the abstractions of a discipline (Orr, 1994, p. 95).

Goodlad (1984) has also called the effectiveness of the school system into question. Following his extensive research he concludes:

> Few of the activities are likely to promote an understanding of the basic interdependence of the biological and physical resources of the environment or the manner in which heritages and traditions of the past are operative today and influence the directions and values of society. Yet it is to goals such as these that such subjects (science and social studies) are supposedly committed (Goodlad, 1984, p. 236).

In response to the environmental crisis society is now facing, many argue that schools are not teaching values. However, when considering our educational system, George Sessions (1983, p. 28) notes,

> The problem with the contemporary educational establishment is not that values are being ignored. Education is surely teaching values both explicitly and implicitly; it is teaching the worldview and values of the scientific/technological society.

These views of Sessions (1983), Goodlad (1984), Capra (1992), Rowe, (1992), Robottom and Hart (1993), Orr (1994), Bowers (1995) and Palmer (1998) suggest education and our Western culture is dominated by a mechanistic approach characterized by terms and concepts such as technological scientific, fragmented, subject differentiated, positivistic, anthropocentric, linear, individualism, dualism and quantification (Appendix 4). While not eliminating the possibility that other interpretations or influences such as the capitalist, market driven economy (Huckle, 1996; Fein, 2000) or the patriarchal traditions in Western society (Gough & Whitehouse, 2003), for example, may exist and assert an influence, this thesis will consider the data from this pre-given mechanistic view and take it to be dominant.

To gain insight into how and if education could respond in order to move beyond this dominant mechanistic approach it is worth looking at other philosophies and recent developments in holistic approaches in science. These new understandings might help shape a holistic, social paradigm based on ecological, social and economic sustainability.

Chapter 2 – An Ecological / Holistic Paradigm

2.1 Native philosophy

Alternative philosophies opposing this Cartesian, fragmentalist, mechanistic worldview

abound (Capra, 1982, Suzuki et al, 1992).   Worldviews of indigenous peoples such as the

Navajo of North America, the Kayapo' of South America, the Yarralin people of

Australia and the San Bushmen of Africa, (as well as the organic worldview held by

Western society prior to the 16th century), believe in a holistic perspective where humans

are part of a delicately balanced, interdependent web of life (Suzuki et al, 1992).

Many of these ecologically sustainable cultures thrived on almost all continents of our

Earth. David Suzuki and Peter Knudtson (1992) bring forth much of that ecological

wisdom in the book *Wisdom of the Elders.* Bowers (1995) uses the term cultural/bio-

conservatism to describe these cultures as well as contemporary ecologically oriented

thinkers who understand the distinctive characteristics of their bioregions as well as

adaptive behaviours needed for long-term sustainability. He further argues that the fact

that many of these cultures have survived for hundreds or, in some case, thousands of

years without destroying the balance and integrity of their ecosystems gives powerful

reasons for taking seriously their shared characteristics. Bowers (1995) summarizes the

core beliefs and values shared by both primal cultures and contemporary thinkers such as,

E.F. Schumacher, Gregory Bateson, Wendell Berry and Delores La Chapelle, as:

1. Cultural/bio-conservatism involves a way of understanding time that is more

    attuned to the cycles of the different elements in the biome. For example, a tree, a

    salmon, a geological formation, and a human being have fundamentally different

life cycles that need to be respected. It also has a view of human time that encompasses past and future generations.

2. Cultural/bio-conservatism is oriented toward a deep knowledge of place: that is, knowledge of the life supporting characteristics of local systems.

3. Cultural/bio-conservatism is non-anthropocentric.

4. Cultural/bio-conservatism is dependent upon elders to carry forward the accumulated knowledge of local systems, as well as the human practices and ceremonies that have been renewed over generations.

We are starting to accept some of the wisdom other cultures have to offer and acknowledge the limitations of the dominant Cartesian worldview. This is very important for as Sheridan, Oronhiakehwen Longboat (a member of the Mohawk Nation), and Shirt (a member of the Cree nation) (1998) point out, recognizing traditional ecological knowledge to have methodological lessons to offer in understanding the evolution of the invisible environment of nature, in time, adds to its overall legitimacy in environmental thought. They emphasize that through seventh generation thinking the present tense unfolds the past and makes raw materials for the future. The present is not an unrestricted potential because the present:

> …is guided by a known, rich and frequently consulted past. That past is knowledge that exists to be served, understood and lived-in as profoundly as the present tense. Pauline, in other words, walks softly in the present ever mindful of the effects of her actions on the future. In the middle rather than the beginning of seven generations thinking. Compared to environmental rhetoric that dungeons a

frantic present and an intimidating future, imagine instead the balance and coaching that comes from the presence of the past (Sheridan, et al, 1998, p.1).

The authors propose that the difference between this approach and that of conventional environmental education might be summarized as, "recovery of a past with ecological integrity versus recovery from a past without ecological integrity" (ibid, p.1).

2.2 Scientific Underpinnings

Quantum physics and The Theory of Relativity

These ancient wisdoms are now being supported by our own cultural, scientific discoveries in physics in the early 20th Century. Although Cartesian thinking and Newtonian physics have led to innumerable scientific understandings and achievements from the 19th to 21st Centuries the rise of more holistic theories has brought an expanded level of consciousness. This has contradicted many of the principle concepts of reductionism thereby shifting it from a central role to one that nests within a greater holistic understanding afforded by Einstein, Bohm and others. Capra, (1982, p.62) has summarized these developments and although he overstates his case in suggesting that all principle concepts were shattered, he does identify specific central concepts that were challenged:

> Two developments in physics, culminating in relativity theory and in quantum theory, shattered all the principle concepts of the Cartesian worldview and Newtonian mechanics. The notion of absolute space and time, the elementary solid particles, the fundamental material substance, the strictly causal nature of physical phenomena, and the objective description of nature – none of these concepts could be

extended to the new domains into which physics was now penetrating.

Quantum physics showed dramatically that at the subatomic level there is no basic building block, no distinct parts as Cartesian thinking led scientists to believe. Instead, when atoms were smashed they found the particles formed patterns in an inseparable web of relationships (Greene, 2004). Moreover, these particles have a dual nature: depending on how we look at them, they appear sometimes as particles, sometimes as waves. This showed that at the subatomic level, matter does not exist with certainty at definite places but has a tendency to exist and is influenced by the complicated web of relations between the various parts of the whole – even the observer was seen to influence what was observed.

Einstein's theory of relativity has also challenged the classical concept that associated the mass of an object with an indestructible material substance. It showed that mass has nothing to do with material substance but is a form of energy. As such, a particle can no longer be seen as a static object, but instead a dynamic pattern of energy (Greene, 2004).

Einstein's special theory of relativity significantly challenged the traditional Western concepts of time and space. Rather than seeing space as three dimensional and time as a separate entity, he argued that both are intimately connected in a four-dimensional space-time continuum (Capra, 1975). This transcended the Cartesian worldview of space and time being a passive unrelated backdrop to a world made up of separate and distinct

objects. Instead space-time was now seen as an integral component, influencing every aspect of the whole.

These relatively recent developments in physics are now being supported with discoveries in biology with models of self-organization and discoveries in mathematics with the mathematics of complexity and dissipative structures.

Pattern of Organization

Capra, (1996, p. 85) has summarised self-organisation as:

> the spontaneous emergence of new structures and new forms of behaviour in open systems far from equilibrium, characterised by internal feedback loops and described mathematically by nonlinear equations.

Two self-organising models worth noting here are Maturana and Varela's autopoiesis (Maturana and Varela, 1980) and James Lovelock's Gaia hypothesis (Lovelock, 1991). These models describe the patterns of organisation found in life. They imply a non-mechanistic, post-Cartesian understanding.

Maturana concerned himself with the organization of the living and with what takes place in perception. He hypothesized that the 'circular organization' of the nervous system is the basic organisation of all living systems: "Living systems ... (are) organized in a closed causal circular process that allows for evolutionary change in the way the circularity is

maintained, but not for the loss of the circularity itself." (quoted in Capra, 1996, p. 96).

He concluded that the network pattern, in which the function of each component is to

help produce and transform other components while maintaining the overall circularity of

the network, is the basic 'organization of the living'. This distinctive organisation of

living systems they called 'autopeisis' (meaning self-making). An important defining

characteristic of living systems is that their autopoietic organisation includes the creation

of a boundary that specifies the domain of the network's operations and defines the

system as a unit (Capra, 1996).

James Lovelock has furthered this concept of self-organising systems when he

independently developed his Gaia hypothesis: the planet Earth as a whole is a living,

self-regulating system (Lovelock, 1991). It is regarded as a single living organism with

all parts helping to regulate and balance the planet via feedback mechanisms, thus

sustaining itself (Lovelock, 1989). As such, the natural world is far more than a

collection of separate species and natural resources. The connections between all living

and non-living elements are essential to the overall health of the planet. Alterations to

one aspect, such as an increase in the amount of CO_2 emitted into the atmosphere or the

destruction of various plant or animal species, will cause reactions throughout the system

to compensate for the changes. According to Gaia theory, life creates conditions for its

own existence. In the words of Ann Margulis who has worked in close association with

Lovelock in developing the Gaia theory:

> Simply stated, the (Gaia) hypothesis says that the surface of the
> Earth, which we've always considered to be the *environment* of life,

is really *part* of life. Life actually makes and forms and changes the environment to which it adapts. Then that 'environment' feeds back on the life that is changing and acting and growing in it. There are constant cyclical interactions (quoted in Capra, 1996, p. 106).

This thinking is in line with Bohm's theory of universal order that discredits the modern mechanistic view in favour of a holistic theory that incorporates an implicate and explicate order (Bohm 1986). The explicate order is visible and seemingly separate forms we see in the world around us. The implicate order is the flowing unbroken whole from which things that are manifest have unfolded and into which they finally refold. This order recognises the findings of quantum physics, emphasising that everything is woven together in indivisible links, being affected by and in turn affecting elements both near and far. Bohm suggests that the future is carried as yet unfolded within the implicate order and so can be regarded as co-present. At an even more subtle super-implicate level, matter and consciousness become fused into one. The implicate levels are thus an all-encompassing background to our physical, psychological and spiritual experience (Bohm, 1986). Hence, a blindness to our essential connectedness with everything and everyone else is ultimately self-destructive. Bohm (1986, p. 30) reminds us that the word 'individual' means undivided; hence 'individuality is only possible if it unfolds from wholeness'.

In understanding life and living systems we need to not only recognise the patterns of organisation but also the system's structure. Capra (1996) notes that the study of structure has been the principle approach of Western science and philosophy to the near

exclusion of the study of pattern. Rather than focusing exclusively on one or the other, a comprehensive understanding of living systems will only be achieved with a synthesis, as they are complimentary parts of a whole.

> The pattern of organisation of any system, living or non-living, is the configuration of relationships among the system's components that determines the system's essential characteristics. The structure of a system is the physical embodiment of its pattern of organisation (Capra, 1996, p. 154).

Within this holistic, systemic *organisation* of life, which focuses on patterns, Capra (1996) has recognised that mathematics of complexity and dissipative structures, as defined by Prigogine, have been useful in describing the *structure* of living systems. Dissipative structures incorporate the flow of energy and matter yet remain very stable. A vortex in flowing water is a simple example of a dissipative structure in a non-living system. This co-existence of change and stability lead Prigogine to coin the term 'dissipative structures'. Capra (1996) notes that while Ilya Prigogine's description of a living system as a dissipative structure emphasises the openness of that structure to the flow of energy and matter, Maturana and Varela describe the pattern of life as an autopoeidic network and so emphasise the organisational closure of that pattern. 'Thus a living system is both open and closed – it is structurally open, but organisationally closed. Matter continually flows through it, but the system maintains a stable form, and it does so autonomously through self-organisation." (Capra, 1996, p. 164).

Understanding Prigogine's theory of dissipative structures more fully leads to a greater realisation of how outmoded the mechanistic metaphors used to describe nature are. As well as exhibiting stability with a constant flow of energy and matter, dissipative structures incorporate points of instability at which new structures and forms of order can emerge. Capra (1996) describes how Pirgogine's theory shows how a particular type of chemical process, the catalytic loops that are essential to living organisms, lead to instabilities through repeated self-amplifying feedback and how new structures of ever-increasing complexity emerge at successive bifurcation points.

> A bifurcation point is a threshold of stability at which the dissipative structure may either break down or break through to one of several new states of order. What happens at this critical point depends on the system's previous history. Depending on which path it has taken to reach the point of instability, it will follow one or another of the available branches after bifurcation (Capra, 1996, p. 186).

At the bifurcation point, the dissipative structure also shows an extraordinary sensitivity to small fluctuations in its environment. Capra (1996) points out that since all living systems exist in continually fluctuating environments, and since we can never know which fluctuation will occur at the bifurcation point just at the 'right' moment, we can never predict the future path of the system. These insights into dissipative structures imply a radical shift of perception – from stability to instability, from order to disorder, from equilibrium to non-equilibrium, from being to becoming. (Prigogine and Stengers, 1984).

Completing Capra's synthesis in understanding living systems is the third criteria of *process* (Capra, 1996). He has described this life process as the activity involved in the continual embodiment of the system's pattern of organisation.

Gregory Bateson as well as Maturana and Varela refer to this process as cognition. Bateson, whose entire thinking was in terms of patterns and relationships, has written of the consciousness he regards as pervading everything, organic and inorganic. Similar to Bohm's implicate order, for Bateson there is a universal mind "immanent in the total interconnected social system and planetary ecology" of which the human mind is but a sub-system (Bateson, 1973, p.436-42). According to Bateson, individuals are always situated in a context that includes interacting relationships with other living beings and the environment (Bowers, 1993a, p. 160; 1993b, p.104). It is this "aggregate of interacting parts that makes up the context" that Bateson considers to represent the "unit of mind" which he refers to as a "mental ecology" (Bowers, 1993b, p.104).

In their work on perception and organisation of living, Maturana and Varela also concluded perception and, more generally, cognition, do not represent an external reality, but rather specify one through the nervous system's process of circular organisation (Capra, 1996). From this premise Maturana postulated: "Living systems are cognitive systems, and living as a process is a process of cognition. This statement is valid for all organisms, with and without a nervous system." (quoted in Capra, 1996, p. 97). Capra (1996) has recognised this cognition defined by Bateson, Maturana and Varela as the process of life. He has recognised that this web of life incorporating the organisational

pattern, the structure and the process represents a new synthesis of mind and matter. Although this view of cognition is not accepted by the majority of psychologists, it is one that finally goes beyond mechanism and therefore, is worth considering.

Systems Theory

Complementing these new theories in science, systems theory evolved to take account of the interconnections and patterns that provide a context and define relationships for various elements that were often thought of as existing or functioning as isolated units. Systems theory emphasizes that systems are complexly interconnected in that a system influences and is influenced by other systems. Systems theory incorporates the patterns of organization outlined above arguing that recognizing the complex, dynamic, adaptive aspects of systems will help develop more sustainable cultural systems that work with nature rather than against it (Clayton and Radcliffe, 1997).

2.3 Deep Ecology

Beyond systems theory deep ecology describes a holistic eco-centric philosophy to guide a new paradigm that leads to sustainable thoughts and actions. Arne Naess (in Sessions, 1995) summarized deep ecology in the following eight premises:

1. The well-being and flourishing of human and nonhuman Life on Earth have value in themselves (synonyms: intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes.

2. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves.

3. Humans have no right to reduce this richness and diversity except to satisfy vital needs in a responsible way.

4. The flourishing of human life and cultures is compatible with a substantial decrease in human population. The flourishing of nonhuman life requires such a decrease.

5. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening.

6. Policies must therefore be changed. These policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present.

7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent value) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great. Basic ideological, political, economic and technological structures must therefore change.

8. Those who subscribe to the foregoing points have an obligation directly or indirectly to try to implement the necessary changes.

Its most defining premises are that human beings are placed within a context of a family of other species, an Earth family (Shiva, 2000) and that Nature has intrinsic value. These

two norms of deep ecology are commonly referred to as self-realisation and biocentric equality.

Self-realisation is concerned with an intimate identification with the rest of the earth or the cosmos. The ecological Self is distinguished from the egotistic self. The self (with a lower case 's´) is that which much of humanity is concerned with, that is, the individual self, which begins and finishes at the artificial boundary of a person's skin. It includes the person's ego. The Self, however, is the ecological self - the wider Self - through which every living being is intimately connected. Self-realisation is in the growing understanding of the interconnectedness of nature. Stephen Harding (1997), an ecologist at Schumacher College describes self-realisation as other beings, ranging from microbes to multicellular life forms to ecosystems and watersheds, to Gaia as a whole, engaged in the process of unfolding their innate potentials. He goes on to state that for humans, self-realization involves the development of wide identification in which the sense of self is no longer limited by the personal ego, but instead encompasses greater and greater wholes. Naess has called this the ecological self. Since all beings strive in their own ways for self-realization, Harding recognizes that all are endowed with intrinsic value, irrespective of any economic or other utilitarian value they may have for human ends. As such, there is a fundamental equality between human and non-human life in principle. This ecocentric perspective contrasts with the anthropocentric view that ascribes intrinsic value only to humans, valuing nature only if it is useful to our own species (Harding, 1997).

The second norm of deep ecology is biocentric equality. Biocentric equality is the belief that all things - ecosystems, life and landscapes - have an intrinsic right to exist (Naess et al). This intrinsic value is independent of the needs or appreciation of other life forms, including humans. This shifts the focus away from an acceptance of domination over nature to living sustainably within our greater context. For this reason Rowe, (1992), took exception to the term 'biocentric' preferring a 'geocentric' metaphor. Deep ecologists ask humanity to live within the world. As Shiva (2000, p.16) puts it:

> All life, including the plants around us and even the atoms of the soil, has rights to survival…It is not a new idea. It is the basis on which all sustainable civilizations have evolved.

The philosophy of deep ecology, then, rejects the dualistic view of humans and nature as separate and different. It is important to recognize the distinction here between deep ecologists and those who consider themselves shallow ecologists. Shallow ecologists, in comparison, consider that humans and nature are separate and that humans can dominate the world around them (Palmer, 1998). Deep ecology, however, has been criticized by Stables & Scott (2001) as naïve as it denies the role of human consciousness in the constructing of worldviews.

2.4 An Ecologically Sustainable Culture

With these insights, new to Western science and culture, but fundamental to the teachings of many indigenous cultures throughout the ages, we can no longer continue in unexamined ways. This holistic synthesis calls us to re-examine our present practices in light of these findings. Jickling (2004, p. 17) notes,

> Revealing unconscious and invisible assumptions, the sources of much authority in our culture, can be a first step in social critique. It can lead to "better questions", and can provide a first step towards re-imagining new possibilities.

C.A. Bowers in *Educating for an Ecologically Sustainable Culture* argues that if the technological / consumer-oriented culture of Western society is to become an ecologically sustainable culture, we need to challenge its taken for granted cultural knowledge, traditions and patterns that guide, perpetuate and reinforce it. We need to recognise and replace the often taken-for-granted mechanistic metaphors we incorporate throughout our educational system. Bowers (1995) has realised the need to consider our conceptual understanding and cultural metaphors regarding individualism, creativity, intelligence and teaching. He states:

> In effect, the cultural message systems that sustain the images and values upon which the consumer-oriented society rests continue unchallenged to reinforce the taken for granted attitudes toward material progress and individual opportunity – even as the evidence mounts that the destruction of the environment now puts the entire technological/economic infrastructure at risk (Bowers, 1995, p.1).

Bowers' metaphors for a sustainable culture help to bridge the gap between indigenous peoples and the postmodern world. Bowers (1993) calls for a return to tradition, i.e., an awareness of the continuities with the past; valuing traditions that contribute to long-term sustainability; and reconsidering traditions that threaten sustainability. Bowers argues the interdependent self needs to be seen as part of a community of all life forms, held together through interdependence. Technology will need to be environmentally and culturally sensitive, considering traditional knowledge, wisdom, and material achievements. Science should be considered as only one way of knowing, as knowledge is multidimensional, influenced by diverse cultural groups. It needs to take into consideration continuities with our past and responsibility for future generations while acknowledging many forms of knowing: tacit, theoretical, technical, folk, encoded (in genes, language, cultural artefacts, plants, animals, etc.), poetic, spiritual, and bodily. This perspective is challenged by Stables & Scott (2001) who argue that he takes insufficient account of our identities as late modernists, or postmodernists. They also question Bowers' assumption that pre-modern cultures are ecologically sustainable and whether we can in fact benefit from a partial recreation of those cultures.

With Orr's recognition that all education is environmental education, the question is whether education is acting to reinforce the unsustainable and ecologically destructive technological/materialist-oriented culture or helping to move beyond modernist metaphors and develop an ecologically sustainable culture. John Maynard Keynes (1936)

identifies the difficulty education is facing in becoming an agent of change: "The difficulty lies not in the new ideas, but in escaping the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds." (p. viii) Bowers (1995, p. 37) agrees that past cultural ideals can be recognised as part of the problem:

> Most educators still take the cultural ideals of progress through technological innovation, increasing autonomy of the individual, and empowerment through data based thinking for granted, and thus use them as the basis for framing how students learn to think about specific content areas of the curriculum.

Aldo Leopold recognized the need to incorporate the moral dimensions in developing an ecologically sustainable society. In his classic, *A Sand County Almanac*, Leopold imbeds ethics and morality within an ecological framework. He reinforced human's dependency on the natural ecosystem of which it is an integral part. His land ethic recognised the individual as part of an interdependent community, requiring questions and actions to be judged following the principle that, "A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." (Leopold, 1966, p. 262).

Alan During (1991), captured the essence of ecological sustainability in the form of a new Golden Rule: "each generation must meet its needs without jeopardizing the prospects of future generations to meet their own needs" (ibid, p.165). As stated earlier, many Native American cultures incorporated this sense of morality towards future

generations by judging their present actions in terms of seven generations, their past informing and guiding the present to have a positive impact on the future. This multi-generational, community focus is significantly different to our individually centred culture.

Chapter 3 - Education and Sustainability

3.1 Ecological View of Intelligence

Rather than using a hierarchical metaphor such as atomistic thinking, that generates the notion of developing knowledge in progressive building blocks, ecological intelligence uses a nesting metaphor where individuals are nested in the symbolic systems of culture, and cultures in the natural systems that are the source of the many forms of energy humans rely upon (Bowers, 1995). This would give us not only a different view of intelligence but also in Bowers' words profoundly different implications for how we think about education.

> This would include understanding the basic characteristics of individual/cultural dependency upon the patterns of living systems that make up the environment, the way the cultural metaphorical constructions of the past continue to influence how we think and behave in relation to the environment, as well as addressing the moral and spiritual implications of an expanded ecological intelligence. In effect, a more inclusive form of intelligence would lead to a fundamentally different curriculum than what is now viewed as empowering an individually-centred form of intelligence (Bowers, 1995, p. 126).

Maturana and Varela (1980) present a rather different, although not widely accepted view of cognition that challenges the typical individually centered view: that "all living systems are cognitive systems" and that "living as a process is a process of cognition" (Maturana and Varela, 1980, p. 13). Bowers (1995) argues we need to move away from our tradition of representing intelligence as a function of the human brain to take on this more ecological perspective. In elaborating on Maturana and Varela's concept of "living

systems as cognitive system", Bowers (1995) defines it as encompassing an animal's environment of signifiers that provide information about other predators, prey, weather, shelter, and standing in a group. It is also meant to encompass the more reflective and metaphorical forms of intelligence of humans, as well as the many ways human/environment relationships involve important information that leads to changes in both human behaviour and intentional thought processes. This view of intelligence is reinforced by Bob Samples (1987) in his book, *Openmind / Wholemind*, in noting that current research suggests we are not limited to the traditional five senses. He lists nineteen different human senses that influence one's intelligence. Senses such as balance-movement, temperature, magnetic, infrared, ultraviolet, ionic, proximinal, barometric and geogravimetric (sensing mass differences) all relate to the living system of the individual being a cognitive system.

Holistic education seems to be moving in similar directions on supporting eight different learning styles based on Howard Gardner's work. Gardner (1993) proposes eight different intelligences to account for a broader range of human potential in children and adults. These intelligences are:

- Linguistic intelligence ("word smart")
- Logical-mathematical intelligence ("number/reasoning smart")
- Spatial intelligence ("picture smart")
- Bodily-Kinaesthetic intelligence ("body smart")
- Musical intelligence ("music smart")
- Interpersonal intelligence ("people smart")

- Intrapersonal intelligence ("self smart")

- Naturalist intelligence ("nature smart")

Gardner says that our schools and culture focus most of their attention on linguistic and logical-mathematical intelligence. We esteem the highly articulate or logical people of our culture. The theory of multiple intelligences proposes a major transformation in the way our schools are run. It suggests that teachers be trained to present their lessons in a wide variety of ways such as using music, cooperative learning, art activities, role-play, multimedia, field trips, and inner reflection. Teaching in this way honours the variety of senses and intelligences people have while encouraging a more holistic perspective. It is interesting to note, however, that Gardner has been criticized for basing his theories on individual construction of knowledge, not taking into account the complex connections between individuals, culture and ecosystems (Bowers, 1995). Indeed, the various intelligences described by Gardner are typically applied to different individuals rather than as various aspects of a person's whole intellect.

Referring to a holistic notion of intelligence, Rupert Sheldrake (1994) makes even more radical suggestions in proposing that the mind does not reside in the head, confined within the brain, as is presently assumed. In his chapter on the extended mind, Sheldrake uses the sense of being stared at and the perceived reality of phantom limbs to support his theory that the mind may be more spiritual than is presently conceptualised. He notes that traditional societies around the world view conscious human life as part of a far larger animate reality. Sheldrake (1994, p.93) states:

> The soul is not confined to the head, but extends throughout and around the body. It is linked to the ancestors; connected to the life of animals, plants, the Earth and the heavens…

Sheldrake contrasts this with the dominant Descartian theory in the West that minds are located inside heads. As Sheldrake (1994, p. 93/94) states,

> In his theory, the realm of soul shrank from nature into man alone, and then in the human body contracted yet further into a small region in the brain, which Descartes identified as the pineal gland. The conventional modern theory is essentially the same, except for the fact that the supposed seat of the soul has moved a couple of inches, into the cerebral cortex.

Carl Jung's notion of the collective unconscious also runs counter to the notion of the psyche being confined to individual minds. This theory reinforces an ecological perspective of interrelatedness in that the psyche is shared by everyone. Gregory Bateson, (1973), reinforces this theory in stating, "The individual mind is immanent but not only in the body. It is immanent also in the pathways and messages outside the body" (Bateson, 1973, p. 461). These pathways and messages are the "patterns that connect" or (in the words of Maturana and Varela) "the coupling between organisms and the environment". According to Maturana and Varela (1980, p. 13), a cognitive system "is a system whose organization defines a domain of interactions in which it can act with

relevance to the maintenance of itself. The process of cognition is the actual (inductive)

act or behaving in this domain".

> This interaction triggers changes throughout the system of the organisms that collectively constitute the larger ecosystem. This communication of information is what leads Maturana and Varela to state that "living as a process is a process of cognition." (Bowers, 1995, p. 128).

Bohm's theory of the implicate and explicate order, referred to earlier, where the

explicate or visual order is enfolded in the larger implicate order, is in line with the

thinking of Jung and Bateson. In his book, Bowers (1995) refers to Bateson's thinking on

humans and their interactions with their ecosystem's communications:

> Bateson is especially clear on what can become problematic in the way humans interact and make sense of the messages communicated through the network of information pathways essential to the life of ecosystems. Bateson argues that humans process the information metaphorically. Over time they collectively create conceptual maps that influence what information they will be aware of, as well as the interpretation of what the information means – which often involves connecting it to larger cultural themes and anxieties. These cultural maps, in turn, are acquired by new members as they learn to think and communicate in the cultural languages of their group...What concerned Bateson was the failure of the cultural maps (metaphorical frameworks) to take into account essential features of the territory: that is, the patterns of information being communicated through the ecosystems humans participate in (Bowers, 1995, p. 129).

Bateson (1991) recognised two important factors: firstly, that cultural maps influence what aspects of the ecosystem that individuals will be aware of, as well as how they will interpret the information; and secondly, that cultural values and assumptions that guide human behaviour have an impact on all the other natural systems connected through the network of information pathways. Our present anthropocentric concept of intelligence does not recognise the interconnections of humans within a greater ecosystem or the implications of this dynamic interchange of communication that it functions through and is dependent on.

Ecological Principles

An ecological view of intelligence is one that recognises the network of relationships of humans nested in their culture and culture being nested in natural systems identified by ecological principles. Bowers (1995) argues ecological intelligence should become the metaphor for educators who are seeking to organize curricula that foster the growth of individual intelligence.

> This new (actually, ancient) view of intelligence would involve a basic change in the criterion for determining what constitutes intelligent behaviour. Whereas the individually-centred view of intelligence uses individual autonomy as the primary reference point, an ecological view of intelligence would use long-term sustainability of the Earth's ecosystems as the primary criterion…An ecological view of intelligence would also involve a radical shift away from the constructivist view that individuals grow in their ability think and behave autonomously by constructing their own ideas out of the raw data and information they encounter through direct experience or from experiences organized by teachers. Rather, it would lead to patterns of thinking that understand relationships in terms of the eight principal characteristics of ecosystems that Capra suggests are also the basic principles of learning: interdependence, sustainability,

ecological cycles, energy flows, partnership, flexibility, diversity, and coevolution (Bowers, 1995, p. 9).

These guiding principles are similar to the emphasis placed on ecological principles and intelligence by Gough (1987), Orr (1994), Smyth (1995) and Sterling (2001) and Webster (2004)

Slow Knowledge

David Orr (1996) refers to this ecologically based knowledge as 'slow knowledge':

> Slow knowledge is knowledge acquired through cultural maturation. It is shaped and calibrated to fit a particular ecological and cultural context. It implies thoroughness and patience. The aim of slow knowledge is resilience, harmony and the preservation of "patterns that connect" (Orr, 1996, p. 5).

Fast knowledge is about 'know-how'; deals with discrete things; is focused on solving problems; is always new; and is often abstract and theoretical, engaging only a portion of the mind. In contrast slow knowledge is about know-how and know-why; deals with context, patterns, and connections; has to do with avoiding problems in the first place; is often very old; and engages all the senses and the full range of our mental powers (Orr, 1996).

Bowers (1995) refers to a similar type of knowledge as trans-generational teaching and

notes that it is one of the basic features of ecologically centred cultures. In traditional

societies this role is filled by elders who can pass on the cultural wisdom of their

ancestors as well as of their own experiences. Bowers maintains that as our culture has

become so fragmented, individualistic and based on a notion of unlimited growth and

progress, elders are no longer seen as teachers of cultural wisdom. If anything their ideas

seem to be viewed as old-fashioned and out of date. Instead, professional teachers have

been given the role of guiding future generations. For these reasons Bowers (1995) feels

teachers should see themselves as part of the process of trans-generational

communication rather than simply encouraging students to create their own ideas, values

and personal sense of identity. He feels teachers need to help students a) understand how

dominant culture developed on basing progress on the degradation of natural systems,

and b) identify practices and patterns in dominant and marginalized culture groups that

are ecologically sustainable:

> Computer stored knowledge, and the self-discovery method of learning, both of which presume the irrelevance of elders, cannot duplicate the complex interaction of communal memory, judgement, and moral centeredness to the cycles of natural systems (including past and future generations of the culture), and a knowledge of the characteristics of different species at different stages in their life cycles… Knowledge of local environments and the moral relationships essential to long-term sustainability are too complex to be learned in the time frame of the modern individual (Bowers, 1995, p. 167).

Through this transmission of ecological wisdom by means of trans-generational communication, the essential message that all new ideas and values must meet long-term sustainability must come through. When this is the case, trans-generational communication works against relativism in individually constructed knowledge, ideas and values. It is essential to passing on cultural wisdom for maintaining a sustainable culture. Bowers summarizes that teachers should ask questions about how human/cultural expectations are to be brought into balance with the Earth's ecosystems and then bring into the discussion the theory framework (an ecological model of understanding) that illuminates the importance of the questions. Thus teachers have a great role to play in guiding inquiry.

To do this effectively with an ecological perspective the teacher's ecological insight and conceptual framework are obviously central to any educational programme they are involved with. Lack of attention to this particular aspect of teacher training and/or background can seriously limit the success of a particular program (Bowers, 1995). Robottom (1987) speaks to the need to prepare teachers for their new role in an ecologically sustainable approach to education. He stresses that teacher training is where most emphasis must be paid if education is to encompass environmental education to a significant degree. His argument is based on grass-roots efforts so as to avoid the centrally controlled, top-down curricular approaches that have been so ineffective.

Necessary as these suggestions for teachers may seem, it is unrealistic to think that significant changes can be brought about by teachers who are struggling for autonomy

and professionalism in a centrally-controlled educational system, influenced so strongly

by political interventions. Teachers do not have much control over curriculum. This is

particularly true in England with the National Curriculum but also true to a lesser degree

in Scotland and Canada where the curriculum is developed through National or

Provincial Guidelines. Although the Scottish Guidelines are not mandatory, the H.M.I.

inspect schools in accordance with the Guidelines and demand national testing at various

stages throughout. This testing and inspection tends to guide what is taught as well as

how. In Canada the Provincial guidelines are mandatory. England is now moving

towards prescribing how teachers are to teach as well as what and when. This seems to

leave little room for professionalism and the type of innovative changes prescribed by

Bowers.

3.2 Systemic Change

An ecological view of intelligence has profound implications for developing education

for sustainability. Orr (1996) argues that ecological intelligence, incorporating ecological

principles and slow knowledge, needs to be incorporated into a meaningful educational

response. The whole structure of education and 'schools' needs to reinforce ecological

metaphors rather than the dominant mechanistic system we inherited from the industrial

revolution. If it does not, individual efforts on the part of teachers, working in an

atomistic system, will tend to be subverted by the 'hidden' curriculum with its powerful

dominant metaphors (Orr, 1994). Jickling (2001, p. 186) notes,

> We achieve much by paying attention to the context of our learning environments. We can ask, 'To what extent do our words, metaphors, images, actions and implicit attitudes impede our progress' and, 'What can we do to reverse these tendencies?'

Sterling (2001) has synthesized these thoughts and argued that if we are to move to a more sustainable society, based on an ecological paradigm, education will need significant changes at a number of levels. To move in this direction he outlines three levels of consideration:

1. Educational paradigm (Ethos). The implications of ecological thinking as a basis for an overall educational paradigm which revisions and reorients the purpose of education (theory, research and practice) and its relationship with wider society and the biosphere;

2. Organization and management of the learning environment (Eidos). How whole system ideas might be reflected in systems change and management, organizational ethos, disciplines and departmental structures, curriculum content/theory and design, hidden curriculum, purchasing policy, and community/social links and relationships;

3. Learning and pedagogy (Praxis). How whole systems approaches might be reflected in the classroom or in community practice, in teaching and learning method, including a systems view of the learner, participative learning and teaching styles (Sterling, 2001, p. 56).

Clearly these authors argue that we cannot continue to simply tinker with an outdated, ineffective system. They argue that the time has come for a serious look at what form

educational changes should take. To say the least, they imply changes will be far

reaching and all encompassing if they are to be meaningful.

> Ecological education requires breaking free of old pedagogical
> assumptions, of the straitjacket of discipline-centric curriculum, and
> even of confinement in classrooms and school buildings. Ecological
> education means changing (a) the substance and process of education
> contained in curriculum, (b) how educational institutions work, (c)
> the architecture within which education occurs, and most important,
> (d) the purposes of learning. (Orr, 1994, p. 33)

According to David Orr (1994) we need to: 1) Go beyond Galileo and Descartes to

incorporate that which cannot be quantified, recognising the integration of people and

nature, mind and body and the intrinsic value of nature. The more qualitative elements of

reality need to be given legitimate consideration: feelings and intuition, aesthetic

appreciation, loyalty, friendship, sentiment, empathy and charity; 2) Challenge the hidden

curriculum that says that human domination of nature is good, growth of economy is

natural, all knowledge, regardless of its consequences, is equally valuable, and that

material progress is our right; 3) Move beyond individualism and rights to recognise our

responsibilities and citizenship in the biotic community; and 4) Recognise the limits of

technology, questioning whether technological progress is necessarily a good thing. We

need to consider its impact on our social, political and cultural imagination as well as our

ecological prospects.

The implications of the recommendations of Orr and Bowers are the necessity to move beyond the mechanistic worldview to a more holistic, ecological paradigm (Chen and Novik, 1984; Cotgrove, 1982; Bybee, 1979; Bowers, 1995; Orr 1992). They suggest that whilst the mechanistic view of the world has led to many advances in various fields, such as medicine, its limitations must be recognised. Ultimately they suggest that it is at odds with the true integrative nature of our world and as such it is misleading when it becomes the overriding social paradigm guiding thoughts, considerations, actions and education.

3.3 Educational Approaches

Outdoor Education, Environmental Education, Earth Education and now Education for Sustainability or Sustainable Development have attempted to respond through the 1970s, 1980s, 1990s and now the 2000s to the environmental crisis. In light of the above critique of the dominant mechanistic paradigm and education in general, it is worth reviewing these areas as a means of achieving a more ecologically sustainable educational approach.

Outdoor Experiential Education

Referring to the shortcomings of formal education (Bowers, 1995; Goodlad, 1984; Greig et al, 1989; Robottom and Hart, 1993; McInnis, 1982) Orr (1994) feels we need to help overcome the disciplinary narrowness and the aloofness characteristic of academic institutions by immersing students, Kindergarten through to PhD, in the natural environment. This he feels would: allow first hand learning through all our senses; cultivate mindfulness by slowing the pace of learning to allow a deeper kind of

knowledge to occur; encourage interdisciplinary perspectives, careful observation and the study of place; and teach students that there are some things that cannot be known or said about a mountain, or a forest, or a river – things too subtle or too powerful to be caught in the net of science, language, and intellect.

The power of experiential learning, referred to by Orr, is one of the foundations of Outdoor Education. It can involve the whole person, immersing them in a total sensory experience, potentially providing a deeper more meaningful learning experience in context. Higgins (1996) believes Outdoor Education has a valuable contribution to make in developing an environmentally sustainable society by incorporating an environmental dimension to outdoor education thereby educating for an understanding of connection and consequence. It can help students develop an understanding of the consequences of individual actions on the environment through direct experience and the involvement of the affective, emotional and physical dimensions as well as the cognitive. Higgins (1996), in referring to both outdoor education and environmental education, acknowledges the important contributions made by outdoor education but recognizes that as outdoor education can focus purely on outdoor pursuits, it is not necessarily environmental education as is often claimed.

Environmental Education

Environmental education developed from Outdoor Education and Nature Study to the point where it became widely accepted to include education *in* the environment, *about* the environment and *for* the environment (Palmer, 1998).   Each of these areas, according to

Palmer (1998), emphasizes different elements: education in the environment stresses an aesthetic element; education about the environment stresses an empirical element; and education for the environment stresses an ethical element. It is expected that experiences in these three areas will help students develop experience, concern and action through individual holistic development in knowledge and understanding, concepts, skills and attitudes (Palmer, 1998). As Webster (2004, p. 51) noted, "Environmental education became a curious mix: emotional response tempered by scientific understanding and belief in reason as the sure judge and guide to sound policy and good citizenship".

Stevenson (1987) categorized these developments in environmental education in terms of the approaches they encourage. Conservative reform that occurs within the present system advocates either a technical or political approach. Technological fixes encourage injecting ecological principles and information into existing decision-making structures, whereas, political approaches focus on reducing human impacts on the environment. Both maintain the status quo rather than transform the economic or political order. In contrast to conservative reform, radical reform focuses on reform of the present system. Within this categorization are the socially critical approach, which seeks social and environmental justice, typically challenging oppressive political structures, and the alternative approach, which resonates with deep ecology and an intrinsic rather than instrumental value of all nature.

Within these frameworks different methodologies have been advocated. Beyond first hand immersing experiences with the natural world, Orr (1994) feels both students and

teachers need to work together in an effort to solve real problems in an attempt to integrate learning with service. This broadens the educational institute so that it incorporates the communities it is an integral part of. By involving people in a common effort to accomplish something that needs to be done, "...students and faculty alike discover that they are competent to change the things that otherwise appear to be unchangeable." (Orr, 1994, p. 98). This emphasis relates to the radical reform approaches and the 'for' aspect of environmental education.

As Fein (1993) noticed, much environmental education tends to centre on processes and skills for inquiry into environmental issues and environmental problem solving. Issue-based environmental approaches became very popular through the Eco-schools programs in Europe. The Foundation for Environmental Education in Europe (FEE) developed the Eco-schools Program in response to the Rio Earth Summit's Agenda 21 document, which promoted local action to solve global environmental problems. FEE Eco-schools offers opportunities for schools to link with their communities and work together to solve and prevent environmental problems at the local level (Henderson and Tilbury, 2004).

Eco-schools as well as others typically added environmental education onto the existing curriculum with an 'infusion' approach that attempts to supplement the curriculum by sprinkling environmental messages and activities throughout (Henderson and Tilbury, 2004). This approach is representative of Stevenson's conservative reform. The theory behind it was interdisciplinary, trying to tie subjects together to give a holistic picture. Unfortunately, rather than uniting the curriculum, this approach resulted in a rather

fragmented diffusion of environmental education (Van Matre, 1990). Smyth (1995) argued that environmental education should not be a separate educational package as it came to be structured and recognized, but rather it should seek to reform education.

This issue-based approach is criticized by Webster (2004) as being an example of programs that lack the essential basis of ecological understandings and the development of systemic thinking as a necessary pre-requisite if lasting sustainable attitudes and behaviours are to result. He feels we have taught people the names of some of the parts of the earth but have failed to convey how it functions as a whole. As a result students have not made simple connections between their lifestyle decisions and how they are contributing members of the systems they influence and are influenced by. Van Matre (1990) argued for deep emotional attachments to the natural world and puts this lack of focus down to there being no clear definition of environmental education. As it developed it became anything and everything related to an environment. He goes back to the common definition, 'Environmental Education is education in, about and for the environment' feeling it opened up the field to such diverse applications that almost any educational experience could qualify. Even the word 'environment' was interpreted widely.

In response to this confusion, Van Matre (1990) developed Earth Education. He clearly identified its goals as helping people learn a) how ecological systems of the earth function; b) how we are personally tied into those systems in our lives; and c) how we can make changes (individually and collectively) in order to lessen our impact upon those

systems. Using immersing experiences to focus on natural systems Earth Education

involves students in first of all understanding the ecological systems and our relationship

with them and then developing a deep and abiding emotional attachment to the earth and

its life. Only once this foundation has been built do Earth Education programs

concentrate on how students can make changes to lessen their impact on those earth

systems. Throughout, the emphasis is on lifestyles before issues. Sauvé (2005) sees

Earth Education as an example of the Naturalist current in environmental education.

Although Van Matre offers a clearly defined ecological perspective, Post-modernists such

as Robinson (1998) take exception to Van Matre's modernist premise that there should be

one clear model that all should aspire to. Warner (1993) also critiques the single model

approach as the romantic metaphors about the natural world that pervade much of the

programming in Earth education are irrelevant for many people in non-European cultures

and inner cities. Van Matre's approach also falls short of the recommendations of

Webster (2004), Tilbury & Wortman (2004), Fein (2000), Huckle & Sterling (1996) and

Smyth (1995) among others who argue environmental education or education for

sustainability needs to have a wider focus, have more emphasis on social perspectives,

and be central to all learning rather than as a separate program or package.

Gough, also, has criticized the "in, about and for" model as far back as 1987. He states:

> Apart from being somewhat patronizing and anthropocentric (who
> are we to say what is 'good for' the environment, and which
> environment is 'the environment', anyway?), this slogan maintains
> the sorts of distinctions that tend to work against a deeply ecological
> world view – distinctions between subject and object, education and
> environment, learner and teacher (Gough, 1987, p. 50).

Gough (1987) suggests attention be shifted away from *objects* of environmental education towards the interactions or inter-relationships that exist among people and environments. "As a foundation for educational inquiry, an ecological paradigm should give us cause for optimism that we may someday learn to live, and live to learn, *with* environments." (ibid, p. 50).

Bowers (1993) argued the ineffectiveness of environmental education came from Western educators responding to the environmental crisis through the creation of environmental education curricula whose very roots are firmly embedded in the culture of Western modernism. He sees environmental education is thus caught in 'a conceptual double bind' or paradox, in which the ability to understand the crisis is dependent upon the same patterns of thought which have contributed to the problem. Bowers (1993, p. 149) further states:

> A critical factor in this conceptual bind has been the modernist's reification of, and reliance upon science and technology as the source of technological fixes. This has lead to an ominous silence on the cultural roots of the crisis, a silence that will continue as long as the ecological crisis is framed by this technological conceptualisation of modernism.

Webster (2004) also recognises this lack of consideration for the cultural roots of the problem as the major limitation of these past educational responses. Even at the level of the school Goodlad (1987) identified the structure of the school itself limited change. Fullan (1993) also questions whether schools can be in the vanguard, driving societal change. He has looked at societal forces beyond schools that limit the role of schools in the change process and recognizes corresponding action strategies are necessary at the individual, local, and provincial levels as well as at the school level. Time has shown that although outdoor education, environmental education and earth education have offered valuable contributions they have not been, in and of themselves, sufficient to bring about an environmentally sustainable society.

Education for Sustainability

One of the most important changes in relation to environmental education has been the association between environmental concerns and development issues. The notion of 'sustainability' has emerged as a central concept (UNCED, 1992), encompassing a balance of economic, social and environmental concerns. Palmer (1998, p. 143) summarizes:

> The ultimate aim is for every citizen to have formulated for himself or herself a responsible attitude towards the sustainable development of the Earth, an appreciation of its resources and beauty, and an assumption of an environmental ethic.

The need to shift away from the current mechanistic paradigm to a more ecological one was further developed in *Caring for the Earth: A Strategy for Sustainable Living* (Munro, 1991). Munro argues for an essential role for education, to ensure that people accept the principle that living 'sustainably' depends on the acceptance of the need to seek harmony with other people and nature.

There is, however, controversy around sustainability being transformed to 'sustainable development' with little or no shift in the current mechanistic paradigm (Reid, 2002). Reid (2002) as well as Bowers (2002) recognized the role of root metaphors in framing thought when they emphasized, "Language thinks us as we think within the conceptual categories that the language of our cultural group makes available" (Bowers, 2002, p.23). Bonnett (2002) summarized the main issues as semantic, ethical and epistemological. Semantically it is possible to interpret the term 'sustainability' in ways that involve minimum disturbance to the status quo. For example, Western-style economies can see it in terms of sustainable economic growth with little regard for an ecological perspective (Rauch, 2002). Ethically there are questions around the rights and duties of human kind to the rest of nature and whether these should be grounded in anthropocentric, bio-centric, or other perspectives. Epistemologically, given the complexity of natural and social systems, the extent of special and temporal dimensions, and our imperfect state of knowledge about them, there are questions regarding how we are to judge which actions will positively contribute to sustainable development - the ends and means are not clear.

Canadian environmental education scholars such as Jickling (1992, 2001) and Sauvé (1999b) have interpreted education for sustainability in narrow, instrumental terms and have criticized it, as 'sustainable development' is a contested term and education 'for' sustainable development can be interpreted as indoctrination. In light of this they have not adopted the new terminology of 'education for sustainability' or 'education for sustainable development' but have retained the term 'environmental education' seeing it as more appropriate.

In addition to the eco-centric view espoused by Webster, Sterling and Bowers a number of other perspectives have emerged in the development of education and sustainability. One such perspective is that of the socially critical thinkers such as Huckle (1999) and Fein (2000). Huckle's interpretation of education for sustainability is based on a radical ideological stand, arguing that it, "seeks to expose contradiction, ideology and politics, and allows learners to glimpse genuinely democratic and empowering meanings." (Huckle, 1999, p.40). Fein (2000) emphasized, "…that it is necessary to consider the complementarity of the personal and the political and that educating for social transformation requires an integration of the liberal/progressive orientation in education with the social justice emphasis of the socially critical orientation" (p. 184). With its roots in Marxism, this is often referred to as the 'Red-Green' perspective.

The socially critical perspective has often been criticized for being anthropocentric, failing to reflect a holistic perspective, subjectively centring individualism, and enshrining rationality over 'spiritual' forms of knowledge and experience and pathways

to empowerment (Bowers, 1991, Jickling & Spork, 1998; Fein, 2000). Bowers (2002, p. 23) argues that, "…critical pedagogy does not lead to individual emancipation and social justice; rather it reinforces a subjectively centred individualism required by the consumer, technologically dependent society."

Related to the socially critical perspective, ecofeminist standpoints critically examine influential social constructs related to and rooted in gender and gender relationships (Gough and Whitehouse, 2003). It works to expose power relations and oppressions associated with gender, race, class, able-bodiedness, and sexual orientation (Barrett, 2005). The feminist current highlights the relations between the domination of women and the domination of nature and moving beyond a constituted homogenous human identity to recognize knowledge to be multiple, subjective, contingent, and intimately tied in with embodied experiences of place (Gough and Whitehouse, 2003). Moving beyond a rational approach, ecofeminism emphasizes intuitive, affective, symbolic, spiritual or artistic approaches (Sauvé, 2005).

The rise of constructive philosophical approaches have challenged eco-centric and socially critical approaches as essentially modernistic in their origins and flawed in their rejection of industrial and post-industrial capitalism. Although post-modernist or 'post-humanist liberal pragmatists' such as Stables and Scott (2001) agree with Bowers' call to critique root cultural metaphors and encourage critical thinking, they disagree with using pre-modern, eco-centric cultural models. They argue environmental education must be grounded in contemporary cultural practice. Jickling (2001) marries the two

perspectives, "…we should not try to appropriate another's culture; however, these observations place a mirror before us and help us to reflect upon our own cultural traditions" (p. 187).

Bonnett (2002) critiques the eco-centric perspective as not being viable at the level of the individual. He argues it gives "…too little credence to the special position that human consciousness has in the greater scheme of things", ignoring "the way in which the idea of reality itself is human-related, that things only show up in the space which is consciousness" (Bonnett, 2002, p.17). Accordingly, he suggests sustainability should be understood as a frame of mind. Gough (2002, p. 70) also rejects ecocentricity as a basis of learning arguing it "…attempts to divest ourselves both of our humanity, and of our essentially participant role in making the world what it is and will be." These arguments do not seem to eclipse ecocentric views for as Bowers (2002, p. 29) asserts, "The use of ecology as a root metaphor foregrounds the relational and interdependent nature of our existence as cultural and biological beings." This seems to correlate with Bonnett's argument that sustainability as a frame of mind retrieves that receptive/responsive relationship and intimate connection we have with nature.

Robinson (1998) has also criticized the eco-centric perspective but focuses on it being essentially modernist in that it, "…works to link everybody into some unseen, but ever-present transcendental web of interconnectedness." (p.2). Postmodernists accept multiple interpretations; and question the privileging of one tradition over another (Robinson, 1998). Eco-centric advocates argue that while there may be numerous social

interpretations there is no denying the interconnectedness of all life and the dependence of society on its natural environment (Webster, 2004).

Even with these various interpretations and emphases there seems to be considerable consensus in the academic literature. Eco-centric and socially critical advocates, postmodernists, and constructivists all argue we need to examine our influencing cultural values, encouraging critical thinking with a view to radical transformation (Bonnett, 2002; Bowers, 2002; Webster, 2004; Foster, 2001; Gough, 2002; Bell, 2005; Fein, 2000; and Jickling, 2001).

Recognizing the danger of education for sustainability being implemented instrumentally, Foster (2001) argues for a non-instrumental approach, which he considers 'deep sustainability'. He describes this as 'living with the grain' with a learning mind-set so as to develop a learning society. Gough (2002) also emphasizes that participation in a learning society leads to sustainable development rather than trying to implement a predefined concept of sustainability and how to get there. Similarly, Scott (2005) emphasizes learning rather than teaching as a framework in education for sustainable development. Reid (2002) summarized the challenge of instrumentalism as, "Rather than what education might do for sustainable development, what might sustainable development do for education?" (p. 73).

Education for Sustainability, arguably, is broader than environmental education in that it attempts to consider economic and social concerns as well as environmental, thereby

presenting a more holistic perspective (Webster, 2004; Barraza et al, 2003; Huckle, 1999). These holistic concepts describing Education for Sustainability, however, have also been used in reference to Environmental Education in a number of influential and widely accepted documents and policy statements:

- The Belgrade Charter states that objectives for environmental education include 'fostering clear awareness of and concern about economic, social, political and ecological interdependence…providing every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment…(UNESCO, 1975).

- The Tbilisi Report recommendations (UNESCO, 1977) make clear that environmental education views the environment in its entirety including social, political, economic, technological, moral, aesthetic and spiritual aspects…emphasizes active responsibility.

- The World Conservation Strategy (IUCN, 1980) claims that 'environmental education has the task of transforming the attitudes and behaviour of entire societies if a new conservation ethic…is to become a reality'.

- Caring for the Earth (Munro, 1991) emphasizes that environmental education teaching should be practical (action oriented) as well as theoretical; and

- Agenda 21 states that 'Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues…it is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with

sustainable development and for effective public participation in decision-making.' (Palmer, 1998, p. 95)

The shift from referring to Environmental Education to Education for Sustainability, then, seems to be an attempt to ensure a more holistic perspective that moves beyond education 'in, about, and for' the environment. Barraza, et al (2003) note: "…education for sustainable development is seen to be more concerned with social and cultural aspects of nature than environmental education ever was." (p.352).

Stephen Sterling (1992, p.2) notes that Education for Sustainability:

- Enables people to understand the interdependence of all life on this planet, and the repercussions that their actions and decisions may have both now and in the future on resources, on the global community as well as their local one, and on the total environment;

- Increases people's awareness of the economic, political, social, cultural, technological and environmental forces which foster or impede sustainable development;

- Develops people's awareness, competence, attitudes and values, enabling them to be effectively involved in sustainable development at local, national and international level, and helping them to work towards a more equitable and sustainable future. In particular, it enables people to integrate environmental and economic decision-making;

- Affirms the validity of different approaches contributed by environmental education, and development education and the need for the further development and integration of the concepts of sustainability in these and other cross-disciplinary educational approaches, as well as other established disciplines.

Although Education for Sustainability was intended to extend environmental education by presenting a more holistic perspective, early Education for Sustainability programs were judged in relation to the 'in, about and for' model of environmental education and were seen to emphasize education 'for' the environment (Palmer, 1998). Accordingly, Palmer (1998) emphasized the need to present a balanced, holistic perspective incorporating 'in' and 'about' as strands. Palmer (1998) references her work which looked at significant life experiences and influences affecting pro-environmental behaviour of educators, (which included educational courses among the various categories), and found:

> "By far the most significant category of response overall was experiences 'outdoors', and in particular subjects talked of the great significance of experiences outdoors in early childhood - experiences in the world of nature. Education - meaning courses in the formal sense - was the second most significant category, though a very long way behind 'outdoors' in terms of numbers mentioning it." (Palmer, 1998, p. 133).

Webster (2004) has recognized many early efforts to teach education for sustainability (EfS) simply grafted social and economic concerns onto mechanistic programs that were

already emphasizing the environment. The literature emphasized the need to balance environmental, social and economic concerns, typically diagramming this as three overlapping circles, which sustainability represented by the central area of overlap. This conceptualization was considered very useful as the segments correspond quite closely to other organizational divisions in society (Gough, 2002). But as Webster pointed out, this conceptualization stemmed from fragmentary, mechanistic thinking that portrayed the environment as something separate from the economy and society. In this mechanistic model the economy seems to float in an unconstrained space where it could conceptually grow without limits (Figure 1).

Figure 1: Balancing Environment, Society and Economy

Figure 2: Integrating Economy Society into the Environment

Webster (2004) argues that a true ecological worldview based on holistic thinking needs to re-conceptualize the environment/ society/ economy relationship as in Figure 2. In Webster's words:

> The ecosphere ('environment') is the context within which everything takes place. It has limits…and these cannot be broken without risking catastrophe (a loss of life support). As it is a complex interconnected world, physical systems providing environmental services and of course biodiversity are protected; since we participate in the web of life. Next comes a society with an improving *quality* of life – since it cannot be a society of more and more it will be a society of Better and Better – and fairer. To provide for that development, within the limits of the ecosphere is the economy – with the economy as a means of servicing human needs rather than people and resources servicing the economy. This would mean redesigning almost every aspect of human life, such is the upside down nature of the current situation where economy is dominant. (Webster, 2004, p.40)

This conceptual shift, where the economy serves a society built on social justice and ecological integrity, recognizes the interdependent relationship between society and the environment. This is supported by Tilbury and Wortman (2004) who note that the idea of sustainability has notions of intergenerational equity, ecological sustainability, and fair distribution of wealth and access to resources. In promoting the United Nations' declaration that 2005-2014 is the Decade of Education for Sustainable Development (ESD), Tilbury and Wortman (2004) emphasize learning for change: motivating, equipping, and involving people in making informed decisions. As such, ESD promotes an integrated assessment of economic goals, social needs, and ecological responsibility. It focuses on the future and our ability to create a sustainable future emphasizing: participatory citizen action that influences structural change; critical reflection; systemic thinking; values clarification approaches; and changing mental models that influence decisions and actions.

In seeing the need to develop holistic/ systemic thinking WWF-Scotland produced a series of educational materials called Linking Thinking (Sterling et al, 2005). These materials develop holistic thinking skills by teaching people to think and approach issues systemically rather than through analytical, reductionist thinking that understands things by taking them apart.

With this emphasis on holistic, systemic thinking in education for sustainability one questions whether schools can respond to the educational challenge. Not surprisingly, as well intentioned as environmental education or education for sustainability is, there is a gap between what is anticipated through policy documents and curriculum guidelines, and the reality in schools. Palmer (1998) looks at the rhetoric-reality gap in the educational practice in environmental education. She references a number of authors (Esland, 1971; Stevenson, 1987; Robottom, 1983; and Tanner, 1974) who believe the introduction of environmental education into a school curriculum represents a fundamental challenge to the dominant conception, organization and transmission of knowledge in schools. Whereas, environmental education focuses on action-oriented goals to transform the values that underlie our decision-making, the traditional purpose of schools is to conserve the existing social order reproducing the norms and values of the status quo (Tanner, 1974).

Palmer (1998) also notes fundamental curriculum and pedagogical contradictions between environmental education and schooling. Environmental education in the 1970s

through to the 1990s suggested students engage individually or in groups in problem

solving, action-based activities (UNESCO, 1975, 1977; Munro, 1991) calling for

interdisciplinary and flexible inquiry. In contrast school curricula tended to be discipline-

based and emphasize abstract theoretical problems (Palmer, 1998; Goodlad, 1984; Sizer,

1984). Stevenson (1987) was quite outspoken on the differences between environmental

education objectives and school curricula:

> While environmental education advocates learning that is holistic
> and co-operative, school learning tends to be atomistic and
> individual. In environmental education rhetoric students are active
> thinkers and generators of knowledge, but in schools students are
> usually in the passive position of spectators and recipients of other
> people's knowledge and thinking (Stevenson, 1987, p.75/76).

Palmer (1998, p. 100) furthers this difference in relation to teaching in noting:

> Teaching, according to ecological theories of perception, focuses on
> promoting inter-relationships between learners and the environment,
> rather than on imparting knowledge in traditional teacher-learner
> hierarchical relationship.

John Miller (in Greig et al, 1989) identified three basic positions of curriculum and

instruction: transmission, transaction and transformation that indicate underlying values

and assumptions of the teacher. Miller identifies transmission with a mechanistic

worldview and a traditional maintenance of the status quo; transaction with a pragmatic

worldview that relies on science and technology to solve the problems of the planet through deliberate intervention by some individuals for the good of others; and transformation with an ecological worldview based on holism where change is seen as inevitable and natural and social improvement comes about through dismantling the human-made barriers to change. Sterling (2001) used Miller's work to identify various aspects of teaching and learning with a mechanistic or ecological view of education (Appendix 3).

Referencing Gough (1987), Palmer (1998, p. 100) summarizes, "A major shift towards an ecological paradigm involves rethinking all of education – not merely environmental education- according to an ecological worldview". Accordingly, Sterling recommends reformation and transformation of the educational system itself at the micro-level of schools and at the macro-level of policy development and implementation (Barraza et al, 2003).

An Ecological Curriculum Model: The Green School

 In 1996, Liza Ireland founded The Green School, in Aberdeenshire Scotland, as a grass-roots effort to develop a new educational approach based on holistic, ecological philosophy (Elrick, 1997). With an aim to promote education for sustainability the school addressed all three levels of educational change identified by Sterling (2001). A visual representation of the school's approach (Appendix 1) uses a tree metaphor. The roots of this approach are the holistic, ecological paradigm, while recognition of intrinsic

value flows through its core. Holism and dynamic concepts of sustainability and iterative change give the trunk stability while allowing for growth.

The management structure involved students, teachers, and the community in human scale, egalitarian, ecological relationships rather than a centralized hierarchical system. Teaching incorporated a variety of roles and multi-sensory approaches and learning occurred in direct involvement with the natural world as well as social and environmental connections. As such, learning took place in appropriate places, in various contexts and with mutual responsibility.

The curriculum model provided a basis for developing ecological intelligence and understanding the ecological principles that inform how the world as a system functions. It also encourages rethinking social systems so as to develop a more ecologically sustainable society. Moreover, it did this by integrating this ecological core into all aspects of learning: concepts, knowledge, attitudes, values and skills. In turn, the model recognizes the fruits of the knowledge gained should in turn nourish the roots, leading to further developments and ultimately, wisdom.

The Gaia Model of Curriculum Development (Appendix 2) illustrates how learning is developed based on interdisciplinary projects rather than on separate subject disciplines thereby encouraging a more holistic perspective. Looking at how people, plants, animals, elements and time are interdependent and relate to that topic develops learning and a holistic, ecological perspective. Bringing in ecological principles of interdependence,

change, diversity, community, cycling and energy flows into each topic; incorporating intergenerational knowledge; and learning through immersion in the natural world encourages ecological intelligence. By learning in the context of environmental sustainability, with true integrative teaching and learning that incorporates the right and left brain intuitive/rational; emotional; creative aspects; and an integration of thoughts and subjects, students become ecologically literate.

The value of Palmer's, Orr's, Bowers', Webster's, and Ireland's work is in their insistence on the need to take a profoundly deeper, all encompassing approach to education for an ecologically sustainable society. They argue we need to get beyond the piecemeal approach to education with its powerful hidden curriculum as well as the narrowly focused approaches in both outdoor and environmental education that are typically couched in the metaphors of the technocratic, mechanistic paradigm.

Empowerment

Rowe (2006, p.3) describes the ecological responsibility of the self as an interacting ecological part of the enveloping Earth-system,

> Every living organism is autonomous to a degree, free to be itself and to do its own thing with one important limitation; namely, the responsibility to maintain the integrity of the whole of which it is a part. This is the overriding duty of cell to tissue, of tissue to organ, of organ to body, and of human body to Earth.

A review of the literature shows a common thread throughout environmental education and education for sustainability is empowerment leading to action (UNESCO, 1975, 1977; Munro, 1991; Rauch, 2002; Fontes, 2004; Tilbury and Wortman, 2004; Bell, 2005). Bell (2005, p.56) notes that, "Environmental learning is practical, action-oriented learning. If it doesn't result in action, it is ineffective or incomplete learning." This is an important aspect of education for sustainability for as Cross (1998) discovered, teachers are recognizing the problem of countering "learned helplessness" among those being taught.

Bonnett (2002) described two main educational approaches to sustainability and questions their effectiveness given the instrumental nature of Western rationality and its adequacy to understand and address environmental issues. The 'environmentalist' approach sees education as a vehicle for actively promoting positive attitudes and patterns of behaviour that reflect the requirements of sustainable development. "It pre-specifies generalized tangible outcomes to be achieved by schools, assuming a systematic action policy developed by those who 'know' and imposed on those who don't…'Sustainable development' rapidly converges with 'common sense' and an instrumental rationality determines the means for achieving a set of taken-for-granted ends" (ibid, p. 10).

In contrast, the 'action competence' approach encourages ongoing pupil exploration and engagement with environmental issues in which the promptings of their own rationality are followed. It is not the role of education to inculcate pre-established environmental

policy, code, or curriculum content (Rauch, 2002; Bonnett, 2002). Bonnett (2002, p.10) questions, "But in a society increasingly dominated by powerful exploitive and consumerist motives, is 'pure' rationality either possible or up to the job…?". Bonnett (2002) also points out there are significant non-rational aspects to environmental issues such as empathy, identification and a broader spiritual dimension. Webster (2004) also questions the effectiveness of this 'do-it-yourself' approach in relation to the 'Eco-schools' programs seeing it narrowly focusing on personal commitment and action rather than moving beyond to levels of systemic change.

Bell's five 'moments' in environmental sense-making and action provide a helpful framework. Bell (2005) describes the first moment as one's conceptual basis and the second as knowledge about the environment and environmental decision-making. The third moment, knowing how to respond, is practical knowledge that includes ethical or moral knowledge of how we should respond to environmental issues as well as the ability to assess the relative merits of different means-ends strategies. The fourth moment, responding appropriately, is an affective or motivational stage that includes having the appropriate values and motives leading to the fifth moment of action.

Bell (2005) critiques the information deficit model of environmental learning that assumes if people are provided with new knowledge about the environment (second moment), they will automatically become more environmentally concerned (fourth moment) and their behaviour will change (fifth moment). Kolmuss & Agyeman (2002) also reject this idea. Bell argues the third, fourth and fifth moments are independent and

that first moment – conceptual progress – can't be ignored. "It is conceptual metaphors that are the most important because they play a key role in framing how we think about and respond to the environment" (Bell, 2005, p. 54).

Metaphors

Metaphors are indicative of our thoughts, perceptions and therefore, influential in our actions. Lakoff and Johnson (1980) have found that the metaphors we use in language are linguistic examples of our conceptual systems and that our conceptual systems are primarily metaphorical in nature. They found these metaphors are highly significant for:

> In all aspects of life…we define our reality in terms of metaphors and then proceed to act on the basis of the metaphors. We draw inferences, set goals, make commitments and execute plans, all on the basis of how we in part structure our experience, consciously and unconsciously, by means of metaphor (Lakoff and Johnson, 1980, p. 158).

The role of metaphors cannot be overstated. The metaphors that are prominent in education will influence the perceptions, thoughts and actions of the next generation. Martinez et al (2001) have shown that in education practitioners are unconsciously guided by images and metaphorical patterns of thought recurring in their field, which can be seen as "archetypes" of professional knowledge or from a merely functional point of view as blueprints of professional thinking. Phillips (1996) notes that while a particular

metaphor enables us to see a phenomenon from a specific point of view, it may disincline us to search for what may be more adequate or more promising perspectives. This is important as schools are often seen as vehicles for social change. Phillips (1996, p. 1011) warns that we may be "insulated from ideas coming from outside" and "can easily get sucked into this self-sustaining whirlpool" of thinking guided by metaphors—as long as we are unable or do not try to get access to our metaphors.

Lakoff (2005) argues if metaphors are changed, thinking will change; if thinking is changed, actions will change. With his five stages of environmental sense-making and action (conceptualizing, knowing about, knowing how to respond, responding and acting), Bell (2005) concurs arguing our conceptual metaphors are significant in influencing what we know, our environmental values, how we respond and act. Hence, "A significant part of learning in the first and third moments of environmental sense-making may involve acquiring new conceptual metaphors through which we can see the environment and our right relationship to it." (Bell, 2005, p. 60)

Jickling (2001) also recognized there are issues surrounding metaphors, revealed through our language. "If we persistently refer to the environment as a 'resource' then we are implicitly reinforcing a human-centred perspective, a condition at odds with the emergence of new and more inclusive ethics (Jickling, 2001, p. 185). Bechta (1998) considered curriculum links with Nature-as-a-Resource metaphor. She found:

> Most of today's environmental education is about conservation and building a harmony between nature and humans. What are we conserving for? If nature is seen as a resource, one can only assume that the goal of conservation is to ensure future use of the resource: nature. Is this the goal of environmental education? There is a range of environmental education curriculum guides out there that show students through activities how to observe, reduce, and quantify nature to get a better understanding of how it works. The doctrine being espoused in these guides is that students will gain an appreciation of nature because they have achieved an understanding of it. In many circles environmental educators believe an appreciation of nature is what makes people become conscious conservationists. But, these activities simply teach a way of seeing, not understanding. (Bechta, 1998, p. 4)

Bell (2005), Lakoff (2002), Jickling (2004), Bowers (2001) and Bechta (1998) have all argued that our taken-for-granted metaphors influence our environmental sense-making. Recognizing the role of metaphors as essential mechanisms of the mind (Lakoff, 1999), Bell (2005, p. 60), speaking of metaphors as 'pictures' argues, "Environmental learning might occur when we improve the quality or resolution of some of our pictures, add new pictures or remove old distorted pictures."

Focusing on the economic aspect of sustainable development, the importance of metaphors has become recognized and new economic metaphors to replace 'Nature as Resource' are being proposed and reviewed. A collaborative research project, 'Natural Capital: Metaphor, Learning and Human Behaviour' was led by members of the Institute for Environment, Philosophy and Public Policy at Lancaster University and the Centre for Research in Education and the Environment at the University of Bath (Reid, 2005). This study undertook extensive work to determine how metaphors imbedded in Natural

Capitalism influence economic and educational thought and practices in promoting

sustainable development. As Reid (2005, p. 5) described:

> A distinctive feature of this discussion is the prominence given to the
> role of metaphors and metaphorical thinking in both areas, and the
> transactions and disruptions that take place therein when confronting
> sustainable development.

It has been suggested that the 'Nature as Natural Capital' metaphor is more appropriate

than the 'Nature as Resource' metaphor. Rather than seeing nature is there to be used,

the Capital metaphor suggests we should maintain nature's capital value into the future

(Bell, 2005).

Gough (2002) extends the Natural Capital metaphor arguing a 'Real Options' metaphor is

more appropriate as it incorporates uncertainty about future possibilities, seeking to value

the options implicit in the environment over time. Bell (2005, p.53) concurs but argues,

"…the role of metaphor in environmental learning suggests that we need to look beyond

economic metaphors to improve our understanding of the environment-human

relationship."

McDonough and Braungart (2002) and Benyus (1997) are challenging the linear

metaphors of the mechanistic mindset by advocating the implementation of new

conceptual metaphors based on ecological systems thinking. Through 'biomimicry' -

innovation inspired by nature (Benyus, 1997), McDonough and Braungart emphasize metaphors modelled on nature such as 'waste = food' to encourage innovation and redesigning industry with closed loops or 'cradle-to-cradle' rather than linear 'cradle-to-grave' characteristics. These pioneers in ecological thinking are showing how conceptual metaphors are essential in the transformation to an ecologically sustainable society.

The Draft Implementation Scheme for the United Nations Decade of Education for Sustainable Development 2005-2014 identifies education as the primary agent of transformation towards sustainable development (Tilbury and Wortman, 2004). Given the influential role of conceptual metaphors (Bell, 2005; Lakoff, 2005; Jickling, 2004; Bowers, 2001), as well as the recognition that education for sustainability involves re-conceptualizing the relationships between the economy, society and environment (Webster, 2004; Tilbury and Wortman, 2004; Betcha, 1998) the research challenges us to look at the metaphorical frameworks underlying pioneering practices in education for sustainability. Such an analysis can help guide future educational initiatives that seek to encourage transformation towards sustainability.

Part Two - Methodology
Chapter 4 – Research Focus

4.1 Assumption

Based on the Literature Search it is assumed that learning is affected by conceptual metaphors.

4.2 Research Questions

Sauvé and Berryman (2003, p. 172) note, "There are few research reports which seek to understand why a program works or not, and there is generally no critical questioning of the ideological and theoretical foundations of the whole enterprise." Taking this into account with the concern for cultural and conceptual metaphors, and recommendations on changing the substance and process, the structure, the architecture and the purposes of education detailed in the Literature Search, this research will address the following questions:

 1/ What are currently thought to be the influential conceptual metaphors involved in executing a viable curriculum for education for sustainability?

2/ To what extent does the use of specific metaphors in the context of philosophy, policy formation, organization/management, curriculum development and teaching and learning practice within select elementary schools hinder and promote education for sustainability?

3/ What do the teachers, administrators, students and parents perceive to be the successes, obstacles, and needs in developing models of good practice in education for sustainability?

4.3 Specific Objectives

1 To identify what theorists argue to be influential cultural metaphors that hinder or support education for sustainability and use this theoretical framework to shed light on current practices.

2 To identify the educational ideals and philosophies promoted by government, directors of education, administrators, teachers, in selected elementary schools, and then compare these to a mechanistic/ecological template.

3 To analyse administrative and management structures and distribution of power between various stakeholders (directors, administrator, teachers, parents, students) in selected elementary schools.

4 To analyse curriculum design (including evaluation and assessment) in selected elementary schools against a template of mechanistic and ecological principles.

5 To determine the extent of community involvement in learning.

6 To document the extent to which buildings and grounds are ecologically managed, exemplify ecologically sustainable energy and resource use, and are linked to the educational curriculum and experience.

7 To analyse teaching and learning in terms of the mechanistic/ ecological template.

8 To analyze unit plans; lesson plans; teaching materials/activities in terms of the mechanistic/ ecological template and in terms of promoting environmental sustainability by developing ecological intelligence: developing an environmentally sustainable land ethic; biophilia or love of the land; ecological principles (interdependence, change, cycling, energy flows, community, diversity); slow, intergenerational knowledge; critical thinking; immersing experiences; and empowerment.

9 To evaluate where teaching occurs as to whether it promotes or hinders environmental sustainability and ecological intelligence.

10 To identify the perceptions of administrators, teachers, parents and students regarding the successes, obstacles, and needs in developing models of good practice in education for sustainability.

Chapter 5 - Research Design and Methodology

5.1 Qualitative Research Design

The methodology involved two distinct elements which complement each other to provide insight into developing education for sustainability**:** an extensive literature review which will identify a *theoretical framework* for promoting education for sustainability; and case studies of elementary schools pioneering programs in education for sustainability (assessing documentary evidence, gathering observational data of buildings, grounds and teaching, and conducting interviews with key informants and focus groups with involved students). Considerable emphasis was placed on the successes, obstacles and needs of the programs from the point of view of each of the groups involved in the experience (administrators, teachers, support staff, volunteers, parents and students). In the absence of concrete studies these methods provided a firm basis for determining the relevance of the theoretical framework espoused in the literature (Appendix 3), as well as providing information about recent pioneering efforts in relation to an ecological/ mechanistic template representative of this framework. From this data it is hoped numerous insights can be gained from the experiences of the schools studied.

The qualitative research design is consistent with and reflects holistic philosophy, a central tenet of the research topic. Janesick (1994) believes this qualitative approach is necessary as quantitative research stems from mechanistic philosophy (Denzin, 2000). Sherman and Welb (1988) recognize that qualitative researchers are interested in understanding the meaning people have constructed. "In contrast to quantitative research, which takes apart a phenomenon to examine component parts (which become the

variables of the study), qualitative research can reveal how all the parts work together to form a whole." (Sherman and Welb, 1988, p.6).

Merriam (1998) notes that qualitative research is based on the phenomenological paradigm, which uses a variety of interpretive research methodologies. Lincoln and Guba (1985) refer to this type of research as naturalistic inquiry. Merriam (1988) identifies six aspects of qualitative research which apply to this study: it is descriptive; it involves fieldwork; it is "concerned primarily with process rather than outcomes or products" (Merriam, 1988, p.19); it is inductive in that researchers build abstractions, concepts, theory and hypotheses from details; the "researcher is the primary instrument for data collection and analysis"; and it is primarily "interested in meaning – how people make sense of their lives, experiences, and their structures of the world" (ibid, p.19).

5.2 Methodological Considerations

Given the qualitative nature of the research a number of research methodologies were considered. As the literature search revealed socially critical research in education for sustainability tended to be anthropocentric and failed to develop a holistic perspective (Bowers, 2002) this approach was discounted. Participatory Action Research focusing on the participant as the researcher (Robottom, 2005) was also discounted, as the researcher was not personally involved in teaching in a pioneering school at the time of the study. Grounded research was also considered but as this method relies solely on generating theory grounded in and revealed from the data (Strauss and Corbin, 2000), it was considered inappropriate. Given the interest in investigating the significant amount of

theory that suggests the need for an ecologically-based, holistic educational approach and that innovations may be hindered by taken-for-granted mechanistic metaphors it was felt a case study methodology would be more flexible and inclusive. In support of this Stevenson (2004, p. 50) argues, "…any descriptively and theoretically rich case that addresses practices related to education and sustainability may help explicate some tacit understandings about such practices, reframe existing understandings or offer new possibilities for understanding or action."

5.3 Case Study

As Merriam (1988, p.19) asserts, "A case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation." As the research questions consider process, context, and discovery within pioneering educational programs, case study methodology seems to be particularly relevant. In considering the variety of influences that affect student learning, what Stake (2000) refers to, as a collective case study, jointly studying a number of cases in order to investigate a phenomenon, was used. In support of this, Merriam (1988, p.2) states, "Case study research, and in particular qualitative case study, is an ideal design for understanding and interpreting observations of educational phenomena". It is "an intensive, holistic description and analysis of a single instance, phenomenon, or social unit." (ibid, p.27).

Yin (1994) notes that case study is a design particularly suited to situations in which it is impossible to separate the phenomenon's variables from their context. Merriam (1998, p.41) concurs arguing,

> The case study offers a means of investigating complex social units consisting of multiple variables of potential importance in understanding the phenomenon…Case study has proven particularly useful for studying educational innovations, for evaluating programs, and for informing policy.

Cohen, Louis and Manion (1994) also recognize a number of advantages of case study research. They note case study data is strong in reality providing a 'natural' basis for generalization. "Their particular strength lies in their attention to the subtlety and complexity of the case in its own right." (Cohen et al, 1994, p. 123). As such, case studies recognize the complexity and 'embeddedness' of social truths. They also assert that case studies are a 'step to action' as their insights may be directly interpreted and put to use as they allow readers to judge the implications of a study for themselves.

As this study describes innovative educational programs and compares them to a theoretical template or framework, designed to promote a holistic, ecological approach that is said to encourage sustainability, the collective case study is both descriptive and interpretive. Merriam (1998) acknowledges that innovative programs and practices are often the focus of descriptive case studies in education. As such, they present detailed accounts of a phenomenon. With interpretive case studies descriptive data is used to

develop conceptual categories or to illustrate, support, or challenge theoretical

assumptions held prior to data gathering (Merriam, 1998). This is supported by Yin

(1994) in discussing generalizing from case study to theory. He notes that in multiple

cases the method of generalization is 'analytic generalization,' in which a previously

developed theory is used as a template with which to compare the empirical results of the

case study. He further contends that if two or more cases are shown to support the same

theory, replication may be claimed. Merriam (1998, p. 38/39) notes that during

interpretive case studies,

> A case study researcher gathers as much information about the
> problem as possible with the intent of analysing, interpreting, or
> theorizing about the phenomenon…The level of abstraction and
> conceptualization in interpretive case studies may range from
> suggesting relationships among variables to constructing theory.
> The model of analysis is inductive.

Gall, Borg and Gall (1996) and Stevenson (2004) also recognize that case study

researchers maintain their own perspectives as investigators, providing the etic

perspective, helping them make conceptual and theoretical sense of the case.

Stevenson (2004) and Gall, Borg and Gall (1996) also stress that one of the goals of case

study research is to understand a complex phenomenon as experienced by its participants

– the emic perspective. This, they suggest, is typically obtained through direct

observation of the participants as they behave naturally in the field; through formal

conversations that bring out the reflective and analytical thoughts of the participants; and the researcher's interpretation and analysis of these explanations and actions. Accordingly, Research Question Three is specifically designed to bring out the interpretive aspect, and focus on, "…the unique understandings and experiences of the individuals involved." (Stevenson, 2004, p. 43)

In addition to propositional knowledge, experiential knowledge can be learned from case reports (Stake, 2000). Through clear, rich descriptions readers can learn or discover independently what the researcher may not have highlighted or deemed important (Stevenson, 2004).

There are, however, a number of limitations of case study research that need to be kept in mind. Merriam (1998) recognizes four potential limitations. Firstly, considerable time is needed to achieve thick rich description and analysis of a phenomenon. Also, case studies can oversimplify and exaggerate a situation, potentially misleading readers. For this reason it is important to keep in mind the case study represents a part of a greater whole. Thirdly, case studies are limited by the sensitivity and integrity of the investigator, as the researcher is the primary instrument of data collection and analysis. Triangulation and thick description in this research study is intended to help minimize these effects. Merriam (1998) addresses this issue by quoting Guba and Lincoln:

> The good qualitative researcher "looks and listens everywhere". It is
> only by listening "to many individuals and to many points of view

that value-resonant social contexts can be fully, equitably, and honourably represented." (Merriam, 1998, p.23)

5.4 Theoretical Influences

Within the qualitative case study approach, a variety of theoretical traditions influenced the variety of methods that were used. Drawing on diverse disciplinary roots, phenomenology; ethnomethodology; ecological psychology; systems theory; and hermeneutics inform the study demonstrating how the holistic approach of the collective case study incorporates a variety of methods and perspectives. Systems theory reinforces holistic philosophy by considering how and why systems function as a whole; ecological psychology looks at how individuals attempt to accomplish their goals through specific behaviours in specific environments. Hermeneutics ask: what are the conditions under which a human act took place or a product was produced that makes it possible to interpret its meanings. Ethnomethodology looks at how people make sense of their everyday activities or their environment, in the case of situational ethnomethodologists, so as to behave in socially acceptable ways; and phenomenology questions the structure and essence of experience of the phenomenon for those people (Patton, 1990; Cohen and Manion, 1994).

Incorporating the perspectives of each tradition is extremely important if one is to gain a holistic perspective. This is achieved by considering the individuals involved, their perspectives and insights as well as the contextual influences of their environment. In systems theory, the emphasis is on understanding the actions of parts in relationship to

the unit as a whole. Graue and Walsh (1998, p. 47) recognize the influence of context and its relevance to this study in stating, "A primary purpose of a system is to regulate the activity of its subordinate units with respect to a particular goal or function. Thus, a classroom constrains the actions of teachers and students with respect to the goals of the school." In this study Research Question Two seeks to address these considerations while Question Three investigates the perspectives and experiences of the individuals involved.

Ethnomethodology

In studying education in the case study schools, ethnomethodology offers an important perspective for as Sacks states, ethnomethodology "seeks to describe methods persons use in doing social life" (in Silverman, 2001, p. 21). As this research seeks to reveal the taken-for-granted cultural metaphors that influence education, this approach seems particularly appropriate. As Gubrium et al (1997, p.8) note, "One must keep in mind … that ethnomethodology wants to make the taken-for-granted into the research problem."

Bowers (1995) stresses that the taken-for-granted cultural metaphors influence how people perceive reality. In researching how elementary education and teaching may be contributing to maintaining a mechanistic paradigm rather that developing an ecological one, using an ethnomethodological approach is supported by Gubrium et al (1997, p. 40) in stating:

> …ethnomethodology's topic becomes member's practical procedures for creating, sustaining, and managing a sense of objective reality…ethnomethodology's emphasis is decidedly social, holding that members accomplish the world of "social facts" through visibly public, interactional, interpretive work.

This emphasizes the context people develop and are influenced by. Gubrium and Holstein in Denzin and Lincoln (2000, p. 491) note that ethnomethodologists see all actions and objects depend upon context: "It is through contextualization that practical meaning is derived. Second, the circumstances that provide meaningful contexts are themselves self-generating." This is quite significant to this research given one of the case study schools involved in this research is trying to teach and model an innovative approach in a traditional setting.

However, a purely ethnomethodological study was not used, as this research did not incorporate a sustained period of observation or the empirical methods of conversation analysis. Nor did it involve consciously disrupting or questioning the taken-for-granted elements in everyday situations in order to reveal the underlying processes at work. Rather, ethnomethodology has provided another perspective so as to achieve a more holistic consideration of the factors contributing to the experiences of each case study school.

Philosophical Hermeneutics

Philosophical hermeneutics also adds a valuable perspective, moving beyond phenomenology and ethnomethodology in rejecting the view that an interpreter must

strive to get rid of or manage inherited bias or prejudice in order to come to a clear

understanding. While acknowledging the phenomenological roots of interpretive inquiry,

it is important to recognize its limitations. Cohen and Manion (1994, p. 30) write that,

> Husserl, regarded by many as the founder of phenomenology, emphasized the need to 'put the world in brackets' or free ourselves from our usual ways of perceiving the world, …freeing ourselves from all preconceptions about the world.

Schwandt (2000) questions our need and ability to bracket the world and free ourselves

from all bias by quoting Gallagher (1992, p.87), "tradition is 'a living force that enters

into all understanding'" (Schwandt, 2000, p. 194). Philosophical hermeneutics has a non-

objectivist view, believing meaning is not necessarily constructed but it is negotiated

mutually in the act of interpretation. It is not simply discovered (Schwandt, 2000). As

Sammel (2003) notes, "Within this hermeneutic phenomenology paradigm, the researcher

takes on the role of co-learner and seeks to be educated by the people involved in the

study (p. 161)…hermeneutic phenomenology provides an important frame for

environmental education as it seeks to hear the narratives of teacher's practices and

understandings (p. 166)"

Constructivist Interpretation

Le Compte and Preissle (1993, p. 92 and p. 23) recognize this subjective aspect by

supporting a more constructivist interpretation in stating that qualitative research:

is distinguished partly by its admission of the subjective perception and biases of both participants and researcher into the research frame (p. 92)…The research, thus, brings a construction of reality to the research situation, which interacts with other people's constructions or interpretations of the phenomenon being studied. The final product of this type of study is yet another interpretation by the researcher of other's views filtered through his or her own. (p.23)

The danger of moving into a purely relativistic position with constructionism has been

recognized by Schwandt (2000) in noting that "many (but not all) constructionist

accounts hold that there is no truth to the matter of interpretation" (p. 198). Philosophical

hermeneutics on the other hand, trusts in the potential of language (conversation,

dialogue) to disclose meaning and truth. Schwandt (2000, p. 198) notes,

For both Gadamer and Taylor, there is a "truth to the matter" of interpretation, but it is conceived in terms of disclosure that transpires in actual interpretive practices "rather than as a relation of correspondence Between an object and some external means of representation" as conceived in traditional epistemology (Smith, 1997, p.22).

Chapter 6 – Methods of Data Collection

In light of the research questions that consider philosophy; written materials; management and school structure; teaching and learning, the approach of the collective case study employed a number of methods of data collection. Believing in the potential of language to disclose meaning and truth, this research will incorporate extensive interviews as well as other methods of direct observation, thick description and document analysis so as to provide information on contextual influences as well as participant perspectives. Patton (1990) supports these approaches in summarizing that qualitative methods consist of three kinds of data collection: in-depth, open-ended interviews; direct observation; and written documents. He points out:

> Multiple sources of information are sought and used because no single source of information can be trusted to provide a comprehensive perspective…By using a combination of observations, interviewing and document analysis, the fieldworker is able to use different data sources to validate and cross-check findings (p.244) (quoted in Merriam, 1998, p. 137).

Merriam (1998, p. 118) notes that this process is very interactive and holistic:

> You observe something on-site that you then ask about in an interview; or something may come to your attention in a document that manifests itself in an observation and perhaps informal conversation in the context of the observation.

The case study, therefore, included interviews, document analysis and observations.

6.1 Interviewing

Merriam (1998) notes that as we cannot observe feelings, thoughts, intentions, previous behaviours, situations that preclude the presence of an observer or how people organize the world and the meanings they attach to what goes on in the world, we need to ask people questions about those things. Patton (1990) supports this in determining that the purpose of interviewing is to allow us to enter into the other person's perspective. Cohen and Manion (1994) support these advantages of interviewing as it allows for greater depth than is the case with other methods of data collection. Accordingly, interviews included:

- Interviews with directors (if possible), administrators, teachers, parents and community volunteers regarding philosophy, management/organization, management of buildings/ grounds, teaching and learning, community involvement and perceptions about the development of an environmentally sustainable program.

- Small group discussions with students regarding environmental consciousness, management/organization of the school, management of buildings/ grounds, teaching and learning, community involvement and perceptions about the development of an environmentally sustainable program.

Bogdan and Biklen (1998) note that in keeping with the qualitative tradition of attempting to capture the subject's own words and letting the analysis emerge, interview schedules

and observation guides generally allow for open-ended responses and are flexible enough

for the observer to note and collect data on unexpected dimensions of the topic. Patton

(1990, p.288-289) has summarized the strengths of using an interview guide:

> The outline increases the comprehensiveness of the data and makes
> data collection somewhat systematic for each respondent. Logical
> gaps in data can be anticipated and closed. Interviews remain fairly
> conversational and situational.

In designing the interview schedules care was taken to garner information directly related

to the research questions and objectives. Questions were designed to move the

respondent from general to specific with a mixture of open-ended and specific questions.

The interview schedules were informed by the Specific Objectives (4.3), as well as the

theoretical framework, including the elements of ecological literacy identified by

Research Question One via the literature search.

While questions relating to Research Question Two focus on the ecological theoretical

framework, those relating to Research Question Three are very open-ended in keeping

with the constructivist perspectives that emphasize the importance of respondents'

experiences and learning how they construct knowledge. Open-ended questions supply a

frame of reference for respondent's answers with a minimum amount of restraint (Cohen

and Manion, 1994). Cohen and Manion (1994, p.277) note that open-ended questions

have a number of advantages:

>They are flexible; they allow the interviewer to probe so that she may go into more depth if she chooses, or to clear up any misunderstandings; they enable the interviewer to test limits of the respondent's knowledge; they encourage co-operation and help establish rapport; and they allow the interviewer to make a truer assessment of what the respondent really believes. Open-ended questions can also result in unexpected or unanticipated answers which may suggest hitherto unthought-of relationships or hypotheses.

However, Patton (1990) realizes that in using an interview guide, important and salient topics may be inadvertently omitted. This concern was addressed in the pilot study by testing and adjusting the interview guides with administrators, teachers, parents and students. The revised schedules used with the actual case study schools are in Appendix 5.

Having interview schedules also allowed the researcher to compare and contrast responses between and across groups. Krueger and Casey (2000) note that it is in comparison and contrast that themes and patterns emerge from the data. They also note that consistent questions also allow for theoretical saturation to emerge. Tuckman (1999) recognizes that the interview schedule will also maximize neutrality of the study's methods and the consistency of its findings.

As this study incorporates interviews with administrators, teachers, parents and students a variety of interview techniques were used. With administrators, teachers and some

parents, face-to-face, one on one interviews were conducted. This allowed information

not directly observable to be gathered (Merriam, 1998). Although Creswell (1998) sees

this indirect information that is filtered through the views of the interviewees, as a

limitation, this study recognizes these diverse perspectives as valuable data that bring to

light how various individuals may vary in their philosophies and how they may have

experienced and viewed the pioneering projects differently. Rubin and Rubin (1995, p.9)

support this further in stating,

> Qualitative interviewers understand that one person's experiences
> are not intrinsically more true than another's. If the interviewer
> discovers four different versions of the same event, it doesn't
> necessarily mean that one of the interviewees is right and the other
> three are wrong. They may all be right, reflecting different
> perspectives on what happened or observations of different parts of
> an event.

The interviews were focused interviews. These closely followed the principle of non-

direction but introduced more observer control in the kinds of questions used and sought

to limit the discussion to certain parts of the respondent's experience. The distinctive

feature of the focused interview is the prior analysis by the researcher of the situation in

which subjects have been involved (Cohen and Manion, 1994).

Cohen and Manion (1994, p. 292) reference Merton and Kendall's set of criteria to

distinguish productive and unproductive interview data:

1. Non-direction interviewer guidance should be minimal.

2. Specificity: respondents' definitions of the situation should find full and specific expression.

3. Range: the interview should maximize the range of evocative stimuli and responses reported by the subject.

4. Depth and personal context: the interview should bring out the affective and value-laden implications of the subjects' responses, to determine whether the experience had central or peripheral significance. It should elicit the relevant personal context, the idiosyncratic associations, beliefs and ideas.

The relevancy of the evaluative function of interviews to this research is particularly evident in criteria number four above and relates directly to Research Question Three. Silverman (2001, p. 112) supports this use of the interview purpose in stating, "…we need not hear interview responses simply as true or false *reports* on reality. Instead, we can treat such responses as *displays* of perspectives and moral forms.". Rubin and Rubin (1995) note that interviewers should encourage people to elaborate, provide incidents and clarifications, and discuss events at length. The depth, detail and richness we seek in interviews are what they refer to as thick description. This enables the researcher to learn in depth and detail how those involved view the successes and failures of a program or project.

Although face-to-face interviews were used with administrators, teachers and some parents, telephone interviews were used with a number of parents and one Director, as they were unavailable during school hours or during site visits. Rubin and Rubin (1995,

p. 141) recognize that, "It is much more difficult to interview someone over the phone when you do not have a relationship but sometimes it is necessary." This limitation of needing to interview parents by telephone due to time constraints was accepted as parents had important perspectives to incorporate. In the case of Discovery Bay, an extremely influential Director was not available in person during the field study. Although these interviews lack the personal connection and feedback face-to-face interviews offer, a lack of relationship was minimized through previous contact with the school. All parents (and the Director at Discovery Bay) who were interviewed this way were very familiar with the study as the researcher had already visits had already been made to the school and community interviewing teachers and students. In all cases the respondents interviewed by telephone were anxious to share their thoughts and perspectives.

Telephone interviews were advantageous in a number of ways. Marks et al (2003) note an advantage of telephone interview is they allowed interviewees to be interviewed from the comfort of their homes at a time most convenient to them without the visible intrusion of an interviewer and tape recorder. They suggest parents interviewed in this way, "…may well have been at their 'freest' to speak." (Marks et al, 2003, p.349). Dillman (1978) note that the use of telephone interviews allows for good reliability and validity of data, as well as saving time and money.

Prior to each interview, convenient times were established and general conversation helped to put the respondents at ease. Verbal acknowledgement and encouragement was

given throughout the interview in recognition that conventional visual cues such as smiling or nodding ones head was not possible (Rubin and Rubin, 1995).

Thirdly, small focus group interviews were conducted with students, and in one case with two students and their parents, as this was most convenient for the family. This family interview went extremely well with the parents each offering different perspectives and expressing their own views while honouring their children to have their own perspectives that were respected as equally valid. These particular children did not hesitate to express their own opinions even when they disagreed with their parents.

The majority of students were interviewed in groups of six to eight students. This encouraged them to be more relaxed with their friends; help each other with their answers; as well as keep each other on track and truthful (Graue and Walsh, 1998). Interview groups ranged from specific groups such as the Student Advisory group to mixed students from each class involved in the pioneering project. Krueger and Casey (2000) support this approach as the research was:

- looking for the range of ideas or feelings that people have about the program;
- trying to understand differences in perspectives between groups or categories of people (administrators, teachers, parents, and students);
- interested in uncovering factors that influence opinions, behaviour, or motivation; and

- wanting ideas to emerge from the group as a group possesses the capacity to become more than the sum of its parts.

Rubin and Rubin (1995, p. 140) note:

> In focus groups, the goal is to let people spark off one another, suggesting dimensions and nuances of the original problem that any one individual might not have thought of. Sometimes a totally different understanding of a problem emerges from the group discussion.

As such the focus group interviews allow the group to discuss shared impressions, revealing how students experienced the program.

Krueger and Casey (2000) note that the role of the moderator is to ask questions, listen, keep the conversation on track and make sure everyone has a chance to share. An important consideration is that there are likely to be differing opinions and perspectives voiced by group members. They emphasize there should be no pressure by the moderator to have the group reach consensus. Instead, they assert that attention is placed on understanding the feelings, comments and thought processes of participants as they discuss the issues.

Throughout all interviews the perception of the researcher's authority was minimized by emphasizing that the respondent was the expert and it was their experiences and

perspectives that myself and others could learn from. With students, in particular, it was emphasized that adults do not always see how programs impact on students so their opinions were essential.

Creswell (1998) points out that the researcher's presence may bias responses and that not all people are equally articulate and perceptive. Fontana and Frey (1994) also recognize the need to keep one person or a small coalition of persons from dominating the group. This tended to work well with the exception of the first interview with the older students at Discovery Bay School. This particular interview seemed to be monopolized and biased by an ex-student who was visiting that week. To ensure representation of the group, a second interview was held a month later with significantly different results.

To minimize these limitations, as well as bias, an interview schedule was followed and quiet students were asked specifically for their perspectives. Addressing quiet students was done carefully after others had had a chance to speak and they were feeling comfortable in the interview situation. Hypothetical questions and third-person questions made questions less threatening and personal, allowing respondents to answer honestly without having to implicate themselves (Graue and Walsh, 1998). Using open-ended questions and allowing individuals to respond without setting boundaries or providing clues for potential response categories allowed ample opportunities to comment, explain, and share experiences and attitudes (Krueger and Casey, 2000).

In encouraging a permissive, non-threatening environment (Krueger and Casey, 2000) comfort and timing was taken into consideration by interviewing children during quieter times and with permission to take students out of class; by interviewing in the students' preferred location; and by giving students control over whether comments were tape-recorded or not. Interviewing students out of class is supported by Graue and Walsh (1998), as they found that getting out of class appealed to students and encouraged them to participate.

Merriam (1998) also notes that malfunctioning equipment when recording interviews and a respondent's uneasiness with being recorded are drawbacks when interviewing. To minimize these constraints the researcher had extra batteries and an extra tape recorder. Prior to each interview equipment was tested and in a number of cases these additional materials were used thus ensuring a smooth interview from a technological standpoint. Prior to recording an interview, permission was obtained from all respondents. In addition, respondents were given authority to stop the recording at any time should they feel uncomfortable recording sensitive information.

On a number of occasions respondents did stop recording and answered 'off the record'. In these situations their wish was honoured and then ways that information could be recorded while not prejudicing the message or the respondent was discussed. In all cases a way was found to state their opinion while not adversely affecting themselves or others. They were assured that the intension was to reveal obstacles they may have come across so others could learn from them rather than to cause negative personal conflicts. As both

case study schools were small, close-knit communities this assurance was essential to people sharing their true thoughts and perspectives. As the data does reveal a variety of conflicting opinions and stresses, and permission was given to incorporate controversial opinions sensitively, respondents' trust was gained and the interviews were successful in revealing diverse thoughts, feelings and perspectives.

Developing rapport and trust with students was a gradual process. Initially, their teachers introduced the researcher and the research study to students in their classrooms. This initial contact was followed by observation sessions where the researcher sat at the back initially recording observations on the schedule as the lesson progressed and then informally moving amongst the students as activities allowed.

Later in the week student interviews were scheduled. At this time the researcher went to classes and collected a group of 6-8 students identified by the teacher and took them to a location selected by the students for the interview. At the beginning of each interview the researcher chatted informally about herself, where she lived, and answered any questions to establish rapport and a positive relationship with the students. Prior to starting the interview the researcher explained the purpose; responded to any concerns; discussed confidentiality; and secured their permission to tape the interview, allowing students to turn the tape recorder off if they were uncomfortable taping any comments throughout the interview. The importance of their perspectives and opinions was emphasized so as to get a balanced picture of the program. It was also emphasized that their perspectives may agree with or differ from their parents or teachers and that was not only understandable

but also valuable as it represented their points of view. Interviews moved from descriptive questions towards ones that focused on their opinions regarding the successes and obstacles of the program.

In closing the interview, the researcher expressed her appreciation for their co-operation, summarized the major topics and opinions offered, asked for additional concerns or clarifications, and then informed them of follow-up plans to have reports available for member validation in the near future.

To ensure interpretations were as accurate as possible, reflections were written immediately following interviews to record insights and descriptive notes on the behaviour of the informants. Interview tapes were transposed verbatim and coded to the tape counter so exact location of the quote could be accessed easily if necessary (Merriam, 1998).

6.2 Observation

Direct observations within each case study school were undertaken to providing firsthand experiences with teaching and learning situations (Creswell, 1998). To give the reader a sense of "being there" the physical situation is well described: entryways, the rooms, landscape, hallways, its place on the map, the surrounding physical/urban geography, and the school décor. Through this description of context it is hoped to achieve a balance between the uniqueness and the ordinariness (Stake, 1995).

Merriam (1998, p. 97/98) suggests observing the following elements:

1. The physical setting: the context; what kinds of behaviour is the setting designed for; how is space allocated?

2. The participants: who; how many; their roles

3. Activities and interactions: what is going on; how do people interact with the activity and one another; is it a typical or unusual activity?

4. Conversation: content; who speaks/ listens?

5. Subtle factors: informal/ unplanned activities; symbolic/ connotative meanings of words; nonverbal communication such as dress and physical space; what does not happen – specially if it ought to have happened.

6. Your own behaviour: how is my role affecting the scene; what do you say and do?; observer thoughts/ comments.

Tuchman (1999) notes that in classroom research, researchers should consider the characteristics of instruction:

> The instructional program (a total approach to instruction including materials or a curriculum, equipment, and philosophy or plan for instructional management embodied in the teacher's guide); instructional materials; teaching style or strategy; learning environment; and learning activity. (Tuchman, 1999, p. 400)

In light of these suggestions, as well as aspects of ecological literacy identified through

the literature search, observations were made in schools, playgrounds and in teaching

sessions noting:

- Use of space,

- Types of activities,

- Where teaching occurs,

- The purpose of teaching,

- What learning styles are addressed,

- Types of student interactions and teacher/ student interactions,

- Classroom management,

- Types of questions used,

- Types of materials used,

- Environmental content,

- Community involvement,

- Types of evaluation

To help ensure observations were complete and consistent from class to class, an

observation schedule was developed (Appendix 6). This schedule was determined by the

research questions (Merriam, 1998). LeCompte and Preissle (1993, p. 200) further this

by adding that what to observe also depends on "the data that begin to emerge as the

participant observer interacts in the daily flow of events and activities, and the intuitive

reactions and hunches that participant observers experience as all these factors come

together".

Taylor and Bogdan (1984) suggest, for the first few days in the field:

- Observers should be relatively passive and unobtrusive, put people at ease, learn
  how to act and dress

- Collecting data is secondary to becoming familiar with the setting

- Keep the first observations fairly short to avoid being overwhelmed with novelty

- Be honest but not overly technical or detailed in explaining what you are doing

Accordingly, interviews and formal observation sessions were scheduled after the first

few days of meeting everyone and familiarization with the program and contexts.

Direct observation also serves as a method of triangulation (Yin, 1994) as it provides

another source of evidence. Although triangulation is discussed more extensively further

on in this report, it is worth noting here Yin's comments, "So complex and involved is

the teaching-learning process in the context of the school that the single-method approach

yields only limited and sometimes misleading data." (Yin, 1994, p.238). Yin further

notes that, "methodological triangulation is the one used most frequently and the one that

possibly has the most to offer." (ibid, p.239)

To maintain the ability to record information as it occurred the role of observer as

participant, where the role of researcher is known, was developed (Creswell, 1994).

Merriam (1998) notes that with this role participation in the group is secondary to

gathering information. Limitations of this approach relate to potential conflicts between

participating in the lesson with the students and teacher and maintaining attention as an

observer, recording observations. Patton (1990) emphasizes the need to balance the

insider and outsider role. The challenge is to combine participation and observation so as

to become capable of understanding the program as an insider while describing the

program for outsiders. Merriam (1998) suggests the researcher, while participating, tries

to stay sufficiently detached to observe and analyze. Yin (1994) also recognizes the

potential for the researcher to become a supporter of the group or organization being

studied, hence reinforcing the need to maintain an element of detachment.

As the researcher has a background as a certified teacher in British Columbia and was

involved in a similar pioneering effort in Scotland, the school staff was happy to have

their lessons observed. This background helped gain entry as an insider, able to share

their program's successes, obstacles and needs as a colleague who understands their

working conditions. At the same time the staff respected the role of the researcher, so it

was quite easy to be detached enabling the researcher to observe as need be. Students

saw the researcher as a researcher, interested in learning from them how their program

worked and what obstacles and needs they were finding as a pioneering school. This

approach is supported by Cohen and Manion (1994) as they suggest the attributes of the

interviewer should involve:

- Trust that transcends the research, promoting a bond of friendship and a feeling of

    togetherness and joint pursuit of a common mission rising above personal egos;

- Curiosity to know, to learn people's views and perceptions of facts, to hear their

    stories, discover their feelings; and

- Naturalness to be unobtrusive in order to witness events as they are, with the aim to secure what is in the minds of interviewees.

6.3 Document Analysis

The other major sources of data were policy documents, handbooks, mission statements, long/short range plans, and teaching and learning materials developed by the case study schools as well as provincial government documents that guided the B.C. Provincial Curriculum. These documents provide important perspectives for triangulation of interview and observational data. Merriam (1998, p.126) sees that, "One of the greatest advantages in using documentary material is its stability…The presence of the investigator does not alter what is being studied."

Merriam (1998) and Yin (1994) recognize it is important to identify the various authors of each document as well as its origin, reason for being written and the context in which it was written. Keeping this in mind, documentary analysis can reveal underlying philosophies that influence outcomes observed and reveal some of the context the case study schools respond to. Creswell (1994) sees that documents enable the researcher to obtain thoughtful data in the language and words of the informants as they have given attention to compiling it. Although Merriam (1998) recognizes most documents have not been developed for research purposes so that they may be incomplete, and may not be in a useful form or may contain built-in biases, she feels they may be the only way of studying certain problems. In this study it is useful to determine built-in biases as documentary data often indicates underlying philosophy and the organizational

foundation. Guba and Lincoln (1981, p.234) concur stating that analysis of documentary

data "lends contextual richness and helps to ground an inquiry in the milieu of the

writer."

Chapter 7 –Data Collection Procedures

7.1 Literature Review

An extensive literature search of conventional hardcopy and electronic sources was

conducted to identify recent trends and issues in education for sustainability.

Computerized searches scanned ERIC (Educational Resources Information Center) data

bases (CIJE - Current Index to Journals in Education and RIE – Resources in Education),

the Social Sciences Citation Index (SSCI), Dissertation Abstracts International, The

University of Stirling Library catalogue, The University of British Columbia library

catalogue, and the Simon Fraser University library catalogue. Key words such as

'sustainability', 'education for sustainability', 'environmental education', 'outdoor

education', holistic education' and 'education for sustainable development', 'ecological

philosophy', 'educational philosophy' were used.

These searches identified journal articles in respected national journals, review books,

books, conference proceedings and dissertations. These were prioritized from most

recent publications. Examining abstracts helped identify the most potentially useful and

relevant articles (Cooper, 1982). Once relevant literature was located, consulting

appropriate references cited in these sources identified further references.

Relevant copies of appropriate resources were located and their relevance judged.

Criteria for selection was based on suggestions by Merriam (1998):

- Authority on the topic (they had done much empirical work; offered seminal theory subsequent research and writing is based on; and was often quoted by others);

- Recent work;

- Particularly relevant work; and

- Quality (thoughtful analysis; well-designed study; original perspective).

Data collected was critically scrutinised with judgements being made about whether particular material should be included or not. Criteria were established for judging the procedural adequacy of how data was generated (Cooper 1989) and to ensure the validity of the review outcome using procedures recommended by Cooper (1989) and Merriam (1998).

Once major issues in education for sustainability were identified, it became clear that there was little direction to guide pioneering efforts and no analysis of recent efforts to determine whether they were in fact implementing and promoting an ecological paradigm. Therefore, the literature review was narrowed with the aim to:

- Identify the philosophical and metaphorical underpinnings of the dominant societal paradigm present educational efforts are couched in; and

- Establish those necessary for an ecologically sustainable society.

This helped establish the influential cultural metaphors involved in executing a viable curriculum for education for sustainability and provided a basis for evaluating pioneering

efforts in the field. This will be of value in informing developments at both the level of national policy and of institutional practice.

Overall, then, the literature review focused on the following issues:

- The dominant societal metaphors and mechanistic philosophy;

- Holistic philosophy informed by various scientific theories as well as traditional knowledge;

- A review of education and environmental education responses;

- A framework for foundations of education for sustainability.

- Research methodology

7.2 Pilot Study

Yin (1994, p. 75) notes that, "In general, convenience, access, and geographic proximity can be the main criteria for selecting the pilot case or cases." Accordingly, a Pilot Study was conducted at a local elementary school due to its convenience, close proximity and the congeniality of the administrator, teachers, parents and students. The pilot study involved interviewing the Principal; two teachers; three students ages 6, 9 and 12; and two parents as well as three classroom observations. The objectives were to test the interview questions and observation schedule for clarity, ease of use and eliciting appropriate information given time constraints of the school day and schedule, sequencing, getting feedback, and simplifying (Krueger and Casey (2000).

The focused interview questions and observation schedule were used to address the three research questions and their specific objectives. They were used to gather information on whether the philosophy; management structure; teaching and learning; and perceptions of the participants supported a viable model for education for sustainability and the extent to which they incorporated Orr's elements of ecological intelligence.

During the Administrator and Teacher interviews the researcher tried to record notes on the interview schedules. It was found to be too difficult as not left enough room had been left to do so and it was distracting from thinking about necessary follow-up questions for clarification, or ways to encourage the flow of the interview. It also distracted the respondent. As each interview was recorded with the respondent's permission, the researcher found she only needed to make the odd note as a reminder when further follow-up was needed or something in particular stood out.

After the Pilot Study it became apparent a number of changes were required to improve the Administrator and Teacher Interview Schedules. To begin with, personal respondent information was added to the beginning of the Schedules so that records of particular interviews could be easily identified. Secondly, on reviewing the metaphors identified in the literature review (Appendix 4) it was apparent the interviews failed to elicit enough information in the categories of Educational Ideals and Philosophy, Curriculum Design, Community Involvement, Views of Teaching, and Views of Learner and Learning. Additional questions were added to elicit this information. They are identified with an asterix in Appendix 5. The interview questions were also revised to clarify meanings. In

addition, for each interview schedule, questions were prioritised to be able to respond with a shorter interview if need be. These questions are highlighted in bold in Appendix 5.

Following the pilot study, the Observation schedule was refined to allow space for a diagram of the class setup, recording weather conditions, location of the lesson, indicators of environmental content, as well as subtle factors such as unplanned events, dress, the title students address the teacher by, and types of classroom displays. The necessity of these changes became apparent while observing and finding the Observation Schedule had not incorporated or allowed sufficient space for this information, and in reviewing the findings in relation to the research questions. Adding this information provided further data for lesson content as well as thick description of the context lessons occurred in. The revised Observation Schedule is in Appendix 6.

The Pilot Study also identified technical considerations. It was necessary to have extra batteries, cassette tapes and even an extra tape recorder on hand. When transcribing the interviews the researcher found it was important to introduce each interview on the tape before the interview started. This made identification of the interview easier when transcribing. The pilot study also flagged up the need to develop a system of recording the verbatim transcription of the interview, the location of the comments on the tape recordings, as well as initial analytical comments and memos. Initially, the researcher transcribed onto a table with pen and paper, as typing skills were not very fast. As this method was not appropriate for the quantity of data they would need to work with, the

researcher considered voice activated typing programs. As these programs take time to learn and time to 'train' the computer to the researcher's voice, it was eventually decided to type the interviews, allowing for extra time as necessary.

7.3 Case Study Schools

The research focused on schools in British Columbia, Canada. As this study is based on schools pioneering education for sustainability, purposeful rather than random sampling was necessary. As Merriam (1998, p.61) notes, "Purposeful sampling is based on the assumption that the investigator wants to discover, understand and gain insight and therefore must select a sample from which the most can be learned"

Identification

To identify Case Study schools a search for schools that had achieved a high level of involvement with environmental or sustainability education programs was initiated. Waldorf schools were considered but discounted as discussions with teachers and administrators in these schools showed strict adherence to Steiner philosophy that had some correlations but did not directly focus on education for sustainability. Based on environmental awards given to schools; the directory of environmental educators in British Columbia; and information from outdoor education, environmental education and education for sustainability professionals, a list of appropriate schools was compiled. Two programs, SEEDS and Destination Conservation, listed schools by their achievement at various levels of involvement in each of their respective programs. Following up on those schools that showed highest levels of attainment revealed either

involvement was restricted to club activities rather than a whole school initiative, or a lack of interest in participating in the study.

Requests for recommendations of pioneering schools in education for sustainability was then sent out through the British Columbia environmental educators' electronic list serve. Various schools were recommended but only two showed significant involvement in education for sustainability on a school-wide basis at the elementary level. Both these schools were keen to participate as case study schools. In each case study school a key informant, who was a person responsible for the sustainability program, was identified to act as link person.

These two schools provided interesting differences in their size and organizational structure. Bogden and Biklen (1998, p.63) advise that,

> If you are doing a second case study to compare and contrast, you pick the second site on the basis of the extent and presence or absence of some particular characteristic of the original study.

Discovery Bay is an urban but a very small Independent elementary school with only eleven students, initially, in two multi-age classes. It is designed specifically from its management structure to its curriculum and teaching methods to promote ecological sustainability. This school was particularly interesting as it represented, as Merriam (1998) terms, a unique sample, one that is "Based on the unique, atypical, perhaps rare

attributes or occurrences of the phenomenon of interest. You would be interested in them because they are unique or atypical." (ibid, p. 62).

Discovery Bay is located in an urban city on the South Coast of British Columbia, Canada. It is situated on a quiet side street between two very busy city streets. It is in the middle of the city but has access to parks and natural areas such as mountainous hills, ponds, beaches and the ocean. Carol is the Administrator and link person for this study.

Discovery Bay caters to students from Kindergarten to Grade 7 (5-14 year olds) and is open to both full-time and part-time home-educated students. During the study, the school had ten students enrolled full-time; three kindergarten students; three junior siblings; three home-educated students who attend with flexible scheduling one to two days per week; and seven part-time, non-registered students who attend and pay on a day use basis.

It had two full-time teachers, one of whom was also the Administrator. A third teacher was employed part-time to provide programming for special needs students through integrated lessons offered to all students. Three community volunteers were also involved in helping the students learn; one on a full-time basis; another was involved part-time by bringing mentally challenged adults into the school one morning a week to facilitate art lessons and enhance community/school relations; the third served as a curriculum advisor on the Board of Directors and helped lead Friday lessons that always took place outside as fieldtrips.

Carol who took her teaching degree with a vision to establish a school for her own children based on bioregionalism started the school. She was joined by four others (Dave, Carl, Albert, Ken) who shared her vision. They established The Bioregional Education Association in 1997 as a non-profit society to direct and operate the school. The society has developed a constitution based on bioregional education; self-directed, holistic learning; consensus decision-making and community participation. This helped establish the school through the first three years. Its Board members are made up of teachers, parents and community volunteers. They meet once a month to make decisions relating to finances, maintenance, school policies, programs, special events, public relations and government regulations.

Forest Grove Community School is a school trying to pioneer education for sustainability. Their mandate was, 'to model and teach sustainability'. However, it provided a rich contrast to Discovery Bay being a more 'typical sample' (Patton, 1990) in that it is a government-run elementary school that has decided to model and teach sustainability within the existing structure, grafting the new approach onto traditional management structures, curriculum and teaching approaches. Patton (1990, p.173) notes that for typical sampling, "the site is specifically selected because it is not in any major way atypical, extreme, deviant or intensely unusual." The typical nature of Forest Grove's organizational structure may help other similarly designed elementary schools identify with its efforts and, hence, the results of this research.

Forest Grove Community School is located in a small rural community, on the South Coast of British Columbia, Canada. The community is bounded by Georgia Strait on the Pacific Ocean and the temperate rainforest of the south coast of B.C. As such it is a place of scenic beauty and a great diversity of forest and ocean wildlife. Most residents of Forest Grove choose to live there because of the natural environment. With minimal community services or employment it has strong ties to a larger town twenty kilometres to the south. Dave is the Principal Administrator and Joan is the Sustainability Program Co-ordinator and link person.

As a government-run elementary school it was built to provide education to the Kindergarten to Grade 7 students in the community. It follows the Provincial Government curriculum and guidelines. The school building and grounds are owned by the Provincial Government and maintained by School Board employees who belong to the Canadian Union of Public Employees. The school is governed and has a budget determined by the Local School Board, which in turn is funded by and governed by the Provincial Government.   Within the union and budget constraints related to the Department of Education, the school Principal administers the running of the school for the education of Kindergarten to Grade 7 students.

As Forest Grove school is a Community School, it is also influenced by the Provincial Ministry of Health and Families. Under this department the Community School is given a budget and staff to offer community programs through the school. A Parent Advisory Committee was also active to help raise money for the school and offer opinions on

various programs. The Sustainability Program that was brought in so Forest Grove

Community School could teach and model sustainability reflects involvement of all these

various sectors. This also accounts for the large number of Administrators involved in

this study.

During this study Forest Grove Community School's demographics included:

approximately 400 students; 11 teachers; 6 administration personnel; and 3 teaching

assistants for a number of physically challenged students; and 6 Sample Families who

were involved in the program.

Access

Requests were sent to the relevant districts, schools and teachers. This letter outlined the

nature of the case study, the sponsor, the primary issues, the time span, and the burden to

the parties as well as how and why the school and teachers were chosen. Professor

Osborne wrote letters on behalf of the University of Stirling confirming the authenticity

of the research study.

Participants were ensured confidentiality throughout the study. During interviews they

had the authority to request their comments not be tape-recorded or details shared where

they felt they might cause concern. Once the research findings are written up, copies

were sent to all participants for verification, accuracy and deletion of names if deemed

necessary.

After initial conversations explaining the objectives and scope of the research study, the administrators of each school agreed to talk to the staff, parents and students regarding their participation. In both cases all interested parties agreed to participate fully in the research.

Data Collection

Dates for data collection were arranged for March 18-22, 2002 for Discovery Bay and April 22-26 (Earth Week), 2002 for Forest Grove. Throughout each week administrators, staff, students and parents were interviewed; classroom and outdoor teaching sessions and activities were observed; school-related meetings were attended, as were community/ school events after school hours. Due to time constraints further parent interviews had to be done by telephone later on. In each interview situation the researcher's contact information was given so participants could offer further thoughts or concerns should they arise. Brief one-day follow-up sessions were arranged in October 2003 to provide validation and information on the programs' continuing development.

At each school, data saturation and an emergence of regularities, and an exhaustion of sources was used to suggest enough data had been collected (Lincoln and Guba, 1985).

Interview Sample Selection

Given the research objectives to gain perspectives from all groups of people involved in the pioneering projects, the link person in each case study school was initially relied on to identify administrators, teachers, volunteers, parents, and students involved in the

programs. Arrangements and schedules for interviews were arranged ahead of time so as to maximize use of the time in the field. Once initial interviews were scheduled the researcher used what Merriam (1998) refers to as snowball, chain or network sampling that involved asking participants to refer other participants. In the case of Discovery Bay School, this method helped identify parents who were more involved as well as those less involved in the school. At Forest Grove Community School network sampling was helpful in identify students and their parents out of the 400+ students and their families who had experience with the program.

Discovery Bay

The following people were interviewed once at Discovery Bay in March 2002: all three teachers, one of who was the administrator as well; all three volunteers who also taught and were very involved at the school; two student groups representing all the younger and older students; and six out of seven parents, two of whom were also Directors. As one of the Directors, who was also a volunteer teacher, was unavailable during the scheduled fieldwork, a telephone interview was conducted at a later date. Unfortunately, technical difficulties made it impossible to transcribe this interview data so a second face-to-face interview was conducted. As mentioned earlier the first interview with the older students at Discovery Bay School seemed to be monopolized and biased by a bitter ex-student who was visiting during the initial field visit. To ensure representation of the group, a second interview was held a month later with significantly different results. All twenty hours of interviewing were taped and transcribed.

Forest Grove

Although the whole school became involved in school-wide recycling and reduction

programs, in the first year and a half of the two-year program only the Grades 6 and 7

students received direct lessons in sustainability. In the last four months of the study the

Grades K-3 students were involved in a few special activities. Therefore, only Grade 5, 6

and 7 students were interviewed as they had the most involvement. These students were

interviewed once in eight different groups of 6-8 students each during class time.

Additionally, the Student Advisory group of ten students, that met regularly and made

recommendations with regards to the sustainability program, was interviewed. Four

Administrators, and eight out of ten teachers were interviewed once. One was not

interested in being involved; the other was a recent exchange teacher from Australia and

had had very little knowledge or involvement with the program. The Program Director

was interviewed twice as other questions came up after the teacher interviews. Single

interviews were held with the three teacher-support staff as well as four representatives

from the six Sample Families, a community volunteer, the head of the Parent Advisory

Committee, and nine parents whose children were involved. Although it was not possible

to interview other parents due to a lack of time or interest on their part, saturation of

information and an emergence of regularities were achieved suggesting sufficient data

had been collected (Lincoln and Guba, 1985). All thirty-six hours of interview data was

taped and transcribed.

Observations

Observations were made of the school grounds, use of space, the learning environments inside and out as well as displays in the school. These were recorded in field notes and maps that were drawn of the school grounds. Observation Schedules were used for the seven classroom observation sessions. Initially pictures of displays and school grounds were taken but as the pictures were not of adequate quality field notes and maps were used to add thick-description data of school grounds and classrooms.

Discovery Bay

At Discovery Bay School the researcher observed the school grounds and the two classrooms; lessons by all three teachers; lessons given by three Volunteers; and the Friday cycling/nature study fieldtrip. As well as these teaching and learning activities, observational data was also gathered at a Board Meeting; two staff meetings; and the evening school/community solstice celebration. In addition to the Observation Schedules, fourteen pages of notes recorded the observations.

Forest Grove

At Forest Grove Community School the school grounds, classrooms as well as classroom lessons by all seven teachers were observed. As fieldwork was conducted during Earth Week there was also an opportunity to observe special activities during the day and in the evening, at the school and at various community locations. Observation Schedules and seventeen pages of notes recorded the observations.

Follow-up Visits

One-day follow-up visits were made to both schools 18 months following the initial fieldwork to see whether initial observations were accurate; how the programs were developing; and whether or how various issues and concerns identified initially were being dealt with.

Chapter 8 - Research Considerations

8.1 Ethics and Confidentiality

Ethical considerations and confidentiality are essential aspects of this research. Before case studies were initiated consent was secured from governing bodies as well as those involved directly with the research (administrators, teachers, parents and students). In classroom observations as well as interviews, all information was treated as confidential. The anonymity of all respondents was ensured with pseudonyms for respondents and schools used throughout. Audio taping was carried out only if the consent of all those involved was secured. Upon completion of the research all results were made available to those involved in the study. Other ethical considerations incorporate honesty to subjects about the purpose; methods and intended and possible uses of the research; any risks involved; and independence and impartiality of the researcher to the subject of the research (Fontana and Frey, 1994).

8.2 Bias

Merriam (1998) recognizes that the ethics of the researcher must be aware of bias that can affect the final product. Cohen and Manion (1994) recognize that the most practical way of achieving greater validity is to minimize the amount of bias as much as possible. They recognize sources of bias to be the characteristics of the interviewer, the characteristics of the respondents, and the substantive content of the interview questions. They elaborate these sources of bias to include:

- The attitudes and opinions of the interviewer;
- A tendency for the interviewer to see the respondent in her own image;

- A tendency for the interviewer to seek answers that support her preconceived notions;

- Misperceptions on the part of the interviewer of what the respondent is saying; and

- Misunderstandings on the part of the respondent of what is being asked. (Cohen and Manion, 1994, p. 282)

To reduce this bias Cohen and Manion (1994) suggest careful formulation of interview questions and the researcher being aware of the possible problems. To this end interview schedules were used to guide interviews (Tuckman, 1999) and the Pilot Study provided an opportunity to test and reformulate interview questions thus addressing this issue. To address the problems of misperceptions of what the respondent is saying all interviews were tape-recorded and transcribed verbatim. If any misunderstandings occurred during the interview on the part of the respondent or interviewer, questions were reformulated as need be. With the exception of some of the students who were unavailable as they changed schools, respondents also reviewed the findings to comment on accuracy.

Graue and Walsh (1998, p.126) also recognize that, "Bias can be introduced into the data record by attitudes and beliefs." Although it is important to minimize the effects of bias, they further argue:

One cannot be free of attitudes and beliefs. Who one is affects how one sees the world. The trick is to develop a strong sense of that

> identity and how it affects one as a researcher in the specific contexts within which one is working. Bias cannot be removed. It can be identified and its effects explicitly monitored (Graue and Walsh, 1998, p. 126).

It is also important to recognize the role the researcher has in deciding which part of the participants' stories will be told, and how their own personal experiences and understandings shape the study (Stevenson, 2004). Through thick, rich description; comparing responses to a template of previously developed theory; and soliciting the opinions of the respondents themselves, researcher bias has been minimized.

It is, however, important to note this research study has adopted an eco-centric perspective, consistent with holistic science and many indigenous philosophies, as a framework to analyse two pioneering approaches to Education for Sustainability. While recognizing other constructivist and socially critical approaches to education for sustainability, this research chose to focus on the eco-centric model as it has been prominent in the literature of science, environmental education and education for sustainability. However, participant perspectives on the successes, obstacles and needs of their programs are solicited to incorporate a more interpretive, constructive methodology; to add further insights and a measure of validity to the theoretically designed template; and open the possibility of other theoretical constructs. It is important to keep in mind the contribution of postructuralsim:

> Any research methodology will reveal its own set of truths…What can be discovered is that which can be revealed through the investigative methodology and the conditions of investigation (Gough & Whitehouse, 2003, p. 38).

Therefore, it remains important for the reader to recognize the findings are based on a particular socially constructed perspective (Hart et al, 2004). This text, its analysis, and conclusions do not represent the only definitive interpretations possible. Feminist poststructural perspectives, for example, would have produced different knowledge (Barrett, 2005). Sammel (2003, p. 165) emphasized, "…the appeal of holistic accounts is betrayed by the presence and absence of language and interpretation where only partial truths can be specified or received due to a fine line between what information or knowledge is given, taken, or left behind." Accordingly, the reader is invited to co-construct meaning and interpret the findings as meaningful or applicable based on their own personal contexts and constructs.

The relevance of the research findings also needs to be grounded in their geo-political, economic, social context: in British Columbia, Canada. Barraza et al (2003, p. 355) note that, "Models that work in northern hemisphere countries and contexts are not necessarily applicable, meaningful or useful in the South". O'Donoghue and Lotz-Sisitka (2005) concur emphasizing the need to consider local, historical contexts and be wary of using research in education for sustainable development for colonizing agendas.

8.3 Internal Validity

To help minimize negative affects of the interviewer's personal bias these have been

disclosed so as to enhance internal validity (Merriam, 1998), allowing the reader to judge

any influences for themselves. In support of this approach Merriam (1998, p.203) states:

> One of the assumptions underlying qualitative research is that reality
> is holistic, multi-dimensional, and ever-changing; it is not a single,
> fixed, objective phenomenon waiting to be discovered, observed, and
> measured as in quantitative research…What is being observed are
> people's constructions of reality – how they understand the world.

In addressing the need to accurately represent people's constructions of reality and

further reduce research bias, low-inference descriptors, that is recording

concrete/verbatim accounts rather than researcher's reconstructions, was used in

conjunction with recording data mechanically using audio tapes where appropriate

(LeCompte and Goetz, 1982). Internal validity is also established through recognizing

recurrent patterns and explanation-building during the data analysis stage (Yin, 1994).

8.4 Construct Validity

In addition to addressing internal validity, this research employed methodological and

data source triangulation (Denzin and Lincoln, 2000; Janesick, 1994; Seale, 1999; Stake,

1995; Kirk and Miller, 1986; Denzin, 1978) thereby establishing a chain of evidence as

well as having key informants review the draft case study report (Yin, 1994) to establish

construct validity. Denzin identified data source triangulation (Stake, 1995) as a useful

protocol, that is, seeing if the phenomenon or case remains the same at other times, in other spaces. Using this method of triangulation meant observing a number of lessons both inside and outside if possible from as many teachers as possible and interviewing as many administrators, teachers, students, volunteers and parents as possible from those involved in each program. The use of observation and interview schedules also helped develop consistency (Tuckman, 1999).

Following the initial, intensive field visit, a briefer one day visit was conducted 18 months later to see whether initial observations were accurate; how the programs were developing; and whether or how various issues and concerns identified initially were being dealt with. Feedback of initial observations and interpretations validated the findings at both schools. At Discovery Bay key staff, Directors and a few parents were interviewed. At Forest Grove Community School there had been a number of significant staff and program changes so only key staff and students were interviewed. In both cases a sense of saturation guided the decisions that those interviews conducted were sufficient. Summaries of these follow-up visits are included in Appendix 10.

Triangulation was also incorporated in the research by studying the two case study schools and comparing the results. Using observations, documentary analysis and interviews in each case study employed methodological triangulation. Cain and Finch (1981) argue that multiplication of methods can help to deepen understanding of different aspects of an issue.

8.5 Member Validation

Seale (1999) notes that checking accuracy of research accounts with respondents to

establish credibility is in Lincoln and Guba's words, "the most crucial technique for

establishing credibility" (Lincoln and Guba, 1985, p. 314). Although those involved in

each case study initially established the credibility of findings through reviews, in relation

to member validation Gubrium et al (1997, p. 44) note:

> …an ethnomethodologist's report is likely to puzzle its subjects.
> Viewing the "seen but unnoticed" aspects of everyday life may
> unsettle members' assumptions about the life world, radically
> undermining the foundations of mundane reason, to put it in
> Pollner's terms.   As appreciative of members' methods as
> ethnomethodology might be, reducing the substance and order of
> members' worlds to a congeries of practices cannot fail to produce
> an ironic "debunking" of sorts, revealing what is typically thought to
> exist separately from members to be members' virtual productions.

This is an important consideration as the research focused on taken-for-granted

metaphors teachers may be unaware of using in their delivery of education. With this in

mind, member validation was used as a secondary source, gaining feedback and further

evidence during the follow-up visit while taking into consideration the possibility that

members' responses may be challenging due to opposing perceptions. The soundness of

this is supported by Seale (1999, p. 71) stating:

> Member validation offers a method for testing researchers' claims by
> gathering new evidence. If approached with a readiness to revise

claims in the light of what is revealed, rather than an attempt to confirm mutual value positions between researcher and researched, it can enhance the credibility of a research report, giving it greater sophistication and scope (although it is often used) to converge on a single version, its use in discourse analysis may be more fruitfully understood as a way of generating richer data.

In considering how much information should be revealed regarding the study itself it is important to consider that taking up the position of observer necessarily transforms the practice being observed. This, according to Brown and Dowling (1998) is the epistemological paradox. It was important, therefore, that teachers were told the study would be looking at sustainability education practices but not details such as observing for the use of metaphors in their teaching generally.

Gubrium et al (1997, p.41) note:

As the goal shifts from describing reality to describing reality-constituting procedures, the researcher separates him/herself from the commonsense assumptions that underpin everyday beliefs about the factual character of the life world.

To ensure member validation, the members in both schools established the accuracy of the research accounts during the follow-up visit.

8.6 External Validity

In this research, the two cases were selected precisely because it was advantageous to

understand the particular in depth. Patton (1990, p. 491) argues qualitative research

should "provide perspective rather than truth, empirical assessment of local decision

maker's theories of action rather than generation and verification of universal theories,

and context-bound extrapolations rather than generalizations." Merriam (1998) supports

the notion of concrete universals, that is, the general resides in the particular. She notes

that by studying a specific case in great detail, we can transfer or generalize what is

learned to similar situations subsequently encountered. Stake (1978, p. 6) notes that, "Full

and thorough knowledge of the particular" allows one to see "in new and foreign

contexts". Merriam (1998) also recognizes reader and user generalizability, leaving the

extent to which a study's findings apply to other situations up to the people in those

situations. To help readers make appropriate judgements in this regard the research

incorporates: two separate cases; rich, thick description of the research situations; as well

as a description of how typical cases seem to be (Merriam, 1998).

8.7 Reliability

Reliability, the extent to which research findings can be replicated, is addressed but with

some very important considerations given the qualitative nature of the research. Merriam

(1998, p. 206) makes a very important point regarding reliability:

> Because what is being studied in education is assumed to be in flux,
> multifaceted, and highly contextual, because information gathering is

a function of who gives it and how skilled the researcher is at getting it, and because the emergent design of the qualitative case study precludes a priori controls, achieving reliability in the traditional sense is not only fanciful but impossible…rather than demanding that outsiders get the same results, a researcher wishes outsiders to concur that, given the data collected, the results make sense – they are consistent and dependable.

In support of this, Rubin and Rubin (1995) argue that most indicators of validity and reliability do not fit qualitative research. They feel that trying to apply these indicators to qualitative work distracts more than it clarifies. Instead, they feel researchers should judge the credibility of qualitative work by its transparency, consistency-coherence, and communicability.

In establishing reliability and transparency, this study incorporates triangulation as described earlier; an explanation of the researcher's position regarding the groups being studied; the basis for selecting informants and a description of them, and the social contexts from which data were collected; the theories and ideas that inform the research; and all aspects of the methods used (LeCompte and Goetz, 1982, in Seale, 1999; Yin, 1994). Reflexive methodological accounting is also incorporated into the research. This includes: transcripts; contact summary sheets; lists of units of information; triangulation results; member validation checks; and daily entries in a research journal (daily activities; decision-making rules and procedures; sampling techniques; descriptions of emerging design/patterns; analytic strategy; supervisor comments, interactions, suggestions, influences) (Seale, 1999; Merriam, 1998; Rubin and Rubin, 1995).

Part Three - Analysis and Interpretation

Chapter 9 – Data Analysis

Miles and Huberman (1994) delineate the process of data analysis as data reduction, data

display, and conclusion drawing/ verification while Wolcott envisions a trio of

description, analysis, and interpretation (Graue and Walsh, 1998). As the research

focuses on pioneering programs, descriptive techniques are an essential aspect of analysis

and interpretation (Merriam, 1998). This narrative description is what Denzin (1989)

calls "thick description":

> Thick description…does more than record what a person is doing. It
> goes beyond mere fact and surface appearances. It presents detail,
> context, emotion, and the webs of social relationships that join
> persons to one another. Thick description evokes emotionality and
> self-feelings. It inserts history into experience. It establishes the
> significance of an experience, or the sequence of events, for the
> person or persons in question. In thick description, the voices,
> feelings, actions, and meanings of interacting individuals are heard
> (p. 83). (in Graue and Walsh, 1998, p. 134)

Graue and Walsh (1998, p.221) feel a good description "must take the reader to a new

place, providing connections to theoretical ideas and interpretive insights."

Patton (1990) suggests a balance between description and interpretation. This research

has followed Patton (1990) as well as Denzin (1989) as he suggests the following

interpretive steps:

1. Locate within the personal experience, or self-story, key phrases and statements that speak directly to the phenomenon in question.

2. Interpret the meanings of these phrases as an informed reader.

3. Obtain the participants' interpretations of these findings, if possible.

4. Inspect these meanings for what they reveal about the essential, recurring features of the phenomenon being studied.

5. Offer a tentative statement or definition of the phenomenon in terms of the essential recurring features identified in Step 4. (in Janesick, 1994, p.215)

Gall, Borg and Gall (1996) note that, "Interpretational analysis is the process of examining case study data closely in order to find construct, themes and patterns that can be used to describe and explain the phenomenon being studied." (p.562). They recognize three aspects of case study analysis and interpretation: description, explanation and evaluation. During description, constructs are used to explain the phenomenon. They further identify themes as salient, characteristic features of a case. In this study it is the themes of each case study school that highlight their differences. The stage of explanation, according to Gall, Borg and Gall (1996) highlights patterns that explain the phenomenon. During this phase one type of variation observed in the case study is systematically related to another observed variation. They note that if no causal effect, one on another variation, then it is a relational pattern. If, however, causality is claimed, it is a causal pattern. In the final stage of evaluation, patterns identified in the stage of explanation help the researcher evaluate the case studies in relation to the research questions.

The case studies were analyzed formatively according to the structured sequential procedures described by Miles and Huberman (1994). Each case was analyzed independently and then they were compared in light of the research questions. Early analysis incorporated contact summary sheets; coding using descriptive, interpretive and pattern codes; memoing; developing propositions; and interim case summaries (Miles and Huberman, 1994). Findings from the contact summary sheets (Appendix 9) were incorporated into further investigations as well as the data analysis.

Following an extensive Literature Search, a template from Sterling (2001) was found to incorporate and summarize many theories and concerns voiced in the literature on education for sustainability (Greig et al, 1989; Orr, 1992; Fein, 2000; Bowers, 2002; Bonnett, 2002; Webster, 2004; Jickling, 2004; and Bell, 2005). Although this template is not based on empirical research, from the literature search it does appear to summarize well what are thought to be influential cultural metaphors involved in executing a viable curriculum for education for sustainability in light of the dominant, mechanistic educational paradigm

Appendix 4 summarizes the mechanistic and ecological metaphors identified in the literature. Mechanistic metaphors include an anthropocentric perspective, linear thinking, centralization, top-down hierarchical control, disciplines and defence of boundaries, individualism, transmission of knowledge and a deficiency educational model. Ecological metaphors are major characteristics of non-linear, dynamic, complex living

systems. As such they incorporate ecological principles of honouring and celebrating diversity and development as increasing complexity within a systemic context; iterative cycling with emergent properties unfolding and enfolding providing constant feedback, adaptation and change; and interdependence within and between systems as dynamic community relationships. An ecological worldview encourages an emergent, transformative, holistic, integrative view of knowledge and learning. As Sterling's template incorporates these metaphors it is worth using to determine the usefulness of the theory in light of practice. This template is described in detail in Appendix 3.

There are, however, some serious considerations in using this template. As a summary of the mechanistic/ ecological paradigms its simplification sets up a dualism that tends to ignore all the subtle, 'grey' areas that exist in reality. Accordingly, it is important to keep an open mind, accepting there are continuums, variations and diversity. Sterling's template is also limited in that it presents only a systemic metaphorical view of nature based on the web of life, interdependence and interrelationships while ignoring other possible interpretations such as 'nature red in tooth and claw' that focuses on competition and survival of the fittest.   In recognizing these limitations the use of this template is seen to be valuable as this obvious dualism can highlight and inform analysis rather than define and evaluate practice. Similarly, the systemic view is useful and does not exclude the possibility of other interpretations,

Sterling's template, as well as the ecological and mechanistic metaphors identified through the literature search and contained in Appendix 4, and the elements of ecological

literacy identified by Orr (1992) represent what Merriam (1998) refers to as categories or concepts indicated by the data and what Gall, Borg and Gall (1996) refer to as constructs. The template and metaphors also capture recurring patterns that cut across the data. Stevenson (2004) recognizes these analytical constructs as a form of propositional knowledge that reflects the researcher's conceptual framework in making sense of the case. Using this template, Orr's framework and the metaphors listed in Appendix 4 is appropriate as according to Merriam (1998), categories should: reflect the purpose of the research; be exhaustive; be mutually exclusive; be sensitizing (to what is in the data); and be conceptually congruent. Identifying conceptual constructs through the use of this template and the identified metaphors also allows for a cross-analysis (Yin, 1994).

Further analysis of participant opinions as to the successes, obstacles and needs of their programs (Research Question Three), can potentially ground the theory in practice, shed light on the rhetoric/ reality gap (Sauvé & Berryman, 2003), and the validity of this theoretical template. Such an analysis also provides opportunities for other theoretical constructs to emerge as well as "…provide a vehicle for readers to reflect on their own thoughts and practices in relation to the issues involved and enrich their understanding of educational possibilities in terms of alternative ways of thinking and acting" (Stevenson, 2004, p.47).

9.1 Coding

Miles and Huberman (1994) note that as codes are efficient data-labelling and data-retrieval devices that empower and speed up analysis they should be kept semantically

close to the terms they represent. "Codes should relate to one another in coherent, study-important ways…keyed to research questions" (Miles and Huberman, 1994, p. 62).

Accordingly, the coding scheme (Appendix 8) reflects the ecological/ mechanistic template (Appendix 3) and the identified ecological and mechanistic metaphors identified through the literature search (Appendix 4). It also incorporates the various aspects of ecological intelligence identified by Bowers (1995) as essential for developing an ecologically sustainable society. It is important, then, to consider both the extent to which teachers incorporate the various aspects of ecological intelligence as well as the metaphorical context of the educational process. To be effective, Bowers (1995, p. 195) feels teachers need to understand two aspects of culture:

> Firstly, they need to understand different cultural ways of knowing so they can make explicit and help put into historical and comparative perspective the hidden aspects of culture that are part of every learning experience. Furthermore, teachers need to be able to recognize when to make the implicit understandings explicit and how to assist students in the process of acquiring the language essential to expressing an alternative interpretation.
>
> Secondly, teachers need to understand the metaphorical nature of the language/thought process, including how metaphorical thinking is encoded in cultural objects such as buildings, cars, clothes, computers and so forth.

9.2 Categorization/ Patterning: Qualitative Computer Program Qualrus

The qualitative data analysis program, Qualrus, was used to code and help analyse the interview data. Weitzman and Miles (1995) argue that using qualitative computer

programs can be more systematic, more thorough, less likely to miss things, more flexible and much faster. Merriam (1998) notes that code-based theory-builders and conceptual network builders may help the user make connections between codes to develop higher-level categorizations, or support the development or testing of propositions. The analysis process, however, was designed around the research questions rather than what the program makes available – a danger highlighted by Tesch (1990). This procedure is supported by Weitzman and Miles (1995) who note that as software tools can shape the researcher's choice of methods, the methods should be chosen first and the computer program found to match. They also recognize that computer use may distance the user from the data. One of the major advantages of 'Qualrus' is that it retains the original data and context with the coding.

When searching for a qualitative research program, the criteria for selection included holistic/ non-quantitative functions; coding and retrieval; original data availability; and ease of use. The computer analysis program 'Qualrus' met each of these.

The following, written by Idea Works, the designers of Qualrus, describes the program's characteristics:

> Qualrus is a qualitative analysis software program that uses an array of intelligent computational strategies to assist with coding, and qualitative data analysis. It is designed from ground up to establish new standards for qualitative analysis software. Qualrus stresses flexibility of research methodology and does not force any particular research style on the researcher. It can be used for the full range of

qualitative research approaches, including grounded theory in which concepts emerge from the data, cultural analysis, interpretive methods, domain analysis, semiotics, life histories, deconstruction, bracketing, experiential analysis, and narratives. (Idea Works Inc., http://www.ideaworks.com)

Qualrus's unique features include:

- Full multimedia support including text, graphics, video, and audio (supported formats include rtf, mp3, mpg, avi and more).

- Memos can be attached to any object, including segment, project, source, code, code assignments, link types, link assignments, allowing for unprecedented flexibility in coding.

- Search tool for Boolean and semantic searches.

- A number of analysis tools to help find patterns and make sense of the coded data, including: concept refinement, concept generalization, hypothesis testing, code occurrence statistics. Those tools keep qualitative researcher close to the original data, allowing to view segments in context.

- Semantic network for visualizing relationships among codes, theory development, and mind mapping.

- HTML output and reports for viewing with standard web browsers and publication on the web.

- Importing data from other projects either to share with a group or build up on your prior work.

- Easy to learn scripting language allows to write programs to customize all program behaviours and completely automate repetitive tasks. The range of tasks that can be performed with the example scripts include: on automatic text coding and exporting project data into spreadsheet format. In fact, with the flexibility of scripting, you can do absolutely anything with your data.

Additionally, Qualrus has:

- Easy-to-use graphical interface;

- Flexible character-level specification of data segments;

- Automatic backup of data to enhance data security;

- Convenient management of documents and multimedia sources;

- Project tree for easy overview and navigation within the project;

- No practical limit on number of documents, segments, codes, or memos;

- Adopt theoretical framework from one project for use with another entirely different set of data;

- Use different theoretical frameworks for a single project; and

- Interactive viewer can be distributed freely permitting others to examine and view data (Idea Works Inc., http://www.qualrus.com).

In using Qualrus to code interview data, interview segments were highlighted and assigned codes based on their content. Descriptive, inferential and pattern codes were applied as appropriate (Miles and Huberman, 1994). In light of this, various segments carry a variety of codes.

9.3 Memoing

Throughout the coding process analytic memos were created to develop themes, facilitate elaboration of the coding scheme and record analytical insights as they occurred. These were attached to the segment they referred to so as to connect directly to the data itself and provide an effective audit trail of the coding process (Gilbert, 2001).

9.4 Interim Reports

Miles and Huberman (1994) note that an interim report synthesizes what the researcher knows about the case and dictates what may remain to be found out. As such, interim reports were used to summarize preliminary findings, indicate potential areas that needed further investigation, and as a basis for internal construct and member validation in the follow-up visits.

9.5 Follow-up Visits

Each case study school was visited on two occasions. The initial field study, in March 2002 was five days in length and afforded opportunities in the first two days for general observations of the school buildings and grounds. Classroom and teaching observations occurred in the latter part of the week when staff and students had a chance to become familiar and comfortable with the researcher. To guide classroom observations an observation schedule was used (Appendix 6).

A second, one day, field visit was made eighteen months later in October 2003. This visit offered opportunities to observe developments in the buildings and grounds as well how the school had dealt with the various obstacles and needs identified during the initial visit; how the programs were developing; and whether or how various issues and concerns identified initially were being dealt with. It also afforded an opportunity to see whether initial observations were accurate thereby addressing construct validity and member validation.

Once the data was described and analysed, initial transcripts and analyses were given to all respondents, with the exception of one third of the students who were no longer at the school, for their interpretations of the preliminary findings. This developed member validation and provided an opportunity for further insights into understanding the data better and determining how each program has developed over time. These findings are summarized in Appendix 10 and have been incorporated into the final analysis.

9.6 Cross-Case Analysis

Merriam (1998) notes that data often seem to beg for analysis past the formation of categories. The conceptual elements, or categories may be linked in some meaningful way. "A simple model or diagram using the categories and subcategories of the data analysis can capture the interaction or relatedness of the findings." (Merriam, 1998, p. 188) Accordingly, within-case and cross-case conceptually ordered displays provide insights for further analysis (Miles and Huberman, 1994).

Sterling's theoretical framework was used to identify whether ecological or mechanistic metaphors were resonant with the philosophy, management structure, curriculum, buildings/ grounds/ resource use, community relations, and teaching/ learning in a cross-case conceptually ordered display. While acknowledging the dualistic comparison is an oversimplification, it was used to summarize the findings of the case study and as a means to compare the two schools, informing rather than defining. The analysis of each school, used to inform the cross-case analysis, is detailed in the following two chapters.

Chapter 10 – Analysis of Discovery Bay Bioregional School

10.0 Introduction

In the analysis of Discovery Bay Bioregional School documentary evidence, interview

and observational data was used to describe the philosophy, management structure, the

intended curriculum and to some degree the enacted curriculum (Stenhouse, 1975),

buildings/ grounds/ resource use, community relations, and teaching/ learning for their

particular approach to education for sustainability. The experienced curriculum is only

minimally referred to through student responses as learning outcomes are beyond the

scope of this research. The data was analyzed through a metaphorical lens to see if there

is resonance with the education for sustainability frameworks identified in the literature

search (Greg et al, 1989; Orr, 1994; Bowers, 1995; Sterling, 2001; Bell, 2002; Bonnett,

2002; Rauch, 2002; and Webster, 2004), and as summarized in Appendices 3 and 4.

Further analysis of respondents' perceived successes, obstacles and needs in developing

their pioneering programs lends data triangulation and potential grounding of theoretical

frameworks.

10.1 General Description

Discovery Bay is an Independent Elementary School built on bioregional principles. The

school building, a typical wooden house built in the 1950s with an adjacent side yard/

garden, is situated on a quiet side street between two very busy city streets. Next to the

schoolyard is a baseball field and across the busy street at the end of the block is a large

park and playground. From its beginnings in 1997 up until 2002, the school operated on

the basement floor of the house with another Independent School occupying the ground

level and upstairs. The school's Bioregional Educational Association purchased the entire building and grounds in 2002 and so from September 2002 they took over the entire premises. This gave them room to expand and allowed them complete control over the building and grounds.

At the beginning of this study the school had thirteen regular students from K-Grade 7, three home-educated students, two full-time teachers, two part-time teachers, and three community volunteers. Eighteen months later the enrolment increased to near capacity: twenty-seven regular students and four home-educated students, (the maximum being 35 students), with the same staffing and volunteer ratios.

10.2 Philosophy

The documents outlining the philosophy and approach of Discovery Bay show how the intended curriculum of the school has been specifically designed to promote ecological sustainability:

> We are an intentionally small, independent school. Our vision is to provide educational opportunities that empower children to create fundamental social change towards more fulfilling and ecologically sustainable communities. To this end, we have chosen a teaching approach that models bioregional philosophies and provides freedom of expression and choice to students. (Discovery Bay School Website http://victoria.tc.ca/~yj383/oakandorca.html)

Albert, a Director, Teacher and Co-founder of the school comments on his philosophy of

the environment, a belief held by the others involved in the school:

> The natural world is important, as it's a teacher, our home; we are part of nature and always will be. Thinking we are separate from nature is only an illusion we have created. It is inspiration, a place of refuge from the rush and chaos of modern society.

In referring to bioregionalism and sustainability, Albert notes that bioregional education

is many things:

> The definition means life-place, and the study of place. For me it goes beyond. It has various levels: there is the mental/ intellectual level knowledge, knowing what kind of animals, plants etc.; then there is the physical level, actually having the physical interaction - so seeing racoon tracks or having some interaction with that animal or plant; then also having an emotional connection so that it is almost like a friend or relative. In Indigenous cultures everything is part of the Earth family. So bioregional education incorporates all those levels: the physical, emotional, mental and spiritual.

> Bioregionalism is about getting back in touch with the natural world and healing the eco-psychological separation the Western culture imposes on them. Ecological, bioregional philosophy gives a strength and cohesion for the foundation and direction of the school, essential as the school is built on consensus and its raison d'etre is environmental sustainability.

These comments resonate with ecological metaphors of nature as family with intrinsic

value, community and interdependence (Sessions, 1995; Orr, 1994; Betcha, 1998). They

also show that bioregionalism addresses the concerns of Orr (1994) to join intellect with affection and loyalty to the ecologies of particular places.

The intended ecological focus also extends to staffing so that bioregionalism is a model that permeates all aspects of the school:

> All staff at Discovery Bay are expected to role model a bioregional lifestyle including ecological and social responsibility, and are required to observe the Bioregional Educational Association Constitution (Discovery Bay School Website, http://victoria.tc.ca/~yj383/oakandorca.html).

In modelling ecological behaviour, the staff, administration, and volunteers all rode bicycles year-round to the school in all weather for ecological reasons. Some parents picked their children up by bicycle while others drove cars demonstrating a range of ecological commitment given a variety of circumstances.

The educational and learning philosophy is also accords with an ecological approach described by Sterling (2001) as the educational ideals are realized through a cooperative learning process based on the school's commitment to:

- An open school with open classrooms

- Multi-age grouping with non-graded education

- A child centred, friendly environment

- Self-directed learning

- Bioregional practices and philosophy

- Democracy for all participants

- Parent involvement in the education process

- Affordable alternative education

(Discovery Bay School Website, http://victoria.tc.ca/~yj383/oakandorca.html)

The school's Guiding Principles further detail the extent to which an ecological view is intended to be inherent in all aspects of the school from their view of learners and their holistic approach in terms of the learners themselves; and the inclusiveness of the community and natural environment in that learning process (Appendix 7). In putting the guiding principles into practice the School Manual states that their enacted curriculum is also very ecological. It emphasizes child-directed methods that focus on exploration and experience, and encourages risk taking and experimentation. It also has a very integrative view of teaching that emphasizes life-long learning recognizing that teachers are also learners and that learners can be teachers. In this way the school is seen as a community of learners.

In helping students develop a bio-centric view based on an ecological, bioregional philosophy, the Directors, Staff and Parents supported an ecological educational philosophy that is student rather than curriculum centered, based on empowerment, critical thinking and transformation rather than transmission of a set curriculum (Miller, 1996; Sterling, 2001). When asked about the purpose of education and the Bioregional School, Carol, the founder, Administrator, and one of the core teachers of the school

That is a difficult question because education for me is learning to be in the world in a good way and that's all of life so it's a false dichotomy to separate those who are educated and those who aren't. There are so many different peoples and different ways of being in the world that I can't answer that.

Ann, a Director and parent is very clear in her outlook on education and the school's role in educating her children. Her main reason, and professed joy, in joining Discovery Bay School is that her beliefs are shared and consciously promoted throughout every aspect of the school. Ann feels:

Education should prepare my children to be wholesome, full, inspirational and creative members of the community - whether that is the small community or the world community. Within that I would want education to empower my children to develop their sense of independence and sense of responsibility.

In relation to teaching and learning, almost all the Directors, Teachers and Volunteers were in agreement with the underlying ecological philosophy. In Ann's words:

The main purpose in teaching is to encourage the children to learn and to discover for themselves. They are a resource for that, to guide the children and spark that initiative. To sit down and teach the children I would not like to see that happen. I really like the workshops as he can voluntarily join in and they spark the child's interest.

In support of this, Carl noted that:

> Whenever you tell a child anything you deprive them forever of the opportunity to learn it for themselves. I want to find more ways to get them to find the answers.

There was, however, an exception to the deeply ecological view at the school as expressed in one teacher's sympathies towards a mechanistic anthropocentric perspective:

> I've allowed myself to look at the environment from an anthropocentric way, but I see a stronger dependency on a healthy environment than others who have an anthropocentric view. I do not see it as there for us to use. Protecting our basis of our survival as well as the survival of generations to come. The aesthetic values are there but they are not as important as survival. The anthropocentric view helps you reach people who mostly have that.

This was at variance to the bio-centric view held by the rest of the Staff and Directors. Another variance showed up in two of the teachers' educational philosophies. Although both have strong bioregional philosophies there are differences in how they want to enact the curriculum as a result of their mechanistic teacher training. One teacher was only with the school as a teaching assistant for a relatively short space of time. She had difficulty accepting the self-directed aspect of the school feeling students should be given

more direction and less choice so they would be more involved in identified learning

activities. She recognized this conflict and felt she would be better suited to a traditional

classroom approach:

> Multiple approaches, encouraging various ways of responding and
> using multiple intelligences and different ways of learning doesn't
> always happen because the approach of the school is very organic, it
> responds to the moment. I think we do need to plan and bring in the
> community but it can't always be at the moment. That's the biggest
> thing I struggle with at this school, the self-directed aspect, as it goes
> against my training as a teacher.

It is important as well as interesting to note that this teacher is no longer with the school

as its approach was not consistent with her training.

Dave, the other teacher, went into education because he wanted to teach science in

secondary school; pass on his love of science, and its practical applications. When asked

about how a teacher develops learning, rather than refer to ecological values such as

empowerment or critical thinking Dave used mechanistic frames of reference as

characterized by Sterling (2001) by suggesting he would, "Find other examples of what

was to be learned and then test students' knowledge."

External factors of various types were perceived to be major constraints in pursuing an

ecological philosophy. These included conflicts with wider societal norms, and with the

prevailing philosophies of parents, children and volunteers. Carol, for example, argued

that major societal obstacles exist due to the ecological philosophy the school represents

and is trying to develop with students,

> It is hard to do things differently while being part of a society that functions counter to the philosophy. The problem is trying to create a more co-operative system while in a mechanistic system - when other people feel the need and have the need to be part of and are so connected to that outside world that they don't have the time to take part in the community. It is hard not to compromise, take on bureaucracy, hierarchies.

Carl saw further obstacles within dominant societal norms,

> Violence in the society and the commercialism, and consumerism are obstacles. It is an ongoing struggle to fight against these. I think that the biggest difficulty is in setting up a non-violent, co-operative society in a macro society that doesn't have these characteristics. The children are affected way more by the society we live in. I hope we can nurture a cell of co-operation and non-violence and respectful relationship to nature and our bioregion, which can grow.

Carol also recognized there are practical obstacles from the diversity of views held by

parents:

> We live in a society that relies on the motor vehicle and central heating so being out in the elements is a challenge. Can we get used to it when we constantly go between central heating and the outdoors. Parents insist on a warm centrally heated building. So there are compromises as to how far we can go with regulations, practicality and finances.

Further, Carol recognized another obstacle with parents and students that was linked to their understanding of the educational or bioregional philosophy. A conflict has arisen at times when, "The other parent in a split family is not in agreement, or when the child is with the school but parents aren't. The school is not necessarily what parents or the child think it is. Now we warn parents how learning, responsibility and choice work so parents make informed decisions." Judith, a parent, recognized the different philosophy and approach often conflicted with parental expectations. She felt this led to,

> Parents giving up too soon, too fast in feeling their kids aren't doing enough academically while they are here; prejudging. These parents have the mindset of desks in rows and have remarked, "The place is set up as a playschool, how can they expect anybody to learn?" Academic achievements may not be apparent yet although they are developing."

Dave also recognized obstacles initially in working with students who may not be used to the different philosophical approach and a system of self-direction: "Until you are established five to ten years you don't always have a lot of choice or luxury to reject students who don't want to be there. It takes awhile to build trust and a stable student

population who are there for the right reasons". Ann, a parent and School Director, recognized they needed to address this in saying, "We need to bring more students in to sustain the school while maintaining the parental belief in the philosophy. The school needs families open to embracing the approach."

Dave, however, recognized that working with a different philosophy impacts on how successfully they are able to develop a different management strategy that encourages greater parent and student participation:

> We have not had many parent or student initiated changes, we'd like
> to have more. Part of the problem, particularly when it comes to
> parents, is breaking the stereotype of what a typical school is.

Judith, a parent, agreed: as a parent she felt she could introduce a new initiative but, "The only limiting factor is self-confidence in sharing, and not being used to a structure where you can do that." Carol and Tara, both Directors, recognized these obstacles that resonate with Sterling's (2001) characterization of mechanistic approaches and voiced a need to involve parents more in sharing the bioregional philosophy, the teaching philosophy and approach.

Carol also expressed a concern in involving volunteers due to conflicts in educational philosophy:

> We want the kids to do the work in developing the school so there is
> a concern with volunteers expecting to lead and be the focus.
> Volunteers are often looking for alternatives. They often have a
> flashy, attention-grabbing show approach, with a clear plan.
> Volunteers often want more direction; they are not sure what to do. It
> is hard to find people willing to follow the kids' lead or just wait.

June, a volunteer teaching art at the school with mentally challenged adults was able to

follow the students' lead but she also refers to these issues and found there were other

obstacles from her point of view:

> There are limits of time as I am only here one day a week; each child
> is so different it is sometimes a challenge to involve them all, and
> respect all their differences; kids being self-directed doesn't allow
> the disabled adults to take a leadership role and interact more
> directly in organizing the activities.

Carl, a volunteer who is in harmony with the school's educational approach, found there

are obstacles for him as a volunteer specifically because he is not a teacher with a central

role. At times he has been involved with motivating a student and a teacher has jumped

in, albeit with good intensions, and tried to take over. Carl also felt, "A problem with

roles and respect also occurs with students being difficult and not respecting volunteers

feeling they don't have to pay attention to them as they aren't teachers."

Although the lack of a shared philosophy with some of the parents, students and volunteers was identified as an obstacle in March 2002, by October 2003 respondents professed this had become one of the successes of the school. Over that eighteen-month period the school had achieved an enrolment increase having attracted new students and parents who chose the school specifically for its bioregional, ecological approach. Those who disagreed with this approach had moved.

10.3 Organization / Management

The organizational structure of Discovery Bay was specifically designed to model and promote ecological principles of community; interdependence; participation, co-operation, and collaboration where positive synergies are sought; and empowerment. This accords with what Greig et al (1989), Orr (1996), and Sterling (2001) indicate as ecological. This intended curriculum has been enacted by consciously including community members, teachers, parents and students in consensus decision-making relating to the development of the school as well as the day to day running, curriculum development and teaching/ learning activities.

Referring to the purposeful, inclusive organizational structure Albert, a Director and volunteer teacher, states, "Our organizational structure is non-hierarchical so we seek an egalitarian model and we seek to have the children empowered as well in making decisions appropriate to their level." This was evident from the students' perspective as well. When the younger students were asked how ideas were developed at the school one replied and they all agreed, "We have a meeting with the teachers, principal and

volunteers and then if we think it's a good idea we do it." This egalitarian rather than top-down hierarchical management structure was very evident and consistently observed during all school visits.

Although the interview and observational data identified the management structure as egalitarian rather than hierarchical, there was an underlying hierarchy with the Board of Directors; Teachers; Parents and Students; and Volunteers. This developed in order to efficiently manage the school, with each group having different as well as shared responsibilities. This hierarchy was not mechanistic based on top-down control (Sterling, 2001) but egalitarian, encouraging openness, inclusion of all, and consensus decision-making at all levels. In this way the intended and enacted management structure appears to resonate with what Sterling indicates as ecological.

This Medium, or 'hidden curriculum' is recognized in the School Manual as an important management consideration.

> The medium of education is the learning environment, the policies and the procedures; it is the experience of school itself. This is often called the 'hidden curriculum,' for children can learn from things that are not intended to be taught. The classroom rules, the daily schedule, the way the chairs are arranged; all affect what and how children learn.
>
> Our desire is that children feel comfortable and safe in our school, and that they are able to share freely and discuss any concerns. We believe that it is possible to teach children to control their learning environment through self-expression, understanding feelings, open communication, and participatory democracy. (Discovery Bay School Manual, 2002, p. 3)

Carl, a Director and Volunteer notes that changes are incorporated through Board

meetings, teacher's meetings and individual initiatives from teachers, volunteers or

parents. "We try to be completely open to parents. We have encouraged parents to be on

the Board and now have three to four parents who come regularly."

When asked how much control or involvement parents have, Ann emphasized the

cohesiveness of the school community that has developed as a result of its organizational

structure:

> I have a lot of involvement but I would not use the word control. I
> feel the educational values I hold are safe here. Decisions are not
> going to be made without the family. I feel I am working alongside
> like-minded people. If I completely disagreed with something I
> would have faith in the group that they would find a way to step back
> and work it through. I have never felt part of a group that I have felt
> safer with. Everyone is working towards the same ends.

Tara spoke of the successes the school has realized in developing a sense of community:

"Our celebrations have felt like a big family gathering with a whole range of ages from

babies to grandparents." Carl furthered this sense of interpersonal development when

speaking of their successes in working with difficult students through discussion and

consensus.

Decision-Making

The School Manual describes how both adults and students are empowered through

consensus decision-making in stating,

> As a member in our community of learners, each child has a voice in the way the school is run, the policies and guidelines and the things we do. Of course each adult has a voice also. Everyone participates in creating the best possible learning community they can through a process of consensus decision-making. Every concern and every idea can be brought to a meeting of the group for discussion and decisions. In this way, the learning environment, policies and procedures are continuously changing to suit the needs of the current participants. (Discovery Bay School Manual, 2002, p. 2).

Dave emphasized the inclusiveness of this approach:

> Consensus is an important process that happens at all levels of the school. Rather than voting where somebody can be left out, when you use consensus you come up with a solution that works at least a little for everybody. Everybody gets what they need from it. Nobody is completely left in the cold. As a teacher I can sit on the Board and by consensus decision-making my voice is always considered and incorporated.

From attending a Board meeting it appeared that consensus-based decision-making was a

central focus. All persons present took turns speaking to the issues, and had their views

taken into consideration before a consensus was reached. When asked how changes in

using the new school space were initiated, Ann, a parent and Board Member confirms

this process in stating, "Dave and Carol gave their views from a teaching perspective, we talked about it as a Board, and the parents and students were asked their views on large paper where everyone can see other's views to build a consensus."

As the school has grown teachers have taken on more responsibility to make decisions relating to curriculum. This also exemplifies support for decentralized rather than centralized control, a characteristic identified by Sterling (2001) as ecological. As Dave notes, "New larger initiatives, such as the garden, may have joint agreement by the teachers and just go ahead or it may if need be go to the Board level. Tara, a parent and Board Member, adds that, "Many decisions are made by Dave and Carol on site, discussing things at the end of the day. They often bring me in as a parent and ask my opinion." Ann, another parent, emphasizes the strength and reliance on the ecological philosophy in stating, "I feel people step back to the basic principles and the answers come out of that in a consensual, co-operative way."

To specifically incorporate and solicit student, parent and community opinions Community Meetings are held from time to time. Students or any member of the school community can initiate these meetings so their concerns or ideas can be discussed. The students all felt they have had some input and say in these Community Meetings.

Support for the enacted organizational approach is evident in comments made by Ann, a parent:

> Decisions regarding curriculum and new initiatives are made co-operatively and by consensus. I saw it being lived and working when I came into the Board, that I felt was strong and successfully working co-operatively. I see it being lived in the classroom and in community meetings. Just the fact that there are community meetings shows that it works and is embraced throughout the school! It is empowering, I feel completely empowered here. I see parents come in here and volunteers and through their body language they seem empowered.

Although not identified as an obstacle, Carol pointed out there were challenges in developing and working within a school that is based on open, non-violent communication and consensus decision-making. Carol recognized difficulties and stresses arise in having to continually deal with other teachers in co-planning and having different expectations or ways of dealing with the students but she felt they try to work things out and it was "not as stressful as having to work in isolation". With consensus decision-making Carol pointed out, "Your needs are met but not necessarily your wants. The whole group has to agree, kids and adults so it takes more time."

Consensus seems to resonate well with an ecological view by emphasizing inclusion and valuing of all people, collaboration, and seeking positive synergies (Sterling, 2001). It also served to encourage empowerment, essential in environmental learning (Tilbury and Wortman, 2004; Bell, 2005). At the classroom level student empowerment was also emphasized. Although teachers plan the curriculum in co-operation with the other teachers, often soliciting the opinions of parents, volunteers and the students, students are empowered to make choices in their learning activities.

Community Involvement

On the Discovery Bay school website, one of the Guiding Principles states, "We strive to connect children to nature and to a diversity of people in their community." (http://victoria.tc.ca/~yj383/oakandorca.html). The Bioregional information on the same website emphasizes the natural environment as part of that community. The documents all recognize that both the built and natural communities from the local to global scale need to be incorporated into education at Discovery Bay by teaching the B.C. Curriculum in a Bioregional context.

A sense of community is also developed and highlighted through egalitarian rather than top-down hierarchical power structures where all members of the school, especially students and parents, as well as the greater community are encouraged to participate in decision-making committees and meetings.

The School Manual identifies The Bioregional Education Association's vision as a world in which:

- Communities are fulfilling, richly diverse & ecologically sustainable
- All people are connected to and feel part of the natural environment
- Children are connected to a diversity of people in their community
- Children and adults act to maintain and create their communities
- Diversity is tolerated, supported and celebrated

The ecological metaphors of community, interdependence, diversity and empowerment are central to the vision of the School as it is under the direction of the Bioregional Education Association. These metaphors are in line with those Greig et al (1989), Orr (1996), Sterling (2001) and Tilbury and Wortman (2004) have indicated as being important ingredients in taking what I have broadly termed an 'ecological view' in this thesis.

In working towards achieving their community-minded vision, the school's Mission Statement incorporates community statements such as, "we learn about our local bioregion, its natural & cultural elements"; "children, parents, teachers and mentors learn together"; "children and adults participate equally in age-appropriate decisions"; and "choices acknowledge responsibility toward the greater environment". (Discovery Bay School Manual, 2002).

Goals in this intended curriculum relating to developing a sense of community include:

- Act together as a community, learning from each other and participating
- In age-appropriate decision-making
- Learn local history, ecology and geography
- Study local ecosystems and their connection to and reliance upon these
- Discover diverse world views
- Be challenged to act in environmentally responsible and sustainable ways

(Discovery Bay Bioregional School Manual, 2002)

Community support and involvement was emphasized throughout the school as well as

actively through decision-making at the Board level. Emphasizing the importance of

supporting and being involved in the local community, the Board of Directors decided to

support a small local printing business for their advertising even though it was a more

expensive option.

When responding to questions regarding the school's involvement in the community all

the teachers responded with examples relating to the extensive weekly fieldtrips that

explored natural environments within cycling distance of the school as well as the

common daily excursions to local areas in walking distance. Carl recognized, "We've

taken some fieldtrips of the kind of economic and mechanical aspects of bioregionalism

visiting a small factory making fleece, doing embroidery, and visiting a bakery." With

the school having visited the lifecycle farm and a number of businesses Dave noted the

importance placed on incorporating the community more: "Without these places there

really isn't an opportunity to teach it. They make it possible." This comment also shows

how important realistic experiences are to curriculum development at Discovery Bay.

The school has also been involved with developing a native plant garden in the

community. A portion of property was given over to the school to develop as a long-term

project over the years, but involvement in this project has wavered as other projects and

time commitments have taken priority.

When parents were asked about the level of community involvement in the school all could give numerous examples and felt it was a central strength of the school. Denise noted:

> The community is very involved and before I was working I was involved here a lot to offset fees. The school is involved in the community more than other schools. For example, mentally challenged adults are involved and I like my son being around them; there are lots of volunteers in the school; and they also do more things in the community, they go out more; I have been teaching dance here on Mondays.

June is a volunteer who involves mentally challenged adults with the school through an art program. In her words, "The goal of program, from the Center's point of view, is community integration, interaction and independence. I have a personal interest in the school and art." When asked why she worked with Discovery Bay she responded, "It is the perfect school because it is so relaxing and we can all take initiative here. These adults work well with a little structure, small groups and flexibility." When she was asked how she felt about the school's openness she said, " It is really open and welcoming to many different ideas and personalities. I feel we are all part of one community."

June recognized the overriding objective of the school is:

>…to show that it is possible to have a respectful community, a community in harmony while at the same time you need to recognise there are people who are really suffering out there and we can't be too insular about it. If you disconnect yourself from others, you aren't being as holistic. You need to be proactive, not escapist.

By involving mentally challenged adults in the school programs, human diversity is honoured, accepted as normal and is not isolated.

Although all respondents spoke of extensive school/ community integration, there was also an expressed need to improve community connections further through educational experiences. The ecological concept of the school being an integral part of the community is reflected in Carol seeing a need for,

>More co-operation between all different community groups. It is hard to gain support and involvement when there are many other missions and organizations in the community. This will give kids more exposure to people and their experiences and share knowledge.

Dave noted that they had taken opportunities to see community workplaces but recognized, "It is something that I haven't been doing enough of as yet."

Albert also recognized the need to extend their community connections but on a wider

scale. He felt, " Being connected with other bioregional education-related schools, the

larger network that is out there; sharing skills, possibilities, workshops", would help.

In developing a sense of community all agreed that the school was open to parent and

student involvement. Questions regarding how to use the new space in the school

considered student needs as well as multi-use, community concepts. This was actively

sought at the Spring Equinox party, asking the parents and wider community to give their

suggestions over buildings and grounds while maintaining the philosophy. One parent

stated, "I feel the school is dying to have the parents say I want to be involved and share

my time and ideas. They wouldn't say no unless there is an ethical or safety

consideration." Ann, another parent, confirmed the opportunity, encouragement and

openness to being part of the school community:

> I could be part of Board meetings as a registered member of the
> Board or as someone who simply wanted to come. That felt very
> open. I love community meetings with kids, parents, volunteers and
> teachers. The kids were not interested in them anymore so we have
> not had them lately. Anytime I have brought anything up Carol and
> Dave are completely open to any ideas, with the attitude that
> anything is possible, let's try and make it work.

Even though there was a recognized openness to parental involvement, two Directors and

a teacher identified greater parental involvement as a need. It was felt that they were

missing resources in the parent-community, as they were not pulling them in by making it

easy for them. Many parents were contributing in work exchanges for tuition but it was felt more could be involved in curriculum and workshops.

Albert extended this sense of community into how we relate within our natural environment. When asked about his notion of progress in developing a community, he responded:

> We can look at it as the quality of our relationships: how we relate to other people, and how we relate to the land and what is the quality of that experience. Do we pave over an endangered ecosystem to build shops to bring in money? What have they destroyed to create this myth of progress? To me it is the quality of our relationships and our connections. If we can have peaceful relations with all existence - to me that is progress.

This seems to have resonance with Bonnett's (2002) characterization of sustainability as a 'frame of mind' and what John Foster (2001) refers to a 'deep sustainability'.

Field observations on three occasions confirm a strong commitment to community in terms of both the human and natural bioregions. The goals of acting co-operatively together as part of the larger community is evident in the amount of involvement in the local built and natural communities, and in the community's extensive and welcome involvement in the school. All community volunteers, whether they were parents, representatives from a community organization giving a presentation, working weekly to help incorporate art, music or personal mentorship, used terminology such as 'we' rather

than 'the school' or 'they' that gave a real sense of belonging and the school having

achieved strong connections as part of the greater community. This has parallels with

Sterling (2001) who characterizes this as indicative of an ecological view where the local

community is increasingly part of the learning community.

Acting together as a community, learning from each other and participating was also very

obvious in field observations. Interpersonal relationships and communication skills were

central to all activities. Students, teachers, volunteers, parents and directors were

continually bringing concerns to the group. These were honoured with co-operation and

consensus decision-making in impromptu discussions that arose throughout the day as

well as in structured, planned meetings. One of the major impressions on visiting the

school was an overriding sense of belonging, communication, respect and empowerment

at all levels.

The commitment to individual empowerment and decision-making at the school brought

up a question as to whether this focus on the individual was a potential challenge to

community and ecological sustainability (Bowers, 1995).   It was clear that the individual

was seen and treated as part of a greater community and did not have rights that

superseded community needs. Carol, the Administrator stated, "What we are aiming for

is personal learning and goal setting, and personal choice, not allowing something at

others' expense. Our philosophy and guidelines state that there is self-directed learning

in a community context." Individuals needed to compromise and learn to co-operate with

others so that other's learning was not disrupted and the integrity of the built and natural

community was not imposed upon or adversely affected. This accords with the models of

Bowers (1995), Orr (1996), Sterling (2001) and Rowe (2004) who characterize

community having priority over the individual as an ecological metaphor.

Finances

When the staff, parents and directors were interviewed about the successes of the school

all immediately spoke about the obstacles they had to overcome in establishing an

Independent School with minimal government funding. Carl noted, "We started with

zero money and two dedicated people and we exist!" Dave and Carol elaborated:

> We've had five miracles:
> - Finding a place to rent and get started;
> - Getting through the first year regulations in funding;
> - Passing the government evaluation for funding during the next four years;
> - Having the opportunity to buy the school building and grounds and receiving a number of significant anonymous donations to allow an affordable mortgage; and
> - Achieving tax-free status as a charitable society.

Having established the school, one of the overwhelming needs identified by everyone

was growth. Carl noted the school needed, "A growing nucleus of committed people,

parents, and volunteers who care about the school." Tara agreed but recognized they

need,

> The balance between having enough kids to make it financially
> viable and having it small enough so that it is still manageable, still
> possible to run the way we want it run. We've talked about a school
> limit of about forty. If it got much larger we would like to split into
> groups.

Ann realized, "A gradual attrition would challenge the school. Maintaining a diverse age

population will be important." The students also recognized the benefits of a larger

school. The younger students suggested the school needed more students and the older

students suggested, "A bigger school would have more friends."

With the increased enrolment, in the eighteen months between field visits, came the new

need to manage the larger numbers of parents and students while maintaining their

philosophy of non-hierarchy, consensus and community. They are aware of the need to

keep necessary bureaucracy under control so that it doesn't become an obstacle to

communication.

In maintaining the school's growth and development, all the parents, teachers, volunteers

and directors identified finances as the major obstacle as it affects parents, staff, the

curriculum, the building and ultimately the continued existence of the school.

Dave recognized the extent finances influence the school's development. In this light he

felt the school needed,

> A stable student population that is large enough to survive if students drop out, and to help this way of educating catching on so other schools will develop. The limiting factors are not enough reputation.

Carol noted that, "Finances are always an issue. Finances mean we need to access government funding. Fundamentally I believe parent should have access to their funding they pay for in taxes and not do it all themselves, that's why we wanted to be a funded school". Ann agreed the school should be a government funded school but also recognized the tenuous position this put the school in, "The government is unpredictable in their policies and they can affect the school finances."

Ann spoke of particular financial considerations facing parents and the limitations faced in raising finances through tuition, but within a context of optimism:

> Finances are a difficulty because people who have chosen to have one partner work, or neither because they believe in downsizing, will not necessarily have a large income to support an independent school. This will be a challenge and an opportunity to make this work. We will need another way to develop a community that shares and trades in other than money. You can live with less and maintain those choices.

Although the school has been able to buy their grounds and building, Tara, a parent and school director, voiced the ongoing immediacy of financial concerns the school faces when she said, "I worry about the finances as we need to pay the mortgage."

The need to stabilize and secure a sound financial base continued to be a top priority during the October, 2003 follow-up visit. Albert recognized, "A need would be to establish our own finances, as an ongoing basis, to do what we want to do as we don't want to have high fees because we want it to be accessible." There was also the need to develop a depreciation account for building maintenance as the building continues to need repairs and upkeep. In addressing financial needs, Carol identified the need for help or direction in running and developing Independent Schools in terms of accounting and fundraising so they are able to access grants and information on finances.

It was also identified that financial security would allow the school to pay their teachers a more realistic salary, thereby encouraging a long-term commitment. This is a concern voiced by all the Board of Directors as, "The teachers don't make near as much as public school teachers". Carol has recognized finding another teacher may be very difficult as many have voiced an interest but cannot afford to live on the low wage. To ensure continuity of teaching staff it was recognized that teacher wages needed to be increased to a living wage, at least two-thirds of the Provincial Wage Scale. These concerns seem justified, as the new teacher has indicated finances may affect teaching continuity, as she cannot afford to stay with the school for too long, due to the low wages.

Staffing

In March 2002, even with extensive parental and community involvement, there was still a potential for the staff to be overworked. Tara, a parent and Director, was concerned

about the pressures the teachers face, "I worry about the teacher's load. I'd like to see another teacher in there to take some of the load off Carol so they would be able to take time off for professional development and holidays." Carl agreed, "The risk there is burnout. I struggle with Dave and Carol to take two weeks holiday a year." This seems to be well founded as Carol recognized she worked flat out but saw even more time was needed to help develop the school, "The trouble is trying to find the time to collaborate and communicate with other non-profit organizations." Carol noted the time it takes to train someone is also a deterrent especially if she needs to do it every year. She was also reluctant to hand things over and find they aren't done to her standards.

Students also recognized the need for another teacher. When the older students were asked if they got the attention they need to develop their learning in something they choose one boy stated, "No, probably not. There aren't enough teachers; they have to go back and forth. We should get more volunteers; but volunteers aren't trained." Another boy added, "I feel like I've just had enough time in this school and it is time to move on." When he was asked what another school would offer that was different he replied, "More attention, more education, more direction".

In September 2003 the school hired a new core teacher allowing Dave to work part-time offering science workshops in the afternoons, math to the Intermediate students in the mornings, and Bioregional fieldtrips on Fridays.

Future Planning

The future action plan was due to be discussed at an upcoming Visioning Meeting. This school is very forward looking, thinking about how to develop with such a specific meeting being planned as an integral part of running the school. Two thoughts that were discussed were the possibility and implications of expanding to a high school level as the students mature; and expanding the school through a Distance Education program. This type of program would provide curriculum through the Internet to distance students. In this way it would provide enrolment income while not exceeding the maximum physical number of students the building can accommodate based on fire regulations.

The follow-up visit in October 2003 showed many of the management and organizational obstacles and needs had been met due to this increase in enrolment to near capacity of twenty-seven students: increased finances, decreased teacher workload, steady enrolment, another teacher, and a larger school community. The school has also been able to maintain access for low-income families, as the school has been able to succeed in spite of collecting only 45% of the tuition fees.

10.4 Buildings, Grounds and Resources

Discovery Bay's aim is to develop ecologically sustainable building infrastructure and grounds for learning and play, seeing them as part of the hidden and overt curriculum. Both the outside and inside environments have been thoughtfully considered and model ecological practices wherever possible.

The playground has incorporated edible gardens, natural materials for building and playing with, composting and using rainwater, and a covered seating area so students can be outside in all weather. Expanding the gardens and building the soil from its original gravel cover has developed the school grounds. This was done through parents adopting a plot, student workshops in the spring, and help from staff and volunteers. Most of the gardening continues to be done by Dave although some enthusiastic students helped with the planting and weeding. A pumpkin and some potatoes were harvested in the autumn but Dave and some parents took them home, made a pumpkin pie and potato dish and brought them back for the Equinox Party. Not having a kitchen organized at the school yet the students were not able to cook the vegetables themselves.

Carl, a Volunteer and Director, thought the grounds were getting there but still had a ways to go:

> We are getting rid of playground equipment and will put in a river system and natural habitat; rainwater collection; growing edible plants. The building is in serious need of repair so we are fixing it ourselves. We'd love to put in solar panels, windmills and get off the grid; get reused materials from construction companies; and build natural shelters in the summer.

All those interviewed felt they had total control and influence over the buildings and grounds. Dave noted that, "The Bioregional Education Association owns the building so now the Board of the Association has total control within government regulations."

When asked about influence and control over the building and grounds a parent responded positively saying, "I have given feedback and it has been responded to, and we have talked it over; I can also do work on the grounds if I need to work off time for my fees."

The older students felt they have had input into changing the grounds and their ideas have been listened to. The younger students volunteered, "We are going to make a garden but not in the winter." When asked if the grounds were ecologically managed Dave, a teacher, said:

> Yes! No pesticides, fertilizers, and we add only soil that is said to be organic. The playground equipment is being replaced with outdoor gardens and natural climbing equipment. All materials are recycled and brought to school by bicycle. The edible gardens are watered from rainwater piped from collecting barrels.

Feedback from the parents on ideas for developing the grounds and use of building space was compiled at the Spring Equinox party in 2003 after the school took over the entire school building. Further plans to develop the outside area as a natural learning environment incorporating water, native plants and habitats for animals; a water play area; a water stream kids can circulate and pump back upstream by rowing; a bug study area; sitting area; playhouse; woodchip paths; a climbing tree; stepping stone paths; a granite boulder; fruit trees; a bench; and a decorated concrete pad for ball play, building

toys, skipping, picnic tables, planters, and a sand box. These plans show the active, ongoing development of the school.

Further sustainable energy and resource modifications to the building are planned as budgetary considerations are met. Suggestions for the use of the building incorporate various learning stations such as a kitchen, an art/ pottery area, a woodwork space, library, a music room and a science centre. There were also suggestions for specific workspaces for the lower elementary students and a separate one for the older elementary students.

Carol, the school founder, recognizes ecological management as one of the school objectives and built in structures of the school. "As a result we are often fighting with people in the other extreme wanting for example to use olive oil to oil our bicycle chains." When asked about school supplies being made from sustainable resources, Dave's response shows how conscious they are of sustainable resource use:

> Not always, but we consider that for anything we purchase. We use almost exclusively paper that has been used on one side. We use tree-free paper for our photocopying. Mistakes in purchasing tend to get pointed out e.g. too many book purchases rather than using the local library. Any cleaners or soaps must be scent-free. We use peroxide bleach rather than chlorine bleach and use only natural chemicals in science experiments.

In recognizing a number of successes the school has achieved in ecological management of the buildings and grounds, the Administrator, Carol, identified a number of obstacles, "There are compromises as to how far we can go with regulations, practicality and finances. This can be improved with time, priorities and finances." Tara, a parent and Director noted, "The building is restricted by bylaws and finances but we actively consider ecological issues when they come up."

Although not everyone agreed, Dave had concerns in the school being located in the centre of the city. He felt they needed a "Better location, but we are centrally located allowing access to many areas by bicycle". Albert agreed seeing there were obstacles in,

> Attempting bioregional education in a not-so bioregional place. There is not the wilderness within immediate access on a daily basis so learn what we can with what we have. We get food from the store as we do not have enough land to grow all our own food. We are certainly going to plant fruit trees and berry bushes for the kids to eat when we modify our school grounds.

Carol felt this was not an important obstacle as being in the city made it accessible to students and many diverse natural areas. It also provided an urban environment that is an important aspect of bioregionalism. Moreover, she pointed out, it is the predominant environment the majority of people live in.

As a parent, Tara recognized the efforts the school is making to control the potential negative impact of the 'hidden' curriculum, and in making the students aware of their environmental impacts, by purposely not having garbage bins in the school. "The students must take their lunch garbage home so they notice what garbage they generate; the environment and what impact they have is intrinsic in planning events."

This lack of obvious garbage bins, the use of personal mugs and personal towels and the often-seen notices for a scent-free environment show how the school has considered how the hidden curriculum can model bioregionalism by practicing ecologically-minded behaviours within the larger urban setting. This has resonance with Orr's (1996) and Sterling's (2001) contention that ecological management of buildings, grounds and resources, linked to educational curriculum and experience is characteristic of an ecological view and an important consideration in education for sustainability.

10.5 Curriculum

The Discovery Bay Manual (2002) summarizes their intended transformative, ecological curricular emphasis:

> We believe that upon maturity our children should be able to:
> - Communicate effectively
> - Cooperate within diverse groups
> - Create consensus
> - Solve problems in various areas and using multiple methods

- Think critically and challenge the status quo

- Visualize alternate futures

- Motivate themselves to learn and act

- Act thoughtfully, both individually and as a community and consider the ecological ramifications of actions taken. (Manual, 2002, pg. 2)

The Discovery Bay Manual (2002) and Handbook (2002) identify the curriculum as being made up from their own bioregional curriculum and the B.C. Government Curriculum Guidelines and Intended Learning Outcomes. When directors, staff, students, parents and volunteers were interviewed about the focus of the school curriculum it became apparent that most had a dual conception of the school curriculum: the B.C. Curriculum and the Bioregional Curriculum, although all clearly felt the bioregional aspect was the 'raison d'etre' and core of the school. In contrast, and in keeping with the curricular documents, Carol and Albert (school founders) referred to the entire school curriculum as bioregional education.

The Bioregional Curriculum

The Bioregional Curriculum is defined in terms of the four categories of: Taking Care of Self, Building a Community, Knowledge of Our Bioregion, and Global Understanding. These are defined more specifically in Appendix 12. In Taking Care of Self the curriculum focuses on self-awareness, confidence, skills, knowledge and understanding one's place in nature. Building a Community brings out participation, co-operation, meeting the needs of the community, understanding natural communities and human

reliance on the natural world. Knowledge of Our Bioregion incorporates components of the bioregion and ecological principles as well as knowledge of cultural, social and economic patterns. The fourth level of Global Understanding brings out global components and systems as well as global issues and concerns. This is consistent with an ecological nesting metaphor (Webster, 2004).

Discovery Bay has also developed a curriculum diagram, shown in Appendix 11. In addition to identifying Bioregional Education and the B.C. Curriculum as aspects of the overall curriculum, this diagram also identifies the areas of Independent Learning, Democratic Community of Learners, Elders and Kids, Apprenticing, and Child-Directed Learning as pieces of the curricular puzzle. Although these other areas, with the exception of Child-Directed Learning, are not developed further in the documentation, their themes are apparent in the approach described.

Child-Directed Learning is further explained in Appendix 14. The centre of the circle identifies "Children's Natural Curiosity and Innate Need to Learn" as the core. Around this core is: "Through a holistic approach with learning occurring naturally and in context" and "Students need not be aware of traditional subject areas". Within the edges of the circle are independent learning skills such as: communicate, inquire, understand, conceptualize, experiment, problem-solve, seek new perspectives, plan, and take action. On the outside of the circle are skills, knowledge, concepts and understanding as well as the traditional subject areas of science, social studies, mathematics, reading, writing, physical education, drama, art and music.

This diagram is very telling in how deeply rooted a holistic, ecological view is in Discovery Bay's curriculum. Holism, integrated critical thinking, and community are conceptual ecological metaphors (Greig et al, 1989; Bowers, 1995; Webster, 2004) that resonate throughout. The focus is on the student becoming a self-directed, independent learner in a community context. This precludes learning any particular subject matter. Albert felt that,

> The main thing is to develop the capacity to learn and the skills of awareness as that, itself, opens so many doors. Sure the knowledge of nature, of community, of technology, of society are all important as well as how do they all fit together and relate to that person's reality - knowledge of what it means to be human in its broadest sense and live in harmony with the Earth, including knowledge of all life and culture around you. Bioregionalism relates to your place as a beginning starting from your immediate area to your bioregion which is the Earth and the Universe.

By focusing on the child's natural curiosity and innate need to learn, and in being purposely child-directed, the intended and enacted curriculum is open and responsive to individual and community needs based on negotiation and consent – qualities identified by Sterling (2001) as representative of an ecological view. This is also the case with Discovery Bay's stated and observed emphasis on local, personal, applied and first-hand knowledge and interdisciplinary learning. The Manual goes on to state:

> Learning is an integrated process. Problem solving, critical thinking and cooperation are life skills that transcend all subject areas. More importantly than specialized knowledge, students need to know how to learn and how to make connections amongst the things that they know. Integrated studies are well suited to developing a mature understanding of the world and an ability to think clearly to affect social change (Discovery Bay School manual, 2002, pg. 8).

This explains and summarizes well Discovery Bay's bioregional curricular emphasis, one that resonates with an ecological rather than mechanistic paradigm that focuses on discipline subjects.

The B.C. Curriculum

In order to receive 50% funding from the B.C. Ministry of Education, Discovery Bay incorporates the B.C. Curriculum Learning Outcomes, outlined in the Integrated Resource Packages (IRP) for each major subject area. As the government does not specify how these learning outcomes must be taught, or what texts must be used, "Teachers use these documents and the learning outcomes in them to prepare individualized activities and to provide encouragement to students." (Discovery Bay Manual, 2002, p. 8).

The Discovery Bay Manual (2002, pg.2) describes how the B.C Curriculum is perceived, interpreted and intended to be incorporated into the overall school curriculum:

> The IRPs are well thought out and include the set of learning outcomes that most people feel are important for a generalized, well-rounded education. At Discovery Bay, learning outcomes are met by students at their own pace. Topics in some subject areas are covered in a four-year cycle as well as when individuals show an interest. In this way all topics will be covered at least once every four years.
>
> Programs in Mathematics and English Language Arts are developed individually based on readiness, interest and prior understanding. Children are constantly learning - always constructing meaning, inventing and discovering skills, concepts and ideas. When a child is interested and ready, learning is quick, enjoyable and meaningful, not forced or frustrating (Discovery Bay Manual, 2002, pg.8).

The stress throughout the manual is on what Sterling (2001) and Webster (2004) characterize as the ecological metaphors of an integrated and emergent curriculum based on the individual learner rather than on specific grade levels and classes:

> Our program differs from many other educational programs in that the daily curriculum for each child emerges from that child's interests and experience. The learning goals are recorded once they are met; they are not always planned in advance. Children are encouraged individually to progress in their learning, but even during whole group activities, it is each individual who progresses, not the group as a whole. (Discovery Bay Manual, 2002, p. 3)

While teaching the B.C. Curriculum, Discovery Bay tries to avoid the B.C. emphasis on specific discipline learning outcomes at specific grade levels by focusing on individual needs and interests. Although government regulations presented various obstacles to cope with, Carl was surprised that offering a different curricular approach was not an obstacle in itself: "We have a few restrictions from the educational system but it turns out

what I thought was a rigid bureaucracy in our case has been incredibly nurturing. Once

we passed the initial inspection, they gave us four years, it's wonderful."

When Albert was asked about successes of the school he spoke of establishing a

significantly different curricular approach while still receiving government funding

> Carol has been able to walk the fine line between being an
> Independent School, having our own freedom, and being somewhat
> connected to the Ministry of Education where we get 50% of our
> funding.

Being partially funded by the B.C. Ministry of Education has presented some interesting

challenges. The British Columbia Curriculum for Elementary grades is defined in terms

of Learning Outcomes for the subjects of English Language Arts, Mathematics, Sciences,

Social Studies, Physical Education, Fine Arts and Personal Planning. According to the

B.C. Ministry of Education:

> The learning outcome statements are content standards for the
> provincial education system. Learning outcomes are statements of
> what students are expected to know and do at an indicated grade;
> they comprise the prescribed curriculum. (B.C. Ministry of
> Education, 1998, http://www.bced.gov.bc.ca/irp/curric/lo.html)

As indicated above, these learning outcomes are specific to grade levels and separate subjects. It does, therefore, emphasize discipline-centered learning and encourage age-specific achievement levels in each of the content areas. In contrast to the Bioregional curriculum, the intended B.C. curriculum seems to accord with what Sterling (2001) characterizes as a mechanistic educational paradigm in that it is detailed and largely closed; incorporates de-contextualized and abstract knowledge; and focuses on disciplines.

Interestingly, Carol recognized this conflict noting that being a government-funded school helped financially but also created obstacles for their curriculum as, "The government curriculum and evaluations are hoops to jump while trying to retain your philosophy and approach."

Observations confirmed how the Bioregional philosophy and approach that focused on holistic, integrated learning was challenged by the B.C. curriculum. Although the B.C. curriculum is delivered through optional workshops it was more structured and obviously discipline-centered, particularly for the older students. This was particularly evident for science and math in the Intermediate class as these subjects are identified as separate and taught by a different teacher. Diane, the new core teacher, focused on language arts to start each day with Dave coming in for math lessons around 11:00a.m. By taking a fragmented, discipline-centred approach the enacted curriculum is imbued with metaphors that are associated with what Greig et al (1989), Bowers (1995) and Sterling (2001) characterize as mechanistic.

The negative impact of being so discipline-centered with different teachers teaching different subjects became apparent when an opportunity for integrated teaching was missed. Although the core staff are trying to co-plan continually and they are trying to co-ordinate curriculum and fieldtrip content, Dave planned his science and math content quite independently. This was glaringly apparent when a workshop on solar cookers was happening in the core classes upstairs while Dave was busy downstairs planning his science workshops for the afternoon. He was unaware the workshops were happening and when they were called to his attention he did not go and see what was taking place. Even though some potentially engaging math and science was being introduced and taken up by the students, it had to be dropped, as Dave did not incorporate it into the following math or science lessons. Instead, he had the students drop their investigations and get involved in some completely unrelated math and science concepts. This enacted curriculum, influenced by the B.C. curriculum, was counter to the intended bioregional curriculum that stated students need not be aware of subject boundaries.

The Hidden Curriculum

The school manual also focuses on the 'Medium' or 'Hidden Curriculum'. Although it relates to the school organization and management it is worth noting here as Discovery Bay have identified it as having an impact on what students are learning - overtly or covertly.

By recognizing the hidden curriculum and its powerful effect, Discovery Bay has specifically attempted to avoid top-down control, competition and individualism, and encourage community, co-operation and interdependence. In this way the school has specifically tried to avoid being imbued with what Sterling has characterized as mechanistic metaphors in favour of those that are characterized as ecological. The school's focus on bioregionalism is obvious and gives it a core identity that is educating for and modelling sustainability. Addressing both the overt and the hidden curriculum is a constant consideration amongst parents, teachers, volunteers and community partners.

Curriculum Development

When Albert was asked how the curriculum was developed along Bioregional lines given the fact that the school follows the B.C. curriculum he responded to the complexity involved:

> That, and we have self-directed learning. We try to get harmony with the three of them but it is not always possible. So it is a balancing act and sometimes we try to get to do more reading or writing or things like that. I'm trying to get them to have fun in sit-spots and do more awareness games and do tracking, etcetera; and then what is it that they are interested in doing? Then there is the process of integrating it. I believe we should see what their interests are and then see how to weave that in and then weave in what we learn in terms of the bioregional curriculum, for example: bringing in journal writing or a writing workshop into the experiences gained in the bioregional activities. My concern is more with the self-directedness and the bioregional curriculum. The philosophy is that they will learn way quicker and way more when they are interested in something.

Given the emphasis on self-directed learning, Dave, then the Intermediate Core Teacher,

was asked how they melt the Government curriculum and the Bioregional curriculum.

He responded:

> In some ways they are not separate because there is a lot of overlap. We write observations on students when they do something new on individual checklists, if they are lacking in an area we bring up specific things to address that with a specific activity. We also look at checklists of topic areas to see if we are covering those. We work on a four-year rotation in science and social studies. Some bioregional aspects are covered every day/month/year.

Rather than being taught as a specific subject, bioregional education is integrated

throughout the school and curriculum. When Tara, a parent and director, was asked how

bioregional education is incorporated she responded:

> In fieldtrips, geography, natural history; in the school culture in awareness of environmental behaviours, for example, students must take their lunch garbage home so they notice what garbage they generate; the environment and what impact they have is intrinsic in planning events.

Ann, another parent and school director, supported this notion that bioregional education

is infused into the culture of the school when she was asked if bioregionalism has a focus

in the curriculum. She responded:

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I don't think it does. I don't think having it as a part of the curriculum is the way forward. Here is comes naturally as part of everything. It is incorporated on the fieldtrips on Fridays by learning in the environment; by the types of craft materials that are available for example: reused paper; by travelling by bikes; development of the playground as a natural environment with water being pumped up to the top with a row boat; by a balance beam brought by bicycle.

Dave, a core teacher, concurred noting, "Bioregional education tends to flow more than being planned as a workshop. With more experience you can pull things out of nowhere and deal with the moment as it comes."

The students also felt that bioregional education was a big part of the school curriculum in a variety of ways. When the older students were asked what bioregional education means they replied, "It means environmental, helping plants and nature." (F); "We get more choices in what we want to learn." (M); "More self-directed." (M). When asked if they learn about the world around them the younger students' responses were, "Yes, of course. We have to ride our bikes on fieldtrips." (F); "We go to the beach and park." (M); "We learn a lot sometimes." (M) "We learn about nature! Snakes" (M) "We learn about plants too. There is tons of stuff like yew trees, birds, flowers." (F)

When the older students were asked about how lessons about the environment are brought into their learning they replied, "Through field trips, planting trees, animal tracks, nature house, birds."

Resonating with what Sterling (2001) characterizes as an ecological view, curriculum

development was very emergent and collaborative. Dave emphasized that the curriculum

has developed by experimenting with different approaches over the years. "Constantly

going back to books and literature that relate to bioregionalism help develop the

curriculum." Ann, a parent and director, also mentioned topics being taught in four-year

cycles, noting this, "…gives the kids time to experience all the education they need to in

a self-directed way. I see Dave and Carol nudging the kids sometimes and lighting the

spark of interest in an area." Tara, a parent and Director, also recognized the child-

centered approach noting the curriculum was designed and developed in workshops by

Dave and Carol based on the kids. When Dave was asked how he decides on what is

taught in his class he responded:

> A large part of the decision is mine. It probably should be more with
> the students. I'm still trying to figure out the formula on that.
> Students have their own learning goals; I make suggestions.

When asked how a subject like math comes in Dave replied:

> A number of ways: sometimes in a particular math lesson they have
> choice in participating in; a question suited to a particular individual;
> through selected readings related to math. This may be done
> separately or may be integrated through an individual student
> project.

Carol, however, is less discipline centered. She starts the Primary class' day with 'Investigations' that integrate math, science and social studies, then she continues with 'Communications'.

To facilitate an integrated bioregional curriculum and the B.C Government curriculum, the two core teachers do a lot of joint planning and curriculum development. Given the involvement of other part-time teachers with expertise in Bioregional education and volunteers, constant communication is an essential, daily component of the organizational structure.

The amount of co-operation and extensive communication is evident in the planning of social studies where Diane and Carol are co-planning the year's curriculum, and in planning the science curriculum where Dave is working closely with the greater school community. Even though Dave is the science teacher and has many ideas of his own he could not tell how science was going to be taught until he spoke more with the core teachers and the parents at the Visioning Meeting, due to be held the following week. Either way, group as well as individual study options would be available.

Although this is seen as a positive aspect of the school, the new teacher, Diane also found it to be a source of frustration. She is finding that with the extent of co-planning and parent involvement everything takes twice as long. Decisions are all jointly made and

therefore they take time to come to consensus. The social studies curriculum was delayed because of joint planning between Carol and Diane and finding the time to meet. Dave, on the other hand, who is team-teaching for the first time, is finding it a positive experience teaching and sharing ideas with others.

However, as shown earlier, this integration in the enacted curriculum is easily broken down with the influence of the discipline-centred orientation of the B.C. curriculum, which has been characterized as mechanistic (Sterling, 2001) and identified as an obstacle by respondents, and with a specialist teacher in science and math.

Although the curriculum is subject centered and mechanistic at times, it is not at others when projects are developed. The follow-up visit in October 2003 showed the new teacher initiating more planning and structure, with projects and themes being scheduled with workshop options. These workshops were often connected to science and social studies themes and incorporated art, music, drama and language. This showed an active development and belief in emergence in the school. The new challenge seemed to be balancing the new structures and timetabling that the new teacher introduced to help focus the older students with a flexibility that would allow an integration of traditional subject boundaries and self-directed learning rather than teacher-led learning. This also was recognized by Carol, "Ideally, in addition to volunteers, we'll have two main teachers for each group: one that provides a group option and one that oversees individual initiatives and projects."

As the curriculum seemed to be very open and flexible, questions were asked regarding

who made curricular decisions. In keeping with the content of the curricular documents,

full participation from all those involved with the school was emphasized. Dave noted,

"We share all developments in the school and constantly discuss how we can change/

improve things." Carl, a Director and classroom volunteer noted that curricular decisions

were made, "…In principle by discussion and consensus. Interest from some parents

certainly feeds in. Developments are all shared. Carol and Dave have regular meetings I

try to get to."

Carol, the Administrator and Core Teacher, noted that,

> Anybody who is interested in doing something (parent, volunteer, anybody), can get together with teachers and arrange it. Parents can offer learning activities and we take them up on everything they offer while giving them suggestions and guidance to keep with the philosophy and sensitivities of the children.

Tara, a parent and director, supported this to be the case noting, "One way I've been

involved is by bringing a particular interest such as music into the class. I have a feeling

that if I had taken a real issue about something I would be listened to."

The older and younger students noted that usually the teachers decide on what workshops

are given but, "We can decide to go or not." When asked if any of their suggestions

would be listened to one of the older students replied, "I'm thinking this school is kind of

like home-school because you have much more freedom." All students in the school

agreed that they were empowered to make their own learning decisions. One of the

younger students put it in very practical terms, "If we come up with an idea and ask

before school is over we can do it." When the older students were asked about choices in

what to learn they responded, "It is totally open; it has to be something about learning."

Fieldtrips

In developing the B.C and Bioregional curricula, one day a week is committed to Field

Studies. The School Manual (2002, p. 8) states:

> Field studies are an integral part of an experiential learning program.
> Weekly field trips to places of natural and cultural interest bring
> authentism to classroom studies. They nurture connections with our
> cultural and natural heritage and with the often hidden adult world.

Fieldtrips are a weekly aspect of the curriculum to ensure students are learning outside

every week, developing ecological intelligence. Having them every Friday makes

preparation from home easier; accommodates students who come only on certain days;

and ensures they get out every week so the curriculum has a strong ecological context.

Albert explained the significance of these fieldtrips:

> Part of bioregionalism is learning about place so a big part of that is
> learning to read the landscape. It is one thing to read the alphabet and
> books but there are very few people left on this planet of humans

who know how to read the landscape. People are so unaware of all that is around them that it is really hard to read the landscape anymore. That's why we have the ecological and social problems today. It is trying to develop ecological literacy.

Accordingly, fieldtrips provide more integrated options for teaching science or social studies in a bioregional context. As the Bioregional Curriculum is not clearly defined and laid out, topics or themes come from the B.C. Curriculum in science or social studies. Fieldtrips, then, are either nature or culturally oriented but try to be interdisciplinary by offering a more integrated mode of learning. From September 2002, the core teachers were working together with Dave, the fieldtrip co-ordinator, to link the fieldtrip content to the classroom learning with cross planning between science and social studies.

Within each fieldtrip there are two required workshops in the morning that may involve sensory experiences or wilderness skills as well as optional workshops in the afternoon that develop as an emergent curriculum from earlier experiences and interests or from a theme of Nature Explorers that may involve mapping, tracking or bird language for example. These workshops would be more in-depth than the more general required workshops. If they choose, the students can opt for free time to explore on their own.

Ecological Intelligence

As bioregional education seems to be integrated as a theme into all aspects of the school and curriculum, questions relating directly to ecological intelligence were asked to determine the extent of it's incorporation according to the more tangible terms identified

by Orr (1996) of: biophilia (love of nature); developing a land ethic; immersing

experiences in the natural environment; ecological principles; slow knowledge

(knowledge that takes time to develop, often taught by elders); critical thinking;

empowerment; other cultural philosophies. Other aspects of ecological intelligence relate

to incorporating active learning, cognitive as well as affective, spiritual, manual and

physical experiences into the curriculum (Orr, 1996).

As Albert was one of the school founders and presently acts as a Director and one of the

principle bioregional educators on fieldtrips, he was asked what he considers to be the

ecological intelligence that is fostered through the school. He responded:

> It is connected to ecological literacy and relates to the physical,
> mental, emotional and spiritual dimensions of the person. It is the
> ability to respond appropriately. If we are getting feedback that there
> is climate change, loss of biodiversity, loss of soil, air pollution and
> we are not doing anything about it, in terms of ecological
> intelligence we are pretty unintelligent. The ability to read the
> landscape and to have that connection with the landscape in all those
> different realms would show ecological intelligence.

When Albert was asked specifically about whether they incorporate biophilia he replied,

"Yes, that is the emotional. An approach to mentoring is to know the spirit before the

name. It fosters that connection and love of the land." The older students wholeheartedly

agreed that they were learning to love nature. When the younger students were asked if

the school taught them a love of the natural world they replied, "Yes, by going outside a lot."(F); "We eat outside and do work there." (M)

Lisa, a learning assistant teacher felt they were developing biophilia as, "They see by example and we talk about respecting the environment and being sensitive, appreciating and respecting." June, a volunteer who has been teaching art with the students while integrating mentally challenged adults into the class felt the students are developing a real love of the land and animals through art activities and discussions, "…they are now beyond thinking they are so cute based on their looks."

Dave thought they were consciously incorporating biophilia but in subtle ways in developing a sense of place and in respecting other creatures. He gave as an example that the class came to the realization and practice that, "With a hurt bird it is better to stand aside and let nature make the decisions".

Regarding the development of a land ethic Albert noted that:

> Especially on the fieldtrips we are learning how different areas are sensitive so what is appropriate in each area and at what times of the year. Knowing your effect on the space that you are in is part of ecological intelligence: knowing your effect on other people, on animals and plants.

In support of this Dave mentioned that they teach the students not to walk on wildflowers and Carl has been successful in getting the students to walk barefoot if they walk off the path so as to tread softly and avoid damaging plants and wildlife. In addition to the fieldtrips Lisa noted that the school does a lot of gardening and are developing the grounds.

Fieldtrips that happen every Friday as well as topics encouraging outdoor activities that arise daily ensure immersing experiences are central to the Discovery Bay curriculum. The older students were very enthusiastic about whether they felt they learned outside very often responding, "Oh, yes! On fieldtrips every week." (F) When the younger students were asked where their learning happens they all agreed, "Here inside the class and outside. It is usually outside a lot." (F)

When asked whether the school incorporated ecological principles in the enacted curriculum, and if so how, Albert replied,

> Yes, through workshops and mentoring. We are building experiences first. The principles are being learnt more unconsciously now. There is a progression in learning, developing a sense of place. So depending on their age and how long they have been with us will influence the level of their learning. Many of the ecological principles are more intellectual concepts and I feel that we rush into wanting kids to understand the intellectual aspects of cycles or diversity without having the experience of that. So that is why I say we build from the experience of that and are seeing it over time before they are given the names.

Carl also felt ecological principles were an integral part of the curriculum but were not taught in a focused lesson format. He felt it was hard to identify how or when these were taught, "…because this is such an organic process at the school. All of us who interact with the kids are conscious of trying to find opportunities to talk about ecological principles as we go. The evolution of the fieldtrips is the really important part of that."

Dave concurs with this integrative approach stating, "At the level of these kids (ages 5-9) there is only so much you can do with that. We bring it up but don't force it on them. We don't run workshops to teach them but we consciously bring ecological principles up to work them in, often through stories." Ann agreed adding, "They are threads that are woven through."

Consciously trying to incorporate ecological principles throughout as an integral part of the curriculum rather than in a focused lesson format suggests these ecological metaphors resonate with Bonnett's (2002) concept of sustainability as a frame of mind. It also is associated with Bell's (2002) argument that these conceptual metaphors are more influential in environmental sense-making than knowledge-based metaphors.

This approach seemed to be effective in the experienced curriculum as interviews with the students revealed an extensive ability to give examples of various ecological principles. In response to questions about interdependence such as, 'Are things connected outside?' younger students replied, "Sort of. Birds live in trees and trees live in

soil and they need water." A number of older students also gave examples of food chains. When the younger students were asked where they get their own personal energy to go bicycling they responded, "From food: plants, -water, -soil, -seeds -and the sun!". All students also understood the principle of cycles with examples such as the water cycle. Similarly both classes of students exemplified principles such as energy flows, diversity and community through numerous examples.

When asked whether slow knowledge was coming into the school, Albert replied, "At the school it is coming slowly. It is building the connections so it is almost invisible in terms of the teaching that is happening. It is planting seeds through their experiences." Tara agreed recognizing that slow knowledge was incorporated, "In plant lore, talking about Native Peoples and different cultures, and through our school rituals at celebrations."

Lisa saw it coming into the curriculum through books they choose to read and through Carl who is in his seventies. Carl agreed saying, "Some of that is coming in. I try to talk openly about things concerning me. I have thought about intergenerational teaching. We've done some storytelling but I'd like to do more." Dave recognized that, "Carl sometimes brings up little stories as he grew up here. It would be nice if we had more of that. It certainly fits in with the philosophy." Ann also recognized the value of Carl's contribution, "Carl has a calmness, a serenity, a wisdom as our elder. The children certainly connect with him."

Although developing biophilia, a land ethic, immersing experiences, ecological principles and slow knowledge are central to the bioregional curriculum, critical thinking was recognized as one of the most important aspects of ecological intelligence. Lisa saw, "It is part of the bioregional curriculum and is the most important skill." Albert felt it was inherent as it was purposely built into the curricular approach of mentoring:

> I think it is happening all the time. Part of the mentoring process is through the art of questioning rather than through naming. Observing characteristics and discovering for oneself encourages students to think about it, observe, ask their own questions. It encourages a critical thinking approach to learning.

When asked about the incorporation of critical thinking Dave, who is more traditionally focused on the sciences and teaching through transmission rather than transformation acknowledged,

> I'm still trying to figure out how to do this. The age of the kids presents some limitations. They are important aspects but I'm not even sure if we've touched on them yet. An important part yet to come but at the same time we need to be apolitical. Decisions by consensus and giving them opportunities to discuss how things should be in the school address this.

Even with the limitations Dave felt were present, due to the young ages of the students,

Tara, a parent of two students felt critical thinking was a big part of the school, "More

than if they were elsewhere."

In partnership with critical thinking, empowerment is a cornerstone of the Discovery Bay

curriculum. Carol was clear in this regard:

> Education for empowerment is one of our slogans. Community meetings are there to empower the kids to bring up any concerns they have or any rules they don't like: but not empowerment in terms of the majority rules; empowerment in terms of, you have the right and responsibility to bring issues to the group, to involve yourself and explain how you feel. The group has the responsibility to find some solution.

Ann, a parent, recognized, "Self-directed learning is the basis of empowerment. Teachers

model a love for learning and then students are empowered to carry it through." Lisa, a

teaching assistant, agreed noting that students are empowered by making their own

choices and that they have a lot of confidence in making choices. Dave recognized

empowerment as a central goal of the school in stating, "One our highest goals is to teach

kids how to learn which is empowering."

In terms of other cultural philosophies it was interesting to note there were different

perspectives as to whether this aspect of ecological intelligence was incorporated and to

what degree. Often these opinions differed according to what this question brought to

mind.

Albert, who concentrates on bioregionalism through mentoring and exposing students to

traditional skills of hunting/ gathering societies, saw a strong influence through the

activities he is involved with:

> The hunter/gatherer philosophy and living with the Earth - the bioregional culture itself - is different from the dominant Western philosophy so we definitely bring that in all the time in terms of how we learn, our transportation policy, the ecological focus, and our celebratory culture focusing on the equinoxes, the moon.

June thought other cultures were talked about quite a bit in her art classes, "…especially

with plants and how other cultures plant and use plants." She added, however, that in her

art classes,

> I would like to move away from the purely realistic pictures we do. That would come into a cultural discussion of the western approach to art and how other cultures represent their environment, and how there are often no real boundaries between animals and the land and what you represent as 'real'.

Ann, another parent and director, saw there was some incorporation "through the different festivals have been talked about" but there were ways it could be enhanced. "We talked as a Board about bringing in someone who can integrate language and culture, Native People and native lands, and through discussions of Native People and the land." In October 2003 the teachers were developing a significant unit on Native People that would be the focus of the 2003/04 school year.

Regarding manual experiences Carl noted they had been erratic although there had been some excellent woodworking experiences. It was hoped more manual experiences would be offered when they expanded into the whole building the following year.

June has been able to develop ecological intelligence through the affective domain in her art classes. When asked about her choice of topics and activities she responded,

> Together we came up with the idea of making a giant poster of animals of B.C. in their habitat, with the interdependence with the sun, plants, other animals, and decomposers for the wall in the hall. I focus on appreciation rather than difficult issues at this stage unless they ask so as not to overwhelm them at an early age. I used to do quite a few outdoor activities but the kids really want the consistency of the drawing program especially as they get outdoor experiences throughout the week.

In terms of spiritual experiences Carl felt they incorporated it in an ecological sense:

We tried a little bit of silence and reflection but don't want to push spirituality in a formal religious sense. My guess is that will come by osmosis. I think that the three of us [teachers] all have pretty strong feelings about the sacredness of nature and the environment. I think a large part of spirituality is learning to live with others with respect.

Most of the interview responses on bioregionalism focused on the environmental aspects of sustainability. Observations in March 2002 suggested the social and economic dimensions of sustainability didn't seem to get much consideration in the Intermediate class. Dave recognized this shortcoming when he was asked how these aspects of sustainability were incorporated as it seemed to be heavily science based, "We need to teach about the culture more – rather than just a connection to place through natural history." Albert sees the understanding of the social and economic aspects of sustainability as coming from developing a strong connection with the Earth and so initially through a strong environmental emphasis, "If not, then we have no way of truly feeling and knowing what sustainable is and what is living with the Earth. This resonates with what Greig et al (1989), Bowers (1995) and Sterling (2001) characterize as the ecological metaphors of intrinsic nature, community, and interdependence and Webster's (2004) nested metaphor. It also explains the environmental grounding in Albert's concern over location in a city where the natural environment is not as accessible, and his referring to the city as 'a not-so bioregional place'.

As technology has been identified with both sustainable and unsustainable practices (Bowers, 1995; Orr, 1994), respondents were asked how the topic of technology was

involved in the curriculum. Carol the school founder and administrator showed how

aware she is of technology's impacts when she replied,

> For me it is what is appropriate technology. We want to incorporate appropriate technology ideas into our living and space; looking at different ideas in terms of energy and water; learning to distinguish and to know what is healthy. My concern is that we use technology without knowing much about it. Technology is taking us on this path of increasing disconnectedness from the Earth in our day-to-day existence. We need to learn about technology, learn about its impacts, and what we can use based on what is more appropriate. For example we incorporate old technology in woodwork and use computers for learning as new technology. We feel working with your hands is very important.

Dave agreed adding,

> I have nothing against it. It is more the application of technology. High technology is certainly part of a bioregional philosophy. New technology can bring efficiency and how to do more with less. You need to consider its impact on society. Technology is a part of that mental growth that I think society needs but you just have to look at whether it is worth it to use certain technologies because maybe they do create more harm than good.

Carol noted that discussions of technology and need come up and are incorporated into

decisions about what they will incorporate in the school. This approach of judging

technology in light of how it might affect an individual's and society's relationship with

the Earth seems to echo with what Bowers (1995) and Sterling (2001) characterize as

ecological.

Evaluation and Assessment

Discovery Bay has considered assessment to be an evaluative, individual teaching tool

rather than a means of grading and grouping students. The Manual explains:

> In our un-graded programs, we continuously assess what children are
> newly achieving. They are not compared to other students, nor to
> some predetermined idea of what they should know by a certain age.
> Our goal is for students to progress along their unique learning paths
> at a rate that is right for them.

When teachers were asked how the curriculum was evaluated they replied there was no

formal testing. For both the provincial and bioregional curricula they got feedback from

students through observations and discussions, entering these on various checklists. In

referring to the bioregional curriculum Dave added:

> We are at the beginning stages and don't know how much we want
> to evaluate it. If students come out of here with a sense of place that
> is the important part. The results of the bioregional curriculum may
> not be seen until ten years from now when students who have spent
> time here are making a difference in their community or choice of
> career.

Tara, a parent and Director, felt the curriculum was evaluated by the feedback and response to the workshops. As students could choose to attend, teachers are given immediate feedback as to whether they are offering interesting learning activities.

Progress wheels are used as a tool for recording student progress as individual, community and bioregional/global learners. These are shown in Appendix 15. The Independent Skills Wheel incorporates reading, writing, mathematics and problem solving skills, as well as learning skills such as transferring experiences and information to other situations; challenging oneself with confidence; investigating many options; and respecting and taking ownership in work.

The wheel for Progress as a Community Leader focuses on respect for self and others. More specifically it incorporates the ability to: respect opinions of others; contribute to and share responsibilities in groups; accept and give advice; solve social problems with those involved; understand the consensus process and participates effectively; respect and develop own and other's ability to learn; ask specific and challenging questions of others and show appreciation of someone else's point of view.

The wheel for Progress as a Bioregional and Global Learner identifies "respects our community outside the school" and "enjoys learning about nature" as the central themes. These themes incorporate learning about a variety of ecosystems and species that inhabit them; ecological concepts of cycling, change, carrying capacity, energy flow, interdependence, diversity, and community; cultural diversity; natural and cultural

heritage; and issues such as climate change and ecological sustainability, population and development.

These wheels are consistent with their holistic, child-directed approach to learning, as the assessment is not developed according to separate subject disciplines. In this way the assessment is reflective of Sterling's (2001) ecological metaphors as it focuses on student development, emergence and an integrated view of learning rather than discipline-focused content. The themes also emphasize the bioregional and community focus of the Discovery Bay curriculum, ensuring assessment is incorporated into all aspects of the curriculum.

Checklists are used to record individualized learning outcomes for each student as they are attained:

> Based on this record, teachers know in which areas individual students need encouragement and experience. Teachers can then provide individual and group activities to suit. Older students also use this information for their own planning. (Discovery Bay Manual, 2001, p. 8)

In addition to these evaluation wheels there are also student evaluations. These, however, are broken into personal as well as discipline-centered areas of: working with others, individual and project work, language arts, mathematics, science and cultural studies, physical activities, music and art.

In response to questions about student evaluations Tara replied, "The children's learning is evaluated through the use of report cards and charts to get a picture of where they are at as a whole. This shows the type of learning they are doing." Judith referred to these charts more specifically, "They do this really neat circle thing for each of the subjects but it also has all the socio, emotional, developmental aspects as well."

When Tara, a parent was asked if parents were involved in evaluations she replied,

> We used to have meetings with kids to review and set goals and I sat in on those. They don't happen now as it was hard to get the time and parent involvement. Students now do their own evaluations to get a picture of who they are, what they want to learn and how. We have many conversations to try to get the kids to evaluate their learning as part of the curriculum.

Lisa, a teaching assistant, identified discussions with other teachers and students as well as observations as the main forms of evaluation. Formal tests for special needs were used to help identify needs as necessary.

Carol noted that parent / teacher feedback tends to happen informally on a daily basis. Report cards are done co-operatively with goal setting. These goals affect what is taught. Judith, a parent, supported this ongoing evaluation and feedback on a daily basis adding,

> I'd like to express my admiration to Dave, Carl and Carol in their dedication, openness, and helpfulness. When I am worried they put my mind at ease and give me a big picture of achievements and growth.

Field observations verified that evaluation and assessment was obviously an integral part of the enacted curriculum and learning process. Teachers were actively engaged throughout the day in discussions with students about personal learning goals and achievements; with parents informally at the end of the day; or more formally with other teachers and volunteers to discuss individual students or various learning activities. All were obviously dedicated to this process as it was given so much time and consideration.

In line with their commitment to life-long learning and sense of emergence, the staff and directors felt there was a need to evaluate their overall progress. They wanted to know how they were doing in their Bioregional Education in promoting ecological literacy; and what steps they could take to improve.

In focusing on qualitative rather than quantitative measures and in encouraging self-assessment these evaluations are associated with ecological rather than mechanistic metaphors as characterized by Greig et al (1989), Bowers (1995), Orr (1996) and Sterling (2001). But in identifying some assessment with separate subject disciplines there is also resonance with what Sterling (2001) indicates as a mechanistic, discipline-centered approach.

This reflects and is consistent with the differing ecological influences of the Bioregional curriculum and the mechanistic influences of the B.C. curriculum. Although the analysis of the Discovery Bay curriculum is limited to documentary, interview and relatively limited observational data of the intended and enacted curriculum, it has revealed there is a strong resonance in the Bioregional curriculum with what Greig et al (1989), Orr (1996), Sterling (2001) and Webster (2004) characterize as ecological and in the B.C. curriculum with what Sterling (2001) and Bowers (1995) characterize as mechanistic. Accordingly, those mechanistic resonances appeared in the enacted curriculum when Discovery Bay attempted to blend the two curricula through discipline-centred teaching. Significantly, the respondents identified what has been characterized as mechanistic metaphors in the B.C. curriculum and the dominant society as obstacles, and were working in an emergent way to overcome them through on-going curriculum development and diverse teaching and learning methods.

10.6 Teaching and Learning

Discovery Bay demonstrated a vibrant learning environment. The staff and volunteers were exemplary in their dedication, concern for students and their obvious love of learning. Their interest and enthusiasm sparks the students' interests and models lifelong learning.

It is clear from the recent job description for a full-time teaching position, Discovery Bay was looking for a teacher with a strong bioregional, ecological background and approach as well as someone who was willing to be mentored in the philosophy of the school. It is

interesting to note that this teacher is expected to not only teach through bioregionalism but also model it in his or her own personal behaviours. Under skills and knowledge that would be considered an asset, Discovery Bay has identified unusual areas that relate to their bioregional philosophy. Worth noting are the native Coast Salish language, First Nations Perspectives, Wilderness Skills (tracking, awareness, survival), Organic farming, Ecopsychology, Ecofeminism, Social Ecology, and Deep Ecology. Obviously, Discovery Bay sees the importance of the teacher having a strong ecological basis as an essential component of the success of their approach. This also suggests a resonance with some of the literature that indicates these philosophies contribute to an ecological worldview (Naess, 1989; Suzuki and Knudsen, 1993; Sessions, 1995; Gough and Whitehouse, 2003; Sauvé, 2005).

Discovery Bay also required someone who could take initiative and develop curriculum as the curriculum is still developing and is not totally laid out. In support of this curriculum development, Carol would mentor him/her. Diane, the teacher they hired, saw value in this mentoring approach, as she felt new teachers don't often get that type of support in the formal government school system. Teachers also being learners concords with what Sterling (2001) identified as characteristic of an ecological view.

Teaching Methods

The Discovery Bay Manual outlines the teaching approach emphasized:

> Child-directed methods are the most powerful teaching techniques. Activities that allow for exploration and experience allow children to discover skills and knowledge for themselves. Successful learning activities encourage children to take risks and experiment. Risk-taking is basic to learning new skills and experimentation is basic to gaining knowledge and understanding.

Albert felt the bioregional focus of the curriculum naturally brings out a diversity of teaching methods,

> This reading the landscape comes from a very direct connection not just from reading something in a book but actually going out there and being in nature. So a lot of the fieldtrips we go out and have a lot of experiences in nature, opening our awareness and developing our senses, being able to hear more and see more, just basically live more fully as a human realizing our potential.

Within the classroom, diverse teaching methods were also supported. June, a volunteer teacher, recognized the value of art in that it offered diversity. In her classes, "Ecology is taught in a holistic perspective. I'm focusing on the creative side of the environment rather than a left-brained lesson focus". Denise, a parent, acknowledged that the staff at Discovery Bay encouraged whole-person learning, "Yes, they go with him and try different perspectives when there is an impasse." Ann, another parent, recognized this diversity in the students learning math through woodworking.

With the emphasis on experiential learning that is reflexive to the learners' interests and needs, the Discovery Bay teaching approach accords with Sterling's (2001) characterization of an ecological view that asserts learning needs to be meaningful first with a strong sense of emergence in the learning environment. The emphasis Discovery Bay places on meaningful experiential learning was highlighted when both core teachers identified difficulties and obstacles when trying to teach about and incorporate different cultures. When Carol was asked whether other cultural philosophies were incorporated into the curriculum she replied,

> We try to, but we are a little weak on that. All our students are white and we don't know how to reach out to those people. But ideally, we would do more. We've tried to get other cultural students to come in and go to cultural events but it has not been a strong part of the students' experiences.

Dave, the other core teacher, agreed saying, "We've touched on that to some degree, but without having people from other cultures here you are limited. There's not much you can do." It is interesting to note that this has been a limitation not so much because it has not been thought of but because the curriculum is designed around real-life, tangible experiences rather than abstract lessons students do not have direct exposure to. Tara, a parent and director, picks up on the same theme in her response:

> We've been a little disappointed in how un-diverse the people we have attracted are. We would like more diversity. We bring in diversity in the adults from Garth Homer Center for mentally challenged adults. I would like to see more cultural diversity.

In emphasizing that the teaching methods used are as important as the curriculum taught, the manual resonates with what Sterling (2001) has characterized as an ecological child-directed approach to teaching. Honouring individual empowerment the manual states,

> Children are innate learners and this natural capacity to learn should be nourished and encouraged throughout their childhood years. One of the most important duties of the teachers is to organize the space and provide situations to facilitate natural learning. In addition, teachers provide group activities that they feel will add to the experiences of the children. Even so, individual children take from any activity only what is right for them at the particular time they are doing it. Students are always encouraged to pursue individual projects and learning goals, and they may choose to do so instead of attending the group lessons offered.

Carol recognized the more sensitive role the teachers need to take in guiding self-directed learning when discussing the teacher's role, "Rather than teaching them, it is more guiding and facilitating their growth in those areas." When asked more specifically what are the most important things to teach and why Carol replied, "We have to teach children how to find information rather than the information itself. I don't like the words teach and teacher." This approach to teaching accords well with Foster's (2002) emphasis on

developing a learning society and learning mind-set as well as Scott's (2005) emphasis on

learning as a framework in education for sustainability

Guiding and facilitating seems to be the same approach endorsed by Albert. In

responding to questions about how they teach the spiritual dimension of ecological

intelligence Albert referred to the Earth as the teacher:

> We teach this aspect in subtle ways. We do not formally say we are
> going to learn about the spiritual dimension of bioregional education.
> There are different techniques that I do with them. One of them is
> something called sit spots or secret spots where they spend time
> sitting and observing on their own in nature. The kids love this and
> ask to do it often - even one student who says he hates nature. That's
> why I never consider myself a teacher- the Earth is the teacher. That
> is where the more spiritual dimensions come in. In subtle ways,
> through various activities you introduce those things.

Carol explained further how teachers not only guide and facilitate in light of there being

student choice but also how they teach at a conceptual level:

> Yes, students have the choice but it is the teacher's job to make it
> interesting so they will want to participate, others are usually
> listening. I try to teach knowledge outcomes at a conceptual level so
> there is some understanding there as to why things happen a certain
> way. Remembering and recalling information is based on their own
> interests, and is not a requirement.

The organic, self-directed nature of classroom learning developed when the focus was on guiding rather than didactic teaching. When asked what teaching methods she typically used Carol replied, "I like to help the children explore materials I or we can gather and bring together or go out and explore." Dave confirmed Tara's previous comment that he tries to interest the kids in something he finds interesting. In his words he prefers to "be neutral saying something like, 'Check this out. I think you'll find this interesting.' I use one-to-one moments with students as I deal with a diversity of multi-age grouping. This is something I will be working with over the years to try to improve." Carl, a volunteer in the classroom, also uses a low-key approach: "I try to make friends with them and then to explore anything that they want to explore. Regarding how things are done, I try to always to request them to do things rather than telling them." These approaches that emphasize an integrative view of the teachers also being learners and learners also teachers resonates with what Sterling (2001) characterizes as more ecological than the mechanistic view that places the emphasis on teaching.

When the teachers were asked about how they developed learning, Carol supported a very ecological, constructivist view saying, "In as many different ways as I can, with encouragement and experience. They have to do it themselves; it has to come from them. It is a very natural process." Greig et al (1989) and Sterling (2001) argue an ecological paradigm emphasizes transformation and an integrative view where teachers are reflective practitioners and change agents as well as learners. Discovery Bay's approach to teaching and learning resonates with this characterization of an ecological paradigm as they encourage process, development and action oriented learning; critical and creative

inquiry and employ a wide range of methods and tools. Furthermore, all those concerned understand learning to be reflexive and iterative with meaning being constructed and negotiated. These perspectives are consistent with what Sterling (2001) indicates as ecological as well as with what Bonnett (2002), Gough (2002), and Rauch (2002) argue as essential aspects of education for sustainability.

Planning

Being so child-centered the teacher obviously needs to respond to student interests. To ensure this happens, the teachers have thought carefully about how they prepare for learning. This was apparent when Carol clarified the teacher's approach to planning:

> Planning depends on your goals and your time. We need freethinkers who initiate their own learning and develop new ideas. That's one of the reasons why we don't set ourselves up with unit plans and lesson plans. Because that limits what you talk about. I don't believe kids learn in step, by step, by step, but more a bit here, a bit here, a bit there.

This is best exemplified in their approach to fieldtrips. Carol emphasized that, "Fieldtrips don't involve worksheets and Learning Outcomes. We let them explore the environment in their own way."

Although there appears to be openness on the part of both core teachers, Tara, a parent

with children in both the younger and older classes identified the differences in Dave and

Carol's approaches to planning,

> The teachers make the decisions on what and how it is taught
> although I can be involved and have input. When Dave decides on a
> topic it is based on what he is interested in and hopes/ intends his
> enthusiasm will carry over to the kids. He really models how to learn
> it. Carol thinks more about what she will teach next and how she will
> go about it. There is a lot of room for student involvement.

Dave confirmed his approach when he was asked how he planned activities. He replied:

> As much as possible I find activities geared to small groups or
> individuals that will get them interested in something I think they
> should be knowing about from the Government or Bioregional
> Curriculum. Friday destinations are chosen from a theme of my
> interest in the bioregion (e.g. geology). There is no student
> involvement here, except as the teacher perceives their need.

Although Dave has voiced his openness to student involvement and self-directed goals,

this comment as well as the previous ones made by Tara seems to suggest that Dave has a

more teacher-focused approach. This accords with what Sterling (2001) characterized as

more mechanistic as it is product oriented with a focus on teaching a prescribed

curriculum.

In response to questions regarding what is taken into consideration when planning, the two teachers once again demonstrated their different orientations. Carol identified co-operative goal setting with students as affecting what is taught. Dave identified student weaknesses and where they need to improve; how they learn, and their resistance to learning. Once again, this teacher-focused, quantitative approach is suggestive of mechanistic metaphors outlined in Appendix 4 and what Sterling (2001) characterizes as mechanistic.

When Carl was asked how activities at the school were planned he recognized the teachers' role but emphasized student involvement in the decision-making process, "That's coming mainly from Dave and Carol. We have made a start asking students and I would like to see more of discussing with the students in advance what we are going to do and getting more input on fieldtrips and things."

When Ann, a parent was asked what she would like the teachers to take into consideration when planning she focused on her son, "Be respectful of his needs to focus on something and then move on slowly to something else; have in mind the need to interest him in a variety of activities, objects, mediums." Judith, another parent replied, "Without being too bogged down with individuality, to be able to attune to individual differences. I think they do that quite well."

View of Learning

Although it is difficult at times to separate teaching and learning in this analysis as learning has been referred to in relation to the teaching approaches clarified above, the School Manual (2002, p. 8) does identify their view of learners and learning:

> A community of learners results from positive interactions between life-long learners. Ideal learning experiences are those that challenge the community of learners to draw on the skills and strengths of each of its participants to achieve a common goal. Copying is not a crime in a community of learners, it is an asset and a successful learning strategy.

As such, children, parents, teachers and mentors are encouraged to learn together in a learning environment that is safe and inclusive of all levels of learning.

The school also emphasizes that education needs to focus on development of whole people where physical, intellectual, emotional & spiritual growth are fostered, in accordance with an ecological view that sees the learner as a whole person with a full range of needs and capacities. Sterling's (2001) characterization of an ecological view of the learner asserts that existing knowledge, beliefs and feelings should be valued. Discovery Bay expresses this specifically in stating,

> Individuals have unique interests, feelings and learning styles. Successful learning is built on the learner's prior experience and

stems from their interests. All learning experiences should be enjoyable and challenging. Students are not pushed to learn before they are ready and are not held back from learning, based on age or grade. (Discovery Bay Manual, 2002, p. 8).

Discovery Bay also stresses that learning is an integrated process. In doing so it emphasizes ecological metaphors of holism and systemic thinking. This accords with Bowers (1995), Orr (1996) and Sterling (2001) who suggest that the curriculum should encourage more trans-disciplinary domains of interest rather than disciplines and a defence of discipline boundaries if it is to be characterized as ecological rather than mechanistic. It also resonates with the above authors' characterization of the ecological perspective by incorporating transformative education and an ultimate concern with wisdom:

Problem solving, critical thinking and cooperation are life skills that transcend all subject areas. More importantly than specialized knowledge, students need to know how to learn and how to make connections amongst the things that they know. Integrated studies are well suited to developing a mature understanding of the world and an ability to think clearly to affect social change.

Learning tasks need to be authentic and holistic. Breaking things down into component parts is not the only way to understand the world. Children tend to think in holistic ways and enjoy challenges that are real and in context. These challenges rarely have a single step or a unique answer. Understanding the way things are connected into whole systems is as important as knowing about the individual components (Discovery Bay Manual, 2002, p. 8).

The Child-Directed Learning Model (Appendix 14) illustrates the Discovery Bay

approach to learning. This model places the child's natural curiosity and innate need to

learn at the centre. The view of learning at Discovery Bay has parallels with what

Sterling (2001) indicates as ecological in that learning needs to be seen as meaningful

first and this meaning is constructed and negotiated by the student and teachers

(Appendix 3). Ann was very clear on this point:

> Education should spark within children the desire and love of
> learning. From that anything can follow. The true majesty of learning
> has to come first so they want to learn, love to learn, interested to
> learn. The purpose is to spark that and then empower the children to
> learn themselves.

Various learning skills such as communicating, inquiring, problem-solving, taking action,

understanding and seeking new perspectives are developed through a holistic approach

with learning occurring naturally in context.

In addressing learning concerns in the specific subject areas of reading, writing and

mathematics, the Discovery Bay School Manual also resonates with Sterling's

characterization of an ecological view in that it focuses on child-centred learning that

follows a natural process and emphasizes local, personal, applied and first-hand

knowledge. The Manual states reading, writing and math are skills that come quite

naturally to children once they are ready. It also emphasizes learning in context through

authentic experiences. In this way children are encouraged to read by reading and to

write by writing; before doing pencil and paper arithmetic, that same arithmetic is experienced and understood with concrete objects.

> When children explore math authentically, they enjoy it and are proud to solve difficult problems. They show real understanding of the concepts within a problem and can use those same concepts in a variety of different contexts. They notice math in the real world and share with joy the patterns they find. (Discovery Bay School Manual, 2002, p.4)

Within the self-directed teaching/ learning approach, issues arose when students were not interested in learning. Dave emphasized the student's role in the learning process as he was, in March 2002, dealing with a few older students who were not very interested in learning:

> Students are very much involved. They have the ultimate decision on whether they will learn or not. Students and teachers do not always have the same basis of unity, although parents may agree with the philosophy and approach. Teachers may be seen as an adversary. In the future we will tend more and more towards only allowing students to come if the student really wants to come. That is one of the keys. If they decide to come to this school, they know what it is like here, they know they want to be working on something and are not going to create an adversarial situation. They need to see their teachers as advisors to advise them on their education rather than to push them into doing learning activities.

Dave identified the obstacle as a preconception, on the part of the students, that teachers were trying to control them. With student choice and self-direction being a mainstay of the school these few students became very challenging.

A number of days observing the older students confirmed there seemed to be a power struggle happening with some of the students and their teachers. The base of this seemed to be conflict in the students' perception of their power to be 'self-directed' and what the staff considered 'appropriate learning activities'. In an attempt to be non-coercive and honour personal choice, staff were in a difficult position of trying not to impose learning activities but also not allowing students to choose activities that would distract others or would be considered 'play activities'. The community focus of the school as a learning environment seemed to be fighting against an individual emphasis some of the older students placed on the right to choose whatever they wanted.

Carl recognized a further obstacle had developed when students chose not to participate in workshops:

> The general arrangement is that the kids are encouraged to try the
> workshops and if they don't like it and leave it they're supposed to
> do individual things. There is a fair amount of friction with the kids,
> as they would rather do at least two-person and often three or four-
> person things when they're not in a workshop.

Students in the older class also seemed to drop various topics of interest without following through to gain a deeper understanding. When they chose not to do a workshop or pursue an individual project they seemed aimless and so drifted into play to amuse themselves. It seemed they were not being challenged with a variety of learning approaches and did not have structures to help guide their independent projects: to help motivate and set goals leading them deeper into the topic. Students either participated in the workshop or read a book although they all had projects to work on if they chose.

Lisa, a teaching assistant who taught with the school for six months, agreed:

> I have not seen much self-directed learning happening here. When they opt out of a workshop they don't know what/ how to do something or aren't interested in independent research and so don't do anything. They need direction to help them do that. It can't come out of nothing. That's what frustrates me the most. Self-direction doesn't automatically happen.

When Carol was asked how they dealt with conflict between self-direction, and choosing appropriate learning activities she recognized,

> Students don't feel there is choice if they don't like the workshop because they cannot think of options that interest them or they don't have the skills of self-motivation or self-directed learning. I would like to build up this aspect.

Carl also voiced this concern about a lack of student self-direction but recognized his

own limitations and the evolving nature of the teacher's role,

> The crucial thing I don't know how to deal with is the short attention
> span, and lack of interest in going deeply into a topic. What is the
> role of the teacher in a non-coercive, bioregional setting? I
> understand Dave's desire to teach and I have it, but if we are looking
> for self-directed learning that process is making the teacher
> redundant.

All core teachers identified the need to give more time for individual projects backed up

by self-directed and project planning skills. Carol is well aware of this need but

identified resources and expertise as an obstacle in developing a pioneering approach,

"We try to spend time on developing learning, self-motivating skills but I haven't found

much input/ resources on that so we are having to make it up as we go".

To help students develop self-directed learning skills Carl felt it would be helpful to post

workshop topics so students were more aware of the day's choices. Lisa also felt more

structure was needed, "I think kids need structure, discipline and to know where

boundaries are. Sometimes those sorts of things are a bit vague at this school.

In response to the conflict with the older students Carol reinforced Dave's allusion to

student responsibility in saying:

> Students have a lot of individual rights and freedoms here along with a whole lot of responsibilities and that's the most challenging thing for them because they don't see that initially. You can choose to do an individual activity, totally of your own choosing but it has to be learning-oriented and cannot detract from the rest of the class who may be involved in other learning activities.

As the younger students seem to be more co-operative and happy in workshops, teachers felt older students were negatively influenced from earlier learning experiences before going to Discovery Bay.

When the staff was asked about the observed power struggle and lack of interest in learning, Carol recognized there was a need to teach self-direction skills and help spark student interest in learning activities. However, she felt this data was skewed as it was coming mainly from a very vocal visiting student who was on holiday from a non-coercive school that allowed total non-participation in learning. The mother of this student, who had a daughter in the school, confirmed her son wanted complete control feeling that if students had a choice, they should be able to engage in any activity even if it wasn't educational.

To overcome a possible bias in the original interview data, a second interview was arranged with the older students two months later when this previous student would no longer be visiting. The subsequent interviews confirmed the original data was inaccurate.

The second interview showed there was no dissent over what was considered 'appropriate learning activities'; all students felt there was student choice; and all were engaged in learning. This same trend was even more evident eighteen months later during the follow-up visit.

The follow-up visit in October 2003 showed the school was working specifically on independent learning skills through the new teacher, Diane. There was far more focus and direction with the older students who were now working with a new teacher in addition to Dave in a new more stimulating setting. Carol recognized this was a need noting that as Dave was trained as a high school science teacher, he wasn't adept at helping students develop learning skills for self-direction. This was one of the major reasons for bringing Diane in. There seemed to be more structure to the day with students having to negotiate independent learning options that met their needs and abilities if they chose not to participate in a workshop. A basis of unity with students had been established so conflicts relating to students seeing the teachers as adversarial had dissolved and, as a result, positive attitudes to learning had been established.

In hiring Diane who was not a subject specialist, Discovery Bay took specific steps to overcome what they identified as a mechanistic discipline-centred obstacle. This resonates with Bowers (1995) who identified discipline-centred teacher training as a mechanistic obstacle and with Sterling's (2001) characterization of discipline-centred teaching as mechanistic.

Because of the school's child-centred rather than curriculum-centred emphasis, independent studies were a continuing challenge. Carol noted that it is easier to do independent studies when kids have deadlines for completion. "In keeping with natural rhythms we're finding completion is not as important to them. The process of looking into something, getting information, reading about it is important to them but finishing the project isn't important. We're trying to develop ways to motivate them to finish things but we don't want to require them to finish everything they start." (Carol, Oct. 2003).

Although there was far more structure and planning evident in the follow-up visit in October 2003 it was always in conjunction with individual choice, thereby, emphasizing critical thinking, empowerment and ecological intelligence as central day-to-day experiences of each student. Students continued to have the option to choose which workshop they would like to attend or negotiate a different individual learning option. "The aim is to develop a planning framework that is flexible so it can incorporate organic development of learning and empowerment. There is individual choice to opt out of a workshop by negotiating an educational option that meets their needs and works for others." (Carol, Oct. 2003). Currently they provide three afternoon workshop options and core supervision for those who want an individual choice. As mentioned earlier, there was also significant choice in what fieldtrips students participate in and what workshops they choose during that day.

Learning Environment

Given this belief in sparking student interest so that learning is meaningful and full of holistic learning opportunities the learning environment becomes an important aspect to be considered. Dave recognized that learning also occurred in a variety of places quite naturally as the school used the outdoors frequently, "Learning is spread out quite a bit but about 30% outside or even more if you count lunch hours and the trip to school when I accompany students on their bikes."

The learning environment is consistent with bioregionalism and sustainability. As stated earlier, the playground has incorporated edible gardens, natural materials for building and playing with, composting and using rainwater, and a covered seating area so students can be outside in all weather. Further plans to develop the outside area as a natural learning environment with water and native plants and habitats for animals shows the active, ongoing development of the school.

In terms of the specific indoor learning environment, the younger students were in a varied, stimulating classroom. The School Manual recognizes the use of space is different from what one might expect in a traditional classroom. "Our rooms look less like traditional classrooms and more like eclectic living areas. We try to create spaces where interesting learning activities are encouraged by the space itself."

The main classroom reflected this. Rather than desks there were worktables in one area; a piano and computer in another; comfortable couches for reading and discussion; a variety of science-related experiments and objects on the side; an eating area with a

cloakroom beside the backdoor, accessing the garden and covered learning area; and a

large floor to ceiling paper-maché tree and mountain, complete with mountain goat, in the

middle of the room.

Carol spoke of the learning environment when they would take over the whole premises

the following year:

> Ideally younger kids will have a room suited especially for them for
> the majority of their time (older students will also be welcome but it
> will not necessarily be of interest to them). The older kids will likely
> roam more with different spaces to get different types of learning
> experiences such as woodworking, art, and music or quiet places.

The follow-up visit in October 2003 found the learning environment to be an exciting,

positive context for both classes. Each group had a core-learning environment that

catered to quiet as well as active learning experiences, and individual as well as multi-age

group dynamics. There was an extensive library as well as an excellent variety of

teaching resources. In the follow-up interviews no one indicated a lack of resources to be

a problem.

Teaching/ Learning Observations

Throughout the classroom observations the researcher maintained a role as an observer

with very slight participation. The students became very comfortable with the researcher

as general observations took place in the first three days to become familiar with the

students, teachers and the school. The school also had regular involvement with various community members so visitors to the classrooms were a common occurrence and did not seem to affect the students. Although students were open and friendly, they tended not to pay any attention to the researcher's presence and carried on as if she wasn't there.

Field observations showed the learning environment to be very welcoming, open and comfortable while encouraging discussion and interesting, stimulating learning options. There is a downstairs room for music or large art projects, a special clay area and plans to create a woodworking area as well as a cooking facility. The outdoors are also used extensively and seen as a legitimate learning environment that can be accessed at anytime.

The school days started in a very relaxed, open atmosphere with students taking the lead. When they came in they chatted to other students, teachers or volunteers or engaged themselves in activities that caught their interest. For example:

- **8:50a.m**. Two students having a piece of pizza as they hadn't had time for breakfast yet; Dave conversing with Bob about tracks he saw with another student on their bicycle ride home; Andrea came in and started drawing.
- **9:05 a.m**. Two students finish their snack and are jointly looking at a book; Bob is interested in tracks so is encouraged to consult a reference book on tracks. A conversation on track identification develops so Bob is encouraged to go outside and find evidence; Andrea now drawing with a volunteer and discussing the

habitat of the animals she was drawing, incorporating these elements into the picture; another student beside her suggesting they colour words they know blue, words they don't know green and numbers red; she carries on with her self-initiated task.

- **9:25 a.m.** Carol reminds the younger students of the workshop they did on money last week and suggests they might have fun setting up a shop. The girls who love drawing start drawing things they could sell, others collect items and the girl who was working on words and numbers uses her activity to make labels and prices. The shop takes over and engages the children in interactive buying, selling and making change until the morning break.

Teachers had a general outline of workshops or fieldtrips they were leading each day but purposely left time and opportunity for unexpected learning activities that were student-generated. When these suggestions did come up teachers immediately followed them-up either individually with the particular student by supporting a personal investigation or by introducing the idea to the group in case others found it interesting. Throughout the day the learning atmosphere is casual and relaxed with students, teachers and volunteers being respected in whatever opinions they expressed. Consistently, students are asked to do things rather than told to. They were given choice and those choices were respected as long as they were meaningful learning activities and did not interfere with other's learning.

Beneath the empowerment to make choices was an expectation that students would be responsible in their choices. If a student behaved in an irresponsible manner, it was discussed with the student so they understood the expectation and then they were given the time and space needed to cooperate effectively or to work on their own if need be.

Students and teachers didn't hesitate to go outside and stay focused on their work in all weather. Having appropriate clothing for this purpose seemed to be an accepted requirement.

Carol's Lessons

Carol used a wide diversity of teaching methods encouraging use of multiple intelligences. Subjects such as language arts, science and math were integrated into a workshop by focusing on a topic. Active, hands-on learning was the basis of workshops and throughout a real love of learning was modelled and encouraged.

In an example workshop on trees, Carol and the students were continuing their building of a huge paper-maché tree in the middle of the class. Encouraging self-directed learning, when Carol asked students to write something about trees on a piece of paper and was asked how to spell a word or an answer, students were asked to think of where they could find that information. Students happily responded and found the answers themselves. Carol's teaching was very transaction based with a large degree of teacher/ student negotiation and emergence in the learning. Many students went outside for inspiration while others added pictures to their written descriptions, making and cutting

out things to add to the tree. She was very open and accepting of divergent ideas on learning, allowing students to develop their own ideas on what they added to the tree.

Carol modelled guiding and facilitating rather than teacher-directed transmission of information. When students lost interest she was able to refocus and re-engage them through encouragement and a variation of activities. After the initial written activity she invited students into a cozy corner for a guided imagery activity that explored the tree's interdependencies. One student declined and happily chose to read nearby. After the imagery students were very excited to discuss their experiences. Interest focused on baby bird nests and what they could use for cushioning. Many returned outside to find materials while others thought of things they could bring in from home. Projects were now underway for making nest cushions. Carol started to orally tell a story, *Harry and the Roses,* about a bird unravelling a sweater to line its nest, when the student who had been reading excitedly ran to the library and found the book to read. The workshop culminated with students breaking up, often in pairs, to work on finding tree information and recording it in their tree books.

Carol's workshops were very ecologically oriented. Throughout the workshop students were empowered to learn for themselves, choose from various activities and develop critical thinking skills. The teaching materials were all either recycled or made from sustainable materials.

Dave's lessons

Dave modelled a great curiosity in learning in everything he did. His personal curiosity often sparked students' interest and was often the catalyst for his choice in topics. Dave's lessons varied from facilitating and introducing ideas to guided workshops. An example morning started with showing the students a binary method of counting to 31 on one hand in the hopes it might spark students' interest in exploring numbers and alternative ways of adding and subtracting. Further interest was not generated so he went on to reading from a book called, *The Tracker,* stopping to discuss the content and draw a diagram on the board to help clarify the text. This activity was followed by students working on their own projects.

During the independent study time Dave developed a very interactive, reciprocal learning atmosphere. He asked students what they were working on, suggested resources and further ideas for investigation. The emphasis was on active, investigative, self-directed learning. He was typically in the background as a helper, getting involved when they gave up or got stuck. At such times he would show genuine interest in learning and pose questions to refocus and encourage critical thinking such as "I wonder why it isn't working?" or "Where could you use this?"

The topics were all science based following Dave's strengths. The class had a burglar alarm as well as a number of natural objects around to spark interest such as a whalebone, hornet's nest, and crystals.

The afternoon fieldtrip was presented as an option. Dave had noticed a rare wildflower in a vacant lot that may be threatened if a building was put there. He asked the students if they would like to come help him find it and put a flag around it to help protect it. All students happily participated. During the fieldtrip students were encouraged to search and were given positive feedback for their observations.

A very ecological view was encouraged when an injured bird was found. The students were asked not to chase or follow but to empathise and quietly observe, as the bird would feel threatened. He emphasized the importance of letting nature take its course with the bird. The students were encouraged to try to find evidence of feathers from an interaction with a cat. In this way a fieldtrip to find a wildflower developed naturally into an experience with wildlife. Through Dave's handling of the experience, ecological intelligence components of developing a land ethic, biophilia, immersing experiences, ecological principles and critical thinking were encouraged. Friday fieldtrips were similarly very open, interactive and exploration focused. The day would start with a particular focus and destination in mind but would easily adapt to particular observations and experiences the students became interested in.

Dave used the same approach of modelling learning and following his interests, in the hopes that it would interest students, with developing the school grounds and garden. Workshops in gardening or landscaping were sometimes given but typically Dave gardened during breaks and was open to anyone joining him if they were interested. It was not a scheduled activity everyone had to participate in.

During the follow-up visit in October 2003 Diane had taken over as the core teacher for the older class. Dave was still very involved in planning and running fieldtrips and teaching math and science. As mentioned earlier this led to less integration of math and science with the other activities the students were involved in as Dave planned his lessons separately and then came into the class with a planned workshop. Even though planning with the other teachers was limited, his lessons continued to be student-focused, hands-on and interactive.

Diane's Lessons

As Diane had just started teaching at Discovery Bay in September 2003 observations of her teaching were limited. However, it was clear she had introduced more structure to the older students with scheduling of the day. The morning tended to start with language arts activities followed by math with Dave. The afternoons consisted of a choice of three workshops in science, social studies, art or an activity of their own.

Diane's teaching was also very student-centered, interactive and self-directed. She tended to facilitate student ideas and encourage self-direction and respect for others. Individual opinions were constantly sought and respected. The classroom was set up with a variety of learning spaces such as a group meeting area, comfortable reading couches, individual workspaces and active learning spaces. There were numerous self-check lists and reminders on the wall to encourage self-direction learning skills. After an initial group discussion on respecting others and goal setting she moved easily amongst

individuals and small groups encouraging and exploring with the students their various learning activities.

Although not identified as an obstacle by the participants, the only inconsistency observed was in teaching mechanistically through separate subjects rather than in an interdisciplinary way. The core of the Child-Directed Learning Model (Appendix 14) seems to emphasize subject-integration and 'incorporating traditional subjects' rather than teaching through them as the B.C. Curriculum is designed to do. As Discovery Bay is trying to integrate the B.C. and a Bioregional Curriculum it seems there is an inherent conflict in curricular design. The distinction along subject boundaries at Discovery Bay may reflect the influence of the B.C. Curriculum overpowering the Bioregional philosophy that is highlighted in the Child-Directed Learning Model. It became even more obvious with subject specialists such as Dave teaching science and math as separate workshops. These subject boundaries tended to blur, however, during fieldtrips and individual projects.

With the exception of discipline-centred teaching in the Intermediate class, the limited observations showed the teaching methods used by the teachers and volunteers at Discovery Bay modelled their ecological philosophy. Self-direction and critical thinking was encouraged throughout the school, as was non-violent communication, respect and consensus decision-making.

10.7 Conclusion

As mentioned throughout this analysis, Discovery Bay, in pioneering an educational approach based on bioregionalism, has developed a model purposely imbued with ecological metaphors in their philosophy, management, curriculum, buildings/grounds/resources, and teaching/ learning. The founders specifically stated the reason for starting the school was to design an ecological educational approach that could counter what they identified as negative unsustainable mechanistic influences of the dominant educational system. Throughout, the analysis has shown how this particular approach resonates with what Sterling (2001) and others (Appendix 4) have characterized as ecological.

Although the directors, teachers and volunteers were metaphor aware, identifying that they had designed a school specifically imbued with ecological bioregional philosophy and management structures, and using a language in discussing and analysing their work that reflects an ecological metaphoric grounding, in curriculum and teaching/ learning there were resonances with a mechanistic view. This influence in the enacted curriculum seemed to come from the influence of the mechanistic B.C Curriculum that is discipline-centred, whilst the intended and enacted Bioregional Curriculum was strongly associated with ecological metaphors.

What respondents have defined as successes, obstacles and needs added further insights to the analysis as these also tended to resonate with the ecological/ mechanistic characterizations of Bowers (1995), Orr (1996) and Sterling (2001). Identified successes tended to relate to establishing an Independent school and enacting their bioregional

philosophy through an egalitarian, consensus management approach, the bioregional

curriculum, and self-directed teaching/ learning that emphasizes critical thinking,

empowerment, and constructing knowledge. Interestingly, the identified obstacles

referred specifically to the mechanistic influences of the dominant societal norms as well

as barriers created by parents, students and volunteers. In this way there was resonance

with Sterling's (2001) characterization of mechanistic and ecological views of education

and grounding of theoretical frameworks identified in the literature (Tilbury & Wortman,

2004; Webster, 2004; Bell, 2002; Gough, 2002; Rauch, 2002; Foster, 2001; Orr, 1996;

Bowers, 1995). Although the mechanistic/ ecological dualism has served to inform the

analysis it is important to recognize the dualism that can represent a bipolar dichotomy is

simply not that in practice. Practices fall along a continuum, which can be evidenced, for

example, from the diversity of teaching/ learning approaches at Discovery Bay.

As this particular case involved an Independent school designed specifically on

bioregionalism it has exemplified one approach to advancing education for sustainability.

Accordingly, it is worth looking at a very different case. Forest Grove offers further rich

experiences to learn from, as it is a very different structure being a government-run

elementary school that decided to model and teach sustainability within its established

organizational frameworks.

Chapter 11 - Forest Grove Community School

11.0 Introduction

In keeping with the analysis of Discovery Bay School, the analysis of Forest Grove

Community School used documentary evidence, interview and observational data to

describe the philosophy, management structure, the intended curriculum and to some

degree the enacted curriculum (Stenhouse, 1975), buildings/ grounds/ resource use,

community relations, and teaching/ learning in their particular approach to education for

sustainability. Once again the experienced curriculum is only minimally referred to

through student responses as learning outcomes are beyond the scope of this research.

The data was once again analyzed through a metaphorical lens to see if there is resonance

with the education for sustainability frameworks identified in the literature search (Greg

et al,, 1989; Orr, 1994; Bowers, 1995; Sterling, 2001; Bell, 2002; Bonnett, 2002; Rauch,

2002; and Webster, 2004) and as summarized in Appendices 3 and 4. Further analysis of

respondents' perceived successes, obstacles and needs in developing their pioneering

programs lends data triangulation and potential grounding of theoretical frameworks.

11.1 General Description

Forest Grove Community School is a Government-run community school for

approximately four hundred Grades K-7 students. It has eleven teachers and three

teaching assistants to help with a number of physically challenged students. The students

are in either single grade or in a few multi-grade classes such as the Grade 5/6 class. As a

Community School it also runs a number of community programs staffed by Community

School personnel. Both the elementary school and community school share the same premises.

The school is on a quiet rural road. Forests and bushes bound the other three sides and just past the school on one side is the community ballpark. The school itself has gardens, paved and gravel playing areas and a large grass playing field. The ocean and beaches are a ten minute walk away.

The school building is a one-storey building with classrooms down two wings, so all have windows looking outside. The main office and library are situated in the centre off the main entranceway. With the exception of the gymnasium the school is carpeted throughout. At the far end of the school portable classrooms have been added to extend the school's capacity. There is also a Nursery School in a separate building on the school premises, on the other side of the playground.

11.2 Philosophy

Environmental Philosophy

The administrative and teaching staff seemed to support a transformative, relevant and whole-person educational philosophy that viewed learning as a life-long pursuit. This is indicative of what Sterling (2001) has characterized as an ecological view. The Principal, Dave, indicated this philosophy in referring to his ideal educational approach:

It would be 100% relevant for kids; they would be completely actively engaged; and it has to be morally and ethically sound. The content has to be deep and meaningful to kids so they are not only learning the content but changing how they will behave in the future so they can make our society, our community better for everybody.

The teachers also identified the importance of considering the whole person in education.

Julia, a teacher and the Community School Board Chairperson, spoke about the purpose

of education:

3Rs is a very small part; to become a well-rounded person with values, beliefs and goals; the ability to get along with other people and care about them; to see the importance in another person's view; to be able to understand what they are saying to you and be able to work with that; ability to listen, reason, logic.

These thoughts reflect the emphasis being placed on the whole person but also on

empowerment by developing skills to become a contributing member of a community.

Dave takes them a step further in emphasizing the transformative aspect of this

community role and responsibility. He indicated support for an integrative

understanding, co-operation and responsibility when he spoke about the most important

things to teach children:

That they can make a difference, individually; they can make more of a difference collectively; what they do affects themselves, other

people, the planet; I want them to really appreciate what they've got; I want them to be able to think they could solve any problem whether it is academic, emotional or environmental; and that the decisions they make are not made for convenience, their peers or the media but based on what is good.

Bonny, the Grade 5/6 teacher also supported a relevant, whole-person, transformative educational philosophy. In describing what her ideal form of education would look like she stated:

I love to think of education being more of a process than content. I like to see kids developing some skills, trying their best. I would like to see more fine arts so kids can develop more aspects of their personality and more gifts. If you think of how kids can demonstrate learning it doesn't need to be with pen on paper. I think that teaching some outdoor education, with where we live, is far more relevant to showing them a book on the rainforest. There's a huge need for educating the kids outdoors, orienteering, survival. I think the more comfortable kids are outside the more they will want to be out there and the more they will respect where they are and treat it better.

The following quote from Dave reveals further how the administration's beliefs resonate with what Sterling (2001) has characterized as an ecological perspective in seeing learning as process, development, action oriented and empowering so that functional, critical and creative competencies are valued. When asked if there is certain knowledge that is important to learn Dave replied:

> Absolutely, they need to know the influence the media has; about the packaging of materials and what goes into that; about sweatshops in China; about desertification; Third World debt and how the West influences. So they can then change their own corner of the world.

Alice, a Grade 6/7 teacher, represented well the general consensus that learning is a process rather than a product when considering what abilities an educated person would have:

> Educated to me says you are finished but I believe the more you know the less you know. As an educated person you never stop learning and thinking and considering other people's perspectives and what you are doing. You never stop reflecting.

This has congruence with critical thinking and emergence in the learning environment, characteristics Orr (1992) indicates as ecological.

These quotes show how consistent the thinking is between the administration, consultant and teachers. Throughout, the emphasis is on experiential, whole-person, action-oriented, transformative learning to develop ecological intelligence and empowerment for an ecologically sustainable society. All supported transformative learning; learning throughout life; being/ becoming; community values of cooperation and collaboration; responsibility; ecological sustainability; critical and creative inquiry; and meaningful and

action-oriented learning. These metaphors have accordance with what Sterling (2001)

and Orr (1992) characterize as ecological.

Parents also supported the ecological view of transformative education, ecological

sustainability, cooperation and life-long learning. Caroline's comment is an example of

life-long learning and becoming rather than what Sterling (2001) has characterized as a

mechanistic view of 'knowing has instrumental value' and 'education is preparation for

economic life' (Appendix 3):

> As an early child educator I feel strongly about inspiring children to
> be lifelong learners and be open to all kinds of innovative, creative
> approaches to life. Not to be bound in right ways and wrong ways of
> doing things. I think academics have a place in that but I think there
> is room for a lot more than academic information, stuffing it into
> kids' heads.

The administration and teachers all share a strong environmental philosophy that grounds

people in the natural world, rejuvenating them and giving them an interdependent,

ecological perspective. When asked why the natural environment was important the

Principal, Dave, responded:

> It can bring so much to a person: pure enjoyment, it helps ground
> you. Children who are having a tough time go outside and it just
> dissipates. Living in this community where mountain biking is huge

and people are active, and having a school that backs onto those pristine forests I think we need to maximize that.

Joan, the Program Co-ordinator, offered a response shared by all the teachers. She felt the natural environment is important,

> Because it is absolutely gorgeous; it is life-sustaining, for not just humans, naturally; it is bigger than us, the power is amazing; it is a spiritual sort of thing; there are unexplainable things because we do not understand, either we have not taken the time or it is not for us to understand, but it is for us to protect. It is where I go when I need to get rejuvenated; it's humbling; it's an equalizer, it gives you hope.

Roger, the Educational Consultant, emphasized,

> Nature is model, mentor, and measure. Here is the only expression of sustainability we've got. The signals it is giving are getting dimmer and dimmer: we're not listening, tuning in to the incredible teacher. I can't think of anything that has more wisdom, certainly the wisdom we need as a culture and society right now. It is inspiration; it is my energy. If we allow it, it can revitalize us. If we have the wisdom to tune into that we can find our way out of the mess that we are in.

These responses suggest shared ecological metaphors that indicate a spiritual dimension where nature is a source of wisdom and has intrinsic value (Naess, 1973; Sessions,1983;

Benyus, 1997; McDonaugh & Braungart, 2002). They can also be characterized as being

in accord with what Sterling (2001) indicates as ecological.

Sustainability

When referring to sustainability, as the school had set out to 'model and teach

sustainability', the school administrative staff was very clear in their understanding.

They all agreed with Joan's interpretation:

> I like the quote 'live like you plan on staying', so to me that is fitting
> in as a piece to the larger puzzle rather than claiming to be the center
> of the puzzle. You have the right to enjoy your life as a human being
> but not at the expense of others, and not at the expense of the
> environment. I look at the economic, social and environmental
> aspects but it is more than that in that it is trying to fit in, in a
> respectful way so that by the time I've had my journey, I've
> improved the situation as opposed to taking from it, I've left a legacy
> that has allowed other people to benefit from my visit, as opposed to
> scarring, in as much of a way I can manage.

Parents, Dave and Bay, exemplified how the parents interviewed were supportive of

ecological sustainability being an important aspect of schooling with ecological rather

than mechanistic metaphors guiding that effort:

> For us sustainability has a spiritual as much as a practical base. From
> my point of view if we, as a school population, could understand that
> impact goes beyond just the physical-ness of it and that we have an
> obligation that far surpasses whether I choose my yoghurt in

> container A or B. We are engaged in this push/pull with the Earth that's never going to win. If we don't balance that off with a more spiritual outlook then it's self-defeating, otherwise we're just part of a machine.

This resonates with Bonnett's (2002) and Foster's (2001) interpretations of sustainability as a frame of mind rather than in instrumental, mechanistic terms.

Community members represented by the Sample Families program also supported a philosophy based on ecological metaphors such as diversity, community and interdependence. Lynn, for example, noted,

> We have to consume less; we have to have a smaller footprint; appreciate the Earth and its ecosystems the way it is. We have to let wetlands stay wetlands. We have to do land-use planning differently recognizing terrain, habitats, storm water management. You have to start with a base of knowing what is important first so mapping the basis is important.

The teachers had a sense of sustainability and all agreed to being involved but as sustainability was never explicitly defined in educational terms the concept of sustainability became an epistemological issue (Bonnett, 2002). Mike referred to the lack of understanding when asked what he felt sustainability was:

I have no idea. I really don't. I struggle with this. Loosely it means you can continue doing what you are doing but by that definition it is not sustainable because we cannot continue doing what we are doing now. So if it becomes the highest denominator that you can continue doing what you are doing, then you need to define what that denominator is. What is that level where you can continue impacting the Earth and not degrading it, not taking away from it but returning it to where it was.

Further interview data suggested that although some teachers identified this as a serious obstacle, for some teachers, it centered on defining the educational implications. Dave, the Principal, also identified this obstacle as limiting the teacher's involvement:

When people bought in to the Sustainability Program, as much as they believed in it, it wasn't at a deep enough level where they would necessarily go out and make huge changes in their practice. They believed in it; knew it was the right thing to do; and if someone else would do it for me, wonderful.

The Intermediate Teachers seemed to exemplify this opinion as they were frustrated by the lack of definition and guidance available. Rather than be the initiators of change they, echoing Sterling's (2001) mechanistic characterisation, had an instrumental perspective wanting to implement something that was already clearly defined with a scope and sequence.

Parents, Dave and Bay expressed inconsistency and the dominant discipline-centered

philosophy of education as obstacles. When asked about obstacles the school faced they

replied:

> Not having all the teachers on board as it takes more work. The system doesn't lend itself to interdisciplinary study but they have broken through the traditional status quo, the teachers think out of the box already and I applaud them for it. It may take that one more push to get there.

Donna, the Grade 4 Teacher who was cited as a teacher who was more active than others

in incorporating sustainability issues, saw the lack of a shared philosophy of

sustainability as a result of the public school system maintaining the status quo rather

than re-envisioning it:

> Given that the school system follows changes in society rather than leads, this school is in an interesting position trying to teach and model sustainability when it is not happening to a large extent in society. You are trying to make a pioneering effort in an institution that has been recognized as not pioneering and also with people who are not the young and restless. Look at the average age of the staff at this school.

Lynn, a very active community member, looked beyond Forest Grove Community School

and saw that the same obstacle in other levels in the educational hierarchy compounded

problems at the local level:

> The obstacles are the adults in education, at the high school and
> Board office aren't ready for it. I think they do not feel it is their
> mandate or part of their curriculum that they should be teaching. It is
> frustrating working against that.

Roger, the Consultant for the Sustainability Program, also recognized that the lack of a

shared philosophy based on sustainability at all levels of the educational system was a

major obstacle, "We need to change the perception that this is a frill. It comes back to

what is education, what are the central objectives."

Interestingly, people from all groups involved in the school saw the need to strengthen

the philosophical basis for implementing education for sustainability. Mike, one of the

Intermediate Team Teachers, recognized that to succeed the sustainability program

needed a shared philosophy based on sustainability to direct all decisions and actions of

the school:

> In my idea of what this should have been, could have been, maybe
> will be someday, is this is the central drive of the school, this is what
> pulls us together, this is our paradigm, this is where we grow from.
> We cannot have it as a lunch program because it is too important for

that. How do I decide whether what I'm doing or this change I am going to make is right? Okay I'm going and visit my Sustainability paradigm. Otherwise the Sustainability Program will not evolve. People will just argue about whose turn it is to take the recycling out.

Caroline, the School Secretary, saw the need for a mandate based on sustainability to guide decision-making at the school:

But so many things are really happening and I think about when you talk about writing things down and have them carved in stone that is yet to come if we are to continue like this.

Lynn, a committed community member agreed:

I don't think 100% of the teachers value these things. You have to hit the value system where it works to start it off, see it in action and then come back. You need to not only teach but do, everyone from the Principal to the teachers and cleaners.

Although a deep philosophical commitment had not developed for everyone, particularly teachers, the program had planted seeds of change. It was clear that the Sustainability Education Program they implemented was very successful in raising awareness of sustainability amongst administration, teachers, support staff, parents, students and the

sample families. As a Grade 6/7 student summarized, "It has made our school better. I like the murals and it makes us more aware of what we are doing to the world." (F) This awareness was also stressed by a parent:

> These words are part of their vocabulary. They haven't hit the mark yet but they are in their vocabulary when they weren't before. It is on the map and getting recognised as a school that is out there trying this.

Another parent and Sample Family felt, "For a first year program success can be celebrated if you have planted some seeds. I think they were very successful in doing that both with Sample Families and in the school."

Alice, a Grade 6/7 Teacher recognized that even though there had been problems implementing the Sustainability Program, the school had been successful initiating the program as sustainability seemed to be a core belief of the community:

> Philosophically I am really proud of our school that we are attempting it. I'm really thrilled it has been our focus. It may still be going through growing pains in its beginning steps but that's okay. It's just a core belief and by following through with our core beliefs within the school, even if it isn't the best program yet, it's still part of you and part of the community. If you think in the long term I think the little bit we have done is going to help students build bridges as teenagers so when they are adults they will be very environmentally conscious.

The science curriculum of British Columbia provides a foundation for the scientific literacy of citizens, for the development of a highly skilled and adaptable work force, and the development of new technologies (http://www.bced.gov.bc.ca/irp/).

Similarly, the Rationale for the mathematics curriculum emphasizes preparation for economic life:

Mathematics is increasingly important in our technological society. To succeed in the workplace, students require the ability to reason and communicate, to solve problems, and to understand and use probability and statistics, technology, and measurement.

The provincial mathematics curriculum emphasizes the practical applications of learning and the types of skills needed in the knowledge-based workplace (http://www.bced.gov.bc.ca/irp/).

11.3 Organization/ Management

Forest Grove Community School has a top-down hierarchical management structure with very clear boundaries between hierarchical levels and jobs within levels. As a designated Community School it has two parallel management structures, one for the Elementary School and another for the Community School.

The Elementary School is funded by and follows the policies of the B.C. Ministry of Education under the direction of the locally elected School Board. The District

Superintendent is hired by the School Board to oversee all schools in the District. The

Maintenance Department of the School Board takes care of the buildings and grounds.

These employees belong to a different worker's union that delimits who can and cannot

maintain or develop projects on the school grounds. Below the Superintendent is the

Principal who is hired to administer Forest Grove Community School. The teachers,

hired by the School Board are answerable to the Principal. They are strongly influenced,

however, by the B.C Teacher's Federation, their employee union that negotiates directly

with the provincial government regarding working conditions and salaries.

The Community School is designed to address community educational concerns so is

under the direction and funding of The Ministry of Children and Families. A community

elected Board of Directors makes decisions regarding programming. As the

Sustainability Program was a local initiative, the Community School was a natural

avenue for administrating and supporting its development. By gaining independent

funding through outside grant agencies, there was a measure of decentralized control that

allowed the Community School Board of Directors to hire the Program Co-ordinator and

run the program.

There are also areas of overlap. There is a crossover between the elementary school and

the community school as they are in the same buildings, and the elementary school

Principal as well as a Teacher Representative sits on the Community School Board of

Directors. As the Program Co-ordinator was a teacher, the B.C. Teacher's Federation

(teacher's union) and the School Board were also involved in the hiring procedure for this

position. As the Co-ordinator taught lessons in the elementary school the Principal was

directly involved in overseeing the school-based initiatives.   This hierarchy is illustrated

in Figure 3:

British Columbia Ministry of Education   Ministry of Children & Families

Local School Board   Teacher's Union   Community School Council

Superintendent   Maintenance Dept.   Board of Directors

Principal

Parent/ Teacher's   Teachers   Sustainability Co-ordinator

Association

Sustainability Student
Advisory Group

Figure 3: Management Structure of Forest Grove Community School and the
          Sustainability Program.

The Principal, Dave, clarified the responsibilities and boundaries between the Elementary

School and the Community School and how the Sustainability Program affected both:

> If a new initiative was something that was a Community School
> project, which is separate from the school, then it would go to the
> Community School Council. If there is a decision on learning
> resources, anything curricular or student focused then that would be
> taken to a staff meeting. If a decision had to be made right away I
> would call people together to meet and talk about it.   For the

Sustainability Program we needed everyone's approval since the program would impact the school directly.

Centralized Control

Centralized control and the maintenance of clear boundaries are evident at all levels of the hierarchy. Financial and policy controls are very centralized in the Ministry of Education and the Ministry of Families and Children. Changes at the ministerial levels directly affect the types of programs offered as well as available finances and staff. In the Community School hierarchy, Program Co-ordinators are responsible for running different programs with little or no co-ordination or overlap. This top-down centralized control is associated with what Sterling (2001) has characterized as a mechanistic worldview.

Julia, the Community School Council Chair, and Teacher Representative spoke about the defence of boundaries and the difficulties of managing the Sustainability Program through the parallel management structures involved in Forest Grove Community School. When asked how decisions are made regarding new initiatives in the Sustainability Program she replied:

> Being a community school we have connections with the staff but we operate as two separate groups. The Community Council meets every two months. That has been a little bit of an obstacle in that lots of times our Council will come up with wonderful ideas and projects and then it is a question of getting the staff on board. In our particular staff it doesn't work so well if they are not involved in the idea making, planning stage. It is really hard to bring an idea to our

staff. If they are not in on the planning stage they do not necessarily jump on board right away.

The influences of the hierarchy also became apparent when the Principal, Dave, was asked if the programming decisions needed backing at other levels of administration. He replied:

> A little bit just with the posting of the Co-ordinator's position. We had to do some negotiating with the School Board because initially we thought it would be just a Co-ordinator's position. They were worried about the whole union problems. They said it needed to be a teacher so there were some negotiations there. We're pretty autonomous here with what we can do with our budget, staffing, setting goals. We kept the Board office up to date with everything we were doing. So far it has proven it has been our own school, our own initiative and gumption to make it happen. We've had no financial support at all and very little other support from the district level.

Once the decision was made at the local level to hire a particular teacher to be the Program Co-ordinator, centralized control from the Teacher's Union and School Board potentially affected who was hired. Because the Co-ordinator would also be a teacher, the position was posted and the School Board could have hired a person with seniority over someone who had a background in sustainability and knew the Program and community. All recognized this to be an obstacle and potential threat to the Program's success.

Centralized staffing decisions that the school has no control over and have the potential to

seriously impact the program, relate to both teachers and principals. As teachers are

central to incorporating sustainability into the curriculum Dave, the Principal, was asked

if he was involved in interviewing teachers and whether sustainability would come into

the interview. He replied:

> I rarely get that opportunity because the posting and filling of jobs is
> based solely on seniority. It is only if there is no one with seniority
> that I get to interview someone. In six years I have interviewed for
> two jobs.

When asked if he could request an environmental background be a prerequisite for the

job his response showed how little control and influence they have over who is hired in

their mechanistic, hierarchical system:

> No, we can ask that and say it can be useful but not essential. That is
> dictated by the local Teachers Union: being a primary trained teacher
> is the only prerequisite you can insist on. If it is a specialist position
> like Joan's then you can incorporate it, but not for a regular
> classroom teacher.

Yet, as Greig et al (1989), Orr (1992), Bowers (1995) and Sterling (2001) have argued, it

is the classroom teacher who would need to implement the program for it to become

central to the curriculum.

As the Principal seemed to be the catalyst between the Community School and the

Elementary School he played a pivotal role in staffing decisions, implementation and

development of the program. Unfortunately, Principals are centrally controlled by the

School Board and are often moved to other schools thereby affecting the leadership and

direction of a school and its programs. Dave elaborated:

> They like to keep people four to six years and then move them but some have been in place nine years. I don't know where our new Superintendent stands with this. My personal feeling is, if either I need to move or the community or staff needs me to move then it is time to move. If we are still moving ahead, people still feel I am doing a good job, if I'm still enjoying it and learning and growing then why move me just for the sake of moving. I don't know if the Board would support that but I would hope so. It also depends on other Principal's time lines and needs.

Lynn, a community member, recognized this as an obstacle as, "A change in Principals

would be difficult as you could lose your direction." This is exactly what did happen.

Dave was transferred to another school in the district in June 2002, when the Co-

ordinator's position also ended and the new Principal did not have a background in

sustainability and so was unable to fill the void in leadership.

Further lack of support and defence of boundaries stemming from centralized control was

exemplified by the teachers and their union during the second year of the Sustainability

Program when the teachers were involved in a union dispute with their employers, The

B.C. Government. In the second year of the Program, when Joan was trying to influence

teachers to incorporate sustainability into their teaching, the Teacher's Union instructed

teachers to employ work-to-rule tactics so all extra-curricular or special programs not in

the actual employment contract were contentious issues. Joan spoke about the obstacle of

the teachers defending their boundaries, created by the job action, as specifically

affecting their involvement in the sustainability program. When Joan, the Co-ordinator

was asked if she met regularly with teachers to give them feedback on the stated

government learning outcomes and what they could do regarding sustainability she

replied:

> No, not this year given the whole political climate. The teachers were involved in contract disputes and job action. Last year was a lot more flexible. This year it has been very difficult to have a working relationship with people who are totally stressed out by the government. There has been a lot of anger and resentment and drawing of lines. I'm also not teaching this year so I don't have that kind of connection with the Intermediate Team. They talk amongst themselves.

Although the school and community school were in agreement that they would model and

teach sustainability, this agreement was not consistently implemented throughout all

levels of the hierarchy. As well, the Maintenance Department of the School Board

worked independently from the school, but its decisions affected the school buildings and

grounds. This was apparent during Earth Week when the school was show-casing it's

sustainability programs to the community and the Grounds Maintenance crew showed up

to spray toxins to exterminate Carpenter ants. Donna, a teacher who was preparing the

debut of her class video production had no idea they were coming and was very surprised

by the lack of co-ordination and communication between departments and levels:

> For example, who authorized an exterminator to poison an outbreak
> of Carpenter ants which aren't life threatening - during Earth Week
> at that! I don't know who was concerned whether it was the School
> Board being concerned about their buildings, whether teachers
> complained, or it was a health issue. The timing was too stressful
> with setting up for the video premier and the Principal was rushing
> out, so I didn't say anything to the kids and I felt badly. But many
> times it comes down to where are you going to put your energies;
> and where do you have power; and where is it appropriate to exert
> that power.

This exemplifies the lack of communication and understanding that was common in this

mechanistic organizational structure. The clear defence of boundaries, minimal

decentralized control and poor communication often caused conflicts between what the

school and community school originally envisioned and what actually happened.

Centralized control by the School Board also affected the finances of the Program. The

Program Co-ordinator, Joan, explained:

> When you teach and live sustainably you don't need money, you
> save money. The problem is if our school saves the school district
> money in the running costs of the school, the district does not allow

the school to have that money. They argue they need it as they are running at a deficit.

When asked if she had much influence on the School Board as the Program Co-ordinator Joan replied,

> A little bit, maybe. I went to a meeting and had a ten-minute presentation relating the economics of sustainable actions. From that we were invited to come down and do an environmental audit for the School Board. The students did it but nothing else has happened since. I wrote a letter saying teachers need to feel empowered. The response was the Superintendent needed to balance his budget so he could not offer financial support.

Finances were also an obstacle as the hiring of a Co-ordinator depended on outside funding sources. As parents Dave and Bay noted, "Money is also an obstacle as we won't have a Co-ordinator next year." They did, however, recognize that the financial needs of developing a program needed to be built into it right from the start. As Bay elaborated:

> I don't know how you can build a program around sustainability that isn't sustainable! My head shakes on that one. You really have to know what sustainability is, what you are up against, what the parameters are. I don't like to see a company making money off the kids recycling. There should be some money there, feeding a Co-ordinator's position. I'm bothered there's not a mechanism because the school system's not going to see this as a priority. This is another

> obstacle from my perspective. You have to find a means in the process to finance it. Without a Co-ordinator it isn't really a program anymore and there is no one to teach it.

Joan, the Program Co-ordinator, also saw the need to incorporate the Co-ordinator's position into the system but since those in charge of the budget did not prioritize sustainability this was an obstacle. As she noted, "Considering the political climate of schools right now, working in a deficit, they are going to go for the cheapest thing. It would really be incredible if they manage to do the budget and be sustainable." Once again, centralization and a lack of a shared philosophy and commitment to sustainability were seen as obstacles.

By the follow-up visit in October, 2003 significant managerial changes threatened to negatively impact the Sustainability Program at Forest Grove Community School. As of September 2003 the Sustainability Program no longer had a paid Co-ordinator as the Grant had expired. This, combined with a change in Principals resulted in sustainability no longer being a regular item on meeting agendas and there was not strong leadership driving the Program forward. In addition, the Community School, funded through the Ministry of Families and Children was threatened with staff layoffs and closure. As the Community School initiated and managed the Sustainability Program continued support or growth was tenuous.

Developing the Program

With so many levels in the hierarchy as well as the parallel organizations of the

Elementary School and Community School, questions regarding decision-making and

how the program was developed became important. In developing the Program

agreement was sought with all interested parties at the school level. Joan, the Program

Co-ordinator initiated the program and described the process:

> Five to six years ago the Community School Board of Directors decided to do Outdoor Education and that led to us looking at Sustainability. The Directors were happy with that; we went to the Parent Advisory Committee and got their support; went to the teachers who said yes. We got the interest groups to buy in before initiating the program. No one had a really clear idea of what it was. The three categories of modelling sustainability, teaching sustainability and involving the community were identified but the hows or where this would lead was not yet clear.

Dave, the Principal, noted how they brought in others to add some depth and insight into

what a program in sustainability might mean and look like:

> When we started with the school we had Roger Blackwell from The Earthwind Outdoor School come and talk several times to the staff about it and that was key because it took them a long time to grasp what we were doing. Shortly after him we had Ken Brown from the Cedar Foundation come talk about very similar things. It seemed like a natural fit when I came to this school and talked to the staff.

These consulting, informational sessions helped inform staff about the basic concepts of

sustainability, and so helped them accept the idea of modelling and teaching

sustainability.

Even though there was wide consultation and basic agreement to model and teach

sustainability, a management structure where individuals dominated various initiatives

with top-down control prevailed, and synergies and emergence were not emphasized.

When asked what happens when an idea is brought to the staff, Julia, a teacher and the

Community School Board Chair replied:

> Usually we discuss it at a staff meeting, which happens once a
> month. People have an opportunity to say if they like it or dislike it.
> If it looks like a large portion of the staff are for it, usually one or
> two people will take it on, push the rest of the staff to do it, get
> meetings organized, get all the stuff done. If there are no people who
> spark onto it, it doesn't get done. You need to have one or two
> people that will be in charge of it. It can't be a whole staff initiative.

This shows that although the staff has to be accepting of an idea, the emphasis is on a few

people to drive it forward to make it happen rather than through an ecological view that

supports co-operation, collaboration and responsibility (Webster, 2004). The

development of the sustainability program followed this format of a few interested people

initiating and being the driving force. Dave, the Principal, recognized that this surface

level of commitment was all that was sought:

> The program was sold to the teachers as a program that would not add to their workload. And that was a problem as much as I think we needed to do that because again, if we said this is what we believe in, this is what we want and we want you to create everything and develop on your own, forget it.

Julia, a teacher on staff and the Community School Board Chair, recognized the top-down control they developed, purposely taking responsibility off everyone's shoulders so they would get agreement to move the program forward. She also, however, recognized the shortcomings of this mechanistic approach:

> Ideas for the program tend to come from the Board most of the time. It would be nice to have more collaboration with the staff. As to how that might happen, I don't know. I think that would be a better way to have it set up. It would be hard to do because it takes more time; more meeting time and everyone is strapped for time. We just try to tread very carefully and get them on board.

To move the program forward and tie in the school and community, it was decided to hire a Program Co-ordinator. In terms of staffing the sustainability program many felt a paid Co-ordinator was extremely important. As Lynn, a community member, noted:

> If you have volunteers you need a co-ordinator of volunteers. Joan's job, as the Co-ordinator, is really important because you need a community to work together to bring about effective change.

Joan felt it was essential to have a paid Co-ordinator because of the time needed to pull

together the community groups, volunteers, special programs and information needed to

develop the program. As Joan explained:

> There is time needed to coordinate the community, the special programs, and the legwork to develop the program as one doesn't exist anywhere; developing partnerships between the regional district, B.C. Parks, B.C. Hydro, within our local community with businesses that support the program to encourage a project at the school; volunteers. The partnerships have been great. We have been asked to put a tool-kit together for other school districts. Also promote the program through the media.

Nancy, the Grade 5 Teacher, recognized how key the Co-ordinator was in making these

changes happen:

> Those are things we would have never gotten done if we had done it on a school level without hiring someone. We would have dreamt about them happening but they would never have gotten done.

Donna also recognized the valuable role the Co-ordinator could play as a qualified

teacher:

> Joan has happily been involved to team-teach where needed. Because she was a teacher I could tell her the concepts I wanted to get across and not have to fill in all the details so it worked like magic for me, it was perfect.

Grant Proposal

Once approval had been received from the teaching staff, school administration, and the Parents Advisory Council (PAC), a few committed people from the Community School continued to move the program forward. In doing so, with virtually no input from others, they started to alienate others from being involved or developing a sense of ownership and commitment. Dave, the Principal, noted:

> We had the support of all the staff so there were a few people who went ahead and wrote the proposal and got the funding. But the staff didn't own that proposal; they didn't have any input into it other than they knew this was an area they wanted to get into. That was a problem.

To secure funding for a Co-ordinator's position it was necessary to apply to outside funding agencies. Not having experience in developing a program in education for sustainability before, or in writing grant proposals, those involved relied heavily on advice given by those agencies. As it was necessary to meet the obligations of the proposal, the terms and conditions of the Grant Proposal in effect dictated the sustainability program. Dave, the Principal, referred to these obstacles when he spoke about writing the grant proposal:

> We wrote it and sent it in. They gave us feedback saying they wanted to see measurable changes with hard data. That has been a bit of a problem because the grant was written by a couple of people and I think some of the frustrations we've had in this is the staff did not have ownership over what the grant was and what Joan's position was. They thought, many of the teachers, that she's a teacher therefore she will be in the classroom, work with them all the time and the grant didn't allow that.

Having seen the outcomes of a limited instrumental focus and limited teacher involvement Dave realized:

> I think had we not had those hard numbers in there we could have focused on some different things perhaps, made it more real to the kids, although I still think that could have happened and it didn't.
>
> I think from the outset if we said to the staff we want to put it together and then asked how are we going to put it together, what do you want, then I think we would have a very different grant proposal and Joan would have had a different job.

In retrospect, having to rely on funding sources that require measurable outcomes or not having expertise in incorporating curricular development or process needs into funding proposals was identified as a significant obstacle. When asked if curriculum development would have been funded, as teaching sustainability had been a goal, Dave replied:

> That's the other thing. It may not have been. EcoAction would not have funded someone writing curriculum but we still might of gotten around that writing into the proposal a little more detailed how we were going to reduce water, energy and waste: involving kids, writing curriculum. They might have had to be above and beyond the grant like all the planning, preparation teachers do after teaching hours.

This final point, however, was restricted once again as teachers were told it would not entail an increased workload. Julia, a teacher and the Community Board Chair felt the grant process had structured what they were doing:

> It has been a very limiting factor. Lots of ideas would come through the year and we wouldn't be able to follow them up as we needed to fulfill the grant obligations first and we only have so much time.

This quantifiable, instrumental focus is resonant with what Sterling (2001) indicates as mechanistic. In addition to focusing on measurable outcomes of reducing waste, water and electricity, while not incorporating curriculum development, the grant also limited the amount of time the Co-ordinator could put to the Program. As Dave noted, "Joan's position is very limited at only two days a week. We are very limited in the amount of time that she had given the breadth of the grant".

The Co-ordinator's Role

Having secured funding for the Program Co-ordinator's position it became clear that the

Co-ordinator's role was to not only help the school model and teach sustainability, so

they would reach the measurable goals set out in the funding proposal within the two

years allotted, but also extend connections between the school initiative and the

community. As the Co-ordinator's position was only two and a half days per week, this

limited the amount of teaching time available. However, in hiring a Program Co-

ordinator the responsibility to teach sustainability seemed to rest solely with the Co-

ordinator and not with the teaching staff.

Joan, the Program Co-ordinator, recognized they faced obstacles in not only the amount

of time the Co-ordinator was funded for but also in how teachers responded to the

program:

> The teachers felt that to be effective, the Co-ordinator needed to be
> there five days a week. The teachers see the program hinging on the
> shoulders of the Co-ordinator because that's how we sold the
> program. So it is partly our own fault. And with the intent that if we
> get it going and we have buy-in, they will internalize and take off
> with it. Some have and some would like a catering service. For it to
> be sustainable it has to be internalized by teachers.

To help implement the school-based initiative the Sustainability Program was adopted.

Although it has a solid conceptual design, the program lacks details for implementation.

When Joan, the Program Co-ordinator was asked about the Sustainability Program she

replied:

> There is not a program per se on paper so we design it as we go with a Board of Directors to direct it; Roger Blackwell as a consultant; I co-ordinate the program; we ask community and students for involvement; the Directors help; I do the legwork. The ideas come from the community so we design it together.

This sounds very inclusive and associated with what Sterling (2001) has characterized as

ecological, but it is interesting to note the teachers were not mentioned. This lack of

program detail and reliance on co-operative input, with the exception of teachers, in a

strongly hierarchical system caused a number of difficulties for the teaching staff as they

relied completely on the Program Co-ordinator to initiate and implement the program.

Mike, an Intermediate Teacher who found it very difficult to incorporate the

Sustainability Program into his teaching talked about what was needed,

> The Sustainability Program needs to have a central definition, even if that not very specific, that everyone has contributed to so that everyone knows what the changes are that we are expected to make. It needs to have some form or working towards some form of how can we make this a goal so we know how to move to get there. And then we need to involve the people who are expected to effect that change with decisions about how to effect that change. And it has to be meaningful change… But if it is not clearly thought out it, it won't last and people will not buy into it.

To launch the program Grade 6 and 7 students, parents, teachers, administrators and community members gathered for an introductory immersion session at the Outdoor School on Peel Island. Joan, the Program Co-ordinator spoke about how this was managed:

> Some went willingly, some did not. Because it was on school time, they needed to attend. We targeted that group because we wanted them to be role models for the others. It has both worked and those kids who did not like it because it was both busy and tiresome, and weren't asked if they want to go and be role-models were turned off by that whole process. They were told, "This is our curriculum; this is our philosophy; this is what we are doing."

Once again, a prescriptive, top-down approach was used that does not accord with what Sterling (2001) indicates as ecological, which by contrast would have been more inclusive of teachers and students seeking positive synergies, negotiation and consent.

Once back at school it became Joan's job to develop the reducing program; initiate the Community Sample Family Program; and teach sustainability in science classes to the Grade 6 and 7 students. In teaching sustainability through the boundaries of the science curriculum to Grade 6/7s while other teachers had their preparation time, curricular integration was limited and led to further defence of boundaries, as it was not a shared responsibility. As the other teachers in the Intermediate Team were not involved, there

was no coordination or help to incorporate sustainability in their separate subjects. Joan,

the Program Co-ordinator who taught these lessons to the students spoke about this

approach:

> The way we initiated the teacher's involvement was to guarantee that this load would feel lighter. I was able to do that as a teacher. I am able to do that to a lesser degree as the school Co-ordinator by providing events like Earth Week which allow teachers to know that during this week, if they want, they can bring their kids and be involved at some level, whether that is spontaneously getting involved in gardening in the outdoor classrooms, or helping with the murals.

When asked how much influence Joan had over the regular curriculum the teachers were

involved with she replied:

> I do not have any over what they teach; neither does the Board. That is all B.C. Government regulated. The teachers are making their own decisions as to whether they will incorporate a sustainable slant or not. It is totally independent of the Board and the Sustainability Program. I can give ideas. I have gone to them and said, "Do you need help, better resources, better explanations?" Some have said, "Yes; no; I think I got it; I don't know how to do this at all". Next month I will work with a teacher who wants to do alternative energy. I will do the legwork, the research and we will team-teach it. That will hopefully give her the confidence, a resource so that next year she will be comfortable on her own.

So although the majority can decide to move ahead with a particular decision, individual teachers would need to be self-motivated to become involved. This underscores the importance of an inclusive ecological approach. Unfortunately the mechanistic management structure did not encourage teacher involvement.

In effect, the Grant Proposal set up what Bonnett (2002, p. 10) has described as an environmental approach that implied a systematic action policy developed by those who 'know' and imposed on those who don't.

> It is assumed that its success can be measured in terms of consumption levels, that its underlying values are largely economic and unproblematic, that relevant knowledge is generated by subject experts and that its implications for the moral/ social/ political structure of society are basically consistent with the status quo.

Bonnett (2002) argues these are problematic assumptions that negatively affect education for sustainability.

Decision-making

Once the Sustainability Program received funding and the Co-ordinator's role was established, the program needed to be developed. Dave, the Principal, was asked how decisions were made regarding new initiatives in the program:

> Our Community School Council meets every second month. Many of the recommendations come from them because they are the overseeing body of the program. There's also a Sustainability sub-committee that make recommendations too. The Student Advisory that meets every week also sets the direction.

In terms of how developments in the program were shared with the teaching staff Joan, the Program Co-ordinator, in describing the process, showed how separate the program was:

> I go to monthly staff meetings and explain what is going on, what events are happening, whether they want involvement, at what level. This year teachers did not get very involved in Earth Week due to the politics/ job action at the time of planning for involvement.

When the Principal, was asked what happened if someone was is in disagreement his reply matches what Sterling (2001) has characterized as an ecological managerial style where positive synergies are sought but also the acceptance of a mechanistic style of selection or exclusion (Appendix 3) if need be:

> We have a few very difficult people on staff who can be blockers so myself or Julia who is the Community School president will approach them ahead of time to try to work with them to explain why. In a staff meeting it just takes one person to kill an idea. What I try to do is hear from all those who were silent and try to reach a compromise. Sometimes I have had to acknowledge I hear them and then overrule them. Usually people are okay with that. We try to get

consensus but with twenty to thirty people you could be there forever
so majority rules.

When the Program Co-ordinator was asked how decisions were made regarding the

Sustainability Program Joan emphasized the amount of discussion involved but supported

the mechanistic approach of exclusion and lack of involvement of those not in agreement

when she replied:

> If someone is not comfortable with an idea the majority rule and that
> person is only involved at the level to which they are comfortable. If
> that means not at all that is okay. But one person won't stop it,
> fifty/fifty would question it, but the majority would pull it.

When asked if staff meetings used the Sustainability philosophy and program as a

benchmark to weigh their decisions against Joan, the Program Co-ordinator, described the

positive impact the program was making in modelling rather than teaching sustainability:

> Yes, especially when it comes to fundraising and activities that
> involve our community. We are still supporting things that produce a
> lot of garbage, but we are making that decision saying that maybe in
> a year we will be ready to not support it in that way. So it is an
> awareness thing, it has not been a quick fix but it has definitely
> initiated a lot of conversations about how we run community events
> without paper plates, plastic, or Styrofoam. We use fair-trade,
> organic coffee. The volunteers realize it's a commitment.

Staffing

At Forest Grove Community School the primary teachers teach all subjects with the

exception of the Intermediate Team who do what they called platooning. In this

approach, the 120 Grade 5, 6 and 7 students are shared among the four teachers, divided

according to skills for math and language arts. These teachers specialized in life science/

sustainability, space science, and social studies topics according to their interests so that

students rotate to four different teachers for these subjects. This is how Joan, the

Sustainability Co-ordinator was given the life-science/ sustainability class to teach to the

Grade 5-7 students while the other teachers either taught other classes or had time for

preparation in their separate subjects.

Dave, the Principal, noted that staffing and how the Co-ordinator's time was used was a

limitation on the effectiveness of the sustainability program. When asked if they had

talked as a staff about curricular integration he replied:

> Yes, and I guess that's where some of the frustrations came with this.
> Some of the staff felt that that was Joan's job to do that. They didn't
> really understand the restraints she was under because of the grant.
> And we didn't do a good enough job letting them know,
> communicating.

Given the teachers' perceptions of it being the Co-ordinator's job to integrate

sustainability into the curriculum for the teachers and through the classes she taught, Joan

was asked if the teachers needed to incorporate sustainability into their teaching

themselves. Her reply shows how she felt it was a shared responsibility:

> I'm hoping they're doing that now. If they do there is no need of a
> paid Co-ordinator but volunteers to do the recycling and a lot of the
> physical labour. You need a paid position for someone to do the
> legwork, make the connections, to give the ideas if they don't have
> the ideas themselves. The teachers have to take the program on and
> have room to take it on, not being angry about the political scene,
> passing that negativity to a program that has been very successful in
> many people's eyes.

Being given sole responsibility for teaching sustainability in the first two years Joan

could see this was not as effective as they had intended. Parents, Dave and Bay

recognized, "You need a lot more support from the teachers trying to bring it into

everyday classes." Patsy, the Grade 3 Teacher, also realized that developing ownership

was important to the Program succeeding and developing but that had not happened:

> Developing a sense that we are all responsible for the program would
> help to move it forward. I don't think we all have that ownership.
> Everybody is on a different plane.

Teacher Involvement

Julia, the Community School Board Chair, spoke to the minimal involvement on the part

of teachers and community members. She noted, "In the Sustainability Program there is

lots of room for input. The Sustainability Committee want it and are constantly asking in the newsletter wanting people to join the council but nobody comes! There is lots of opportunity there." When Julia was asked how many Sustainability ideas had been taken up by the teachers themselves, as compared to other people related to the Council, her answer exemplified some teacher interest but a lack of significant involvement:

> The Sustainability Celebration Week was bought into by all the teachers but the Council employees: Joan, Denise, Lori were the driving force, really pushing, preparing the schedule, supplies, arranging for people to come. One or two teachers decided what they were going to do and had it all ready but lots of the others were asking when they had to have it done by, with no real ownership of the idea.

This was reinforced when Julia was asked if every teacher had been doing something each term. She replied:

> No. If a teacher decides to weed the gardens a particular month they will but there is no conscious organization of that. It is a function of the personalities involved. They would not respond well to a schedule they must fulfill. But if they come up with the idea and feel ownership for it they're wonderful. It is finding the ideas they want to be involved in.

The lack of teacher involvement or staff development was particularly evident when an exchange teacher joined the staff in the second year of the program. As a Teaching

Assistant noted, "I am working with an exchange teacher from Australia and this seems all new and foreign to him so he doesn't reinforce it in the class."

Nancy, the Grade 5 Teacher, spoke further about the lack of teacher involvement, "I try to do as much as I can but it is hard. Having thirty kids, ten special needs, mobility impaired kids make it harder." Lori, a Teaching Assistant, also saw a conflict of time and perceived teaching responsibilities as an obstacle:

> I don't think it will carry on very much without a Co-ordinator because teachers are too busy with their other stuff, especially as teachers are being given more and more to do all the time. All the recycling won't happen because teachers don't have the time to do it. Making teachers aware of all Joan does won't happen because teachers don't have time to become aware and to teach all that stuff themselves because they have their curriculum to teach.

Donna, the Grade 4 Teacher, felt that obstacles to developing greater teacher involvement stemmed from the program being initiated through the Community School as an outside agency. In this way the elementary school and the teachers were not responsible for the program. As she explained, this was particularly evident when Joan was not part of the teaching staff:

> Joan has asked for ideas in staff meeting and solicited opinions but I don't think she has been as successful in integrating the program, not being a classroom teacher this year. There are several factors that are

at work there but I am not laying blame. I think it is easier to do it from within the staff over time.

Ultimately, by hiring a Co-ordinator and not involving the teaching staff in the development or delivery of the program there seemed to be very little responsibility or ownership by anyone other than the Co-ordinator.

Ownership

This lack of ownership of ideas seemed to be an inherent problem in gaining widespread initiative and involvement in the program, and a by-product of the mechanistic system that set up the Co-ordinator and a few interested individuals to drive ideas forward without collaboration. Patsy, a teacher, recognized it was not an issue of not having control or opportunities. When asked how much control she had over the Sustainability Program, new initiatives or what she did with it she replied:

I think we have a lot of control. Some teachers do it better than I do because they are thinking about it more. For instance the children I teach this year had Shannon last year and are asking, "Where are the compost buckets?" We didn't have them because of the fruit-fly problem. But they were very, very aware. But if I want to take it farther I can.

Interviews with the teachers who were not involved with the Program revealed that the lack of initiative stemmed from a lack of ownership rather than initial motivation. When

Don, a teacher on the Intermediate Team who teach Grades 5, 6 and 7, was asked if the

teachers were ready to go with the program he replied:

> Speaking for myself, and the rest of the Intermediate Team, we were. I think there was a real readiness. I think there was a readiness and a willingness and an attitudinal readiness that it was something we could support. But things got busy in the rest of our lives and there was nobody pulling us along saying here's what we could do so we have gone on to other things.

> If we had worked as a team more we could have been able to take on more ownership and been involved further.

Nancy also felt the lack of a whole-staff team approach, an obstacle right from the start,

contributed to her lack of ownership and feelings of disillusionment:

> I felt sort of overlooked. The whole way it came about, we were going to hire this person, in this job. We didn't have any discussion in terms of what teachers were already doing in their classrooms. The assumption was that we were at zero and we were going to go up from there.

Reflecting on teachers feeling isolated in the decision-making process Mike recognized

the decisions they were included in tended to be very superficial rather than

developmental:

If there was a clear definition of this is where we want to go, then it would be, "Okay, how are we going to get there, what are our options?" The kinds of decisions that we are making are, "What are you going to do to support this aspect of the Sustainability Program?" rather than, "What aspects of Sustainability are meaningful?" So I feel the decisions we are involved in are very rudimentary.

Another Intermediate Team teacher, Alice, showed the outcome of the mechanistic managerial approach, that involved a lack of leadership in developing a team approach and had the Co-ordinator work in isolation with the students, led to staff misunderstanding of the Co-ordinator's role, and defence of boundaries when positions were challenged. When she was asked why they haven't sat down as a team and looked at the Sustainability Program or sustainability her reply was:

We were always trying to seek direction from her and she just said that isn't her venue, "I don't need to come up with a scope and sequence, I don't have to plan this for you. I'm the Sustainability Co-ordinator." But we don't know where we're supposed to be getting that stuff from; we don't know what Sustainability is supposed to look like at the different levels. That's where it was starting to fall apart. It needs co-ordination, input and direction.

When the Principal was asked if the teachers had much input he replied:

Most have played a secondary rather than primary role in involvement, but to varying degrees. They feel really comfortable in the planning/ developing ideas for events like Earth Week. On-going stuff is a little more work because people are busy with the curriculum they've got: if someone comes in and helps them set up a composting depot, great. And some people have taken on themselves other projects: gardens, but they tend to be one-shot deals, like Earth Week last year. All sorts of projects got done that week. They feel really comfortable doing that: where they can put all their energies into one thing, short time, see some great results, and then they get back to their normal routine.

In helping teachers develop ownership and commitment to the Program, Roger, the

Program Consultant, felt teachers needed to be involved more in the initial planning and

development:

A program like this cannot survive without the teachers' energy. Initially it was intended that this program would make their job easier. For that to be true they need to let go of things that they feel do not fit within the Sustainability view. They would need to identify the things they could let go that would give them more time for injecting some of this into classroom curricula, changing the way the classroom runs, the priorities you place on things beyond the classroom: playground, staff room, gym, washrooms, custodial closets.

Mike, an Intermediate Team teacher, felt that to develop a sense of ownership they

needed more background and help in developing education and sustainability as well as

integrating it into curriculum. When asked what would help develop ownership he

replied:

> A clear working definition of what it [sustainability] is; an agreement; some integration into the curriculum; some sense that it is going to be tied together with everything else that we are going to do today. Not just that we have a recycling box in the corner but in everything that we do. To have meaning it has to be connected, in terms of the students and adults here. We don't have enough time to study a lot of things that are not connected.

Professional Development

Further obstacles to teachers integrating sustainability into their teaching seemed to stem from them not knowing enough about it or how to incorporate it given their present teaching practices, and a lack of attention to this basic reality. As curriculum and staff development were not specific measurable outcomes, the prerequisite of staff development for integration across the curriculum was left to individual initiatives.

Although teachers felt they had control over the degree they became involved in the Sustainability Program, there were diverse views on the amount of control they felt they had over the B.C. government curriculum. Alice, a Grade 6,7 teacher said, "We are given a core and we stick to the core. But how you teach the core is up to you. It's more in your approach and methodology where decisions are made.

Although Joan, the Program Co-ordinator, and a teacher herself recognized the limitations the teachers faced:

> They have a huge pressure to get through the curriculum. They consider how much time it would take to relearn or re-teach in a way so it is sustainable. If Joan does it for them or gives them the book or manual it is really fast, it is okay.

The Principal, Dave, also noted that teachers put up their own obstacles due to their embedded habits and perceptions:

> Time is always used as an obstacle. When you look at the potential to bring this into the curriculum it is a perceived obstacle; it doesn't have to be an add-on. But you are working with teachers who have taught the same thing and many of them the same way for many, many years so you have to change that mindset. And that's difficult. So that's the idea with a Co-ordinator, someone who would help them do that. It didn't happen as much as we wanted.

On the school level, Roger Blackwell introduced the staff to the Sustainability Program and as he designed the program he acted as their consultant. When asked if there had been much in-service from Roger about it being a different way to teach rather than an add-on Dave replied:

> Yes, and we have talked about that. That hasn't really filtered down to the classroom yet. But exactly, if you want to teach science, social studies or language arts you can and you just bring in sustainability issues as part of your teaching. People aren't there yet. There are some teachers that are moving much faster in that direction, that

have really taken this on and are doing a lot in the classroom, Donna with her ArtStarts grant for the video, some of the science things that are happening down there.

Although Roger Blackwell, the consultant for the Sustainability Program, did introduce

sustainability and the Sustainability Program to the staff, this did not seem to be

sufficient. As Nancy explained:

> Roger is a wonderful person but he can't teach teachers because he has gone right off the tangent in terms of vocabulary and knowledge. So when you come back to your average teacher who doesn't know about glossy paper, he isn't into food chains, he is into the Mountain of More. He has all this lingo that kids might find catchy and will remember. People need basic understandings in normal language. And he needs to let them talk and discuss the ideas and what they are doing already to feel involved.

Alice, a Grade 6/7 Teacher, agreed:

> We thought that Roger Blackwell was going to provide professional development. We have booked him for pro-D days but I honestly don't know what he has given us. I don't pick up any ideas or direction. It's a blank.

Don, an Intermediate Teacher, also felt there was a lack of in-service or leadership to help teachers put the program into their classroom teaching:

> We had in the Fall the Peel Team spend a morning with all the Grade 6 and 7s but I don't think that was all that successful because it was hard to put that into context. It seemed to be an isolated event. We had a big splash but there was no attempt to follow that up with what we are going to do next.
>
> I think that I have felt a void of leadership in terms of let's get together to meet and talk about our program; how we might tie Sustainability into your programs; what are some things we can do; what are some common activities?

As teachers were central to teaching sustainability in the elementary school the Principal, Dave, was asked if there were opportunities in the professional development calendar for the teachers to immerse themselves in sustainability. His response shows that teachers play a pivotal role in deciding what areas they will focus on regardless of the direction the school may have decided to go in as a whole:

> There are but up until now teachers have controlled professional development. I have nothing to do with that. If they decide they want to work on their math program then that is what they do. And it is hard for us then to say this is what we really want you to do.

Julia, the Board Chair, was asked if any of the staff were involved in the environmental educator's workshops during the provincial professional development days. She indicated only Joan, the Program Co-ordinator, took advantage of those opportunities which shows, once again, how limited the teachers' commitment was to developing the sustainability program. Essentially, the sustainability program was seen as an extra rather than integral aspect of the established curriculum and teachers' responsibilities.

As the teachers felt they needed more support and direction to incorporate sustainability into their teaching they turned to the Co-ordinator, expecting Joan to provide them with a framework and direction. Given the time and focus constraints of the Grant Proposal, Joan felt this beyond her job responsibilities. It was assumed everyone on staff would take on the responsibility to develop and teach sustainability themselves.

In teaching and learning for sustainability they took what Bell (2005) has identified as the information deficit model of environmental learning that assumes if people are provided with new knowledge about the environment they will automatically become more environmentally concerned and their behaviour will change. Bell argues conceptual metaphors are more important as they play a key role in framing how we think about and respond to the environment. Bell notes the information deficit model is ineffective as new knowledge does not automatically lead to behavioural change, and environmental knowledge can be controversial.

Most teachers were not able to develop curriculum and teach sustainability without

significant leadership and professional development. With poor communication this

impasse led to misunderstandings between the Co-ordinator and Intermediate Teachers.

As Alice explained:

> Joan does not hear us when we say we don't know what the program is for these students. I know that Joan was running a program with our students but I don't know what that program was and what she was doing. We needed to know for there to be continuity.
>
> What she should do to help us with Sustainability in the classroom, she doesn't know. I don't think Roger Blackwell does either. I don't think he is providing a whole lot of direction for us at all.

Bonny, the Grade 5/6 Teacher also felt they needed more professional development but

had no idea where to look, "There's nothing. We need to know what is working

elsewhere. It's a waste of time if we have to reinvent it here."

After two years of running the Sustainability Program the Co-ordinator's position was no

longer funded. This concerned everyone involved, as there was no clear direction or

leadership. Not having had significant professional development or involvement in

developing the program, the staff was very unclear about how to develop the program

further.

In referring to needing to educate themselves and learn how to tie sustainability into curriculum Julia recognized their lack of knowledge and leadership as an obstacle to further development:

> I'd like more education about sustainability, personally and as a council. That's where we're stuck right now. Where do we go from here? I don't feel qualified to answer.
>
> I don't know if what we need is out there yet. It is a little worrying. That's why we haven't put in for funding yet.

Dave, the Principal, recognized teachers needed more support and professional development before they would be ready to integrate sustainability into their teaching:

> There is a need for more on-going in-service with teachers. Someone showing them a science unit that fits the curriculum and brings in sustainability; someone to bring in all the resources because they don't have time - so what they go back to are the things that they've done in the past. But the one shot in-services aren't going to work. Or if there was other schools that were really taking this on and have really brought it back to the classroom, send the teachers there to observe for three to four days. The cost is huge but it would be a possibility.

Joan, the Program Co-ordinator, recognized it would take, "A willing group of teachers who are going to spend the time to understand what sustainability looks like in all their

subjects and in all their decisions."

This need resonates with what Sterling (2001) indicates as an ecological approach that would have developed a learning community that includes everyone in developing the program, relying on cooperation, collaboration and responsibility. The management approach, which might be characterized as being mechanistic by Sterling (2001), appeared to seriously undermined teacher involvement and ownership.

Ultimately, a lack of staff development in developing the program as a team and integrating education for sustainability into the curriculum limited the extent, effectiveness and longevity of the program. It brought people to a standstill, as they did not have a visionary plan with which to apply for further funding for a Co-ordinator.

Student Involvement

As with not involving teachers, Nancy felt hiring a Co-ordinator and not involving students in the decision-making process was also a major obstacle:

> You have to give the kids the ownership; it has to come from the kids. I think because it was a posted job, someone was going to get a salary to do it, it became her job to do it, she'll make our kids love the environment but that's not what happened.

Student involvement often depended on teacher support. Being the bottom of the hierarchy in the school system that was structured on top-down control, students did not seem to have power to make changes unless teachers supported and authorized those actions. The Co-ordinator tried to involve the students by establishing a Student Advisory Council in the second year to initiate student involvement in the development of the program. The students recognized this when they were asked how decisions were made regarding Sustainability. They identified that there was the Student Advisory Council, made up of two students from each class, who go to meetings and talk about what they can do for the Sustainability Program.

A lack of communication and limited opportunities for involvement seemed to curtail greater student involvement. When asked about student involvement a Grade 6 student's reply, endorsed by the group, showed their frustration with the lack of communication and empowerment:

> There is the Sustainability Committee and we don't know what they are doing really. They don't really tell us what they do. Some of us wanted to be on the Committee and they [the teachers] wouldn't let us. (F)

When students on the Advisory Committee were asked if they felt teachers were open to their ideas they replied, "Some are really open but some don't want to listen, they don't have the time." (M) The students felt the teachers, not the students, held the power to

decide what ideas would or would not be followed up on. As one Grade 6 student,

referring to the absence of recycling containers in the classroom, put it, "It is kind of their

choice because it's their classroom. Some students take their recycling home and put it in

their recycling at home." (F) The following discussion in a focus group interview shows

how Grade 6/7 students felt teachers giving minimal support and attention to the

recycling program affected their involvement:

> Student 1: "I don't see some recycling bins in Mrs. Johnson's class."
> (M)
>
> Student 2: "There are: they are under the bench." (F)
>
> Student 1: "Yes, but because you don't see them you don't think of
> using them." (M)

The Student Advisory Committee also recognized this obstacle realizing that if the

recycling boxes are not very visible they are not used properly. As one of the Committee

members said:

> In my class we don't do anything on Sustainability We have the
> recycling boxes in the corner but they don't really work because you
> can't see the labels as to which one they are so people just throw
> anything in there. It isn't really fair for the people who need to sort
> them. The Intermediate's boxes are really small and are not visible
> behind the teacher's desk. So many kids don't know where they are
> and we just throw everything in the garbage. (M)

When the Grade 6 and 7 students were asked if they felt they were involved in things to make a difference they replied:

> No. They just tell us to do it. The Advisory Group is just painting out there the Earth Week Mural - they're not creating.   Rather than just Ms. Walker and the Student Advisory Council, I think we should get more involved and be involved in some decisions. (F)

Some Grade 6 and 7 students did note that their classes were able to decide what they wanted to do for Earth Week the previous year. This however, was limited to the one week in the spring that was designated as Earth Week.

One particular Grade 5 student was very interested in and committed to environmental ideas as she was planning to attend the United Nations Children's Conference on the Environment later that year. When she was asked how involved she was in planning activities for Earth Week that year her answer showed how limited opportunities were, even for those students as committed as she was:

> Since I am only in Grade 5 I can't be in the Student Advisory Council but next year I really want to be on it. They have planned extra-curricular activities, Sustainability Week - a lot of really neat activities.   I think the kids in the grade 5/6 split classes should be able to get involved in all the activities instead of just some of them because it is hard to hear what the Grade 6 kids are doing and then being disappointed not being able to participate.

Student involvement was limited as the Sustainability Program activities mainly took place outside the regular classroom, as extra-curricular activities. This was evident when the same Grade 5 student, having been asked how you get on the Student Advisory Council, replied, "I think you just sign up but you have to be doing pretty well in class because you miss a bit of school." She went on to suggest, "It would be better to have more kids involved in the Sustainability Group because then there would be more kids to do some work around the school and get the Sustainability Program working farther." Again this echoes with what Sterling (2001) describes as the mechanistic characteristics of selection or exclusion.

Overall, some students in Grade 6 and 7 were more involved than others. Those on the Student Council or Student Advisory Committee worked on the Outdoor Classrooms and Check Your Lunch activity or the Mural and Composting Centre during Earth Week. Other Grade 6/7 Students felt they were only involved in recycling in their classroom or gardening twice a year. When these students were asked if there were things other than recycling they would like to do for the Sustainability Program one student's comments were very representative:

> I want to recycle more paper; plant more trees and shrubs. I would like five or six of us to do the recycling and take turns. Now Ms. Walker and the Sustainability Committee do it. Rather than just Ms. Walker and the Committee I think we should get more involved and be involved in some decisions. (M)

Outside the Student Advisory Council, the lack of opportunities for students to be involved motivated Sheri with the help of her mother, a Community School Co-ordinator, to establish an EcoKids Club for Grades 4-7 students. Interestingly, the follow-up visit in October 2003 showed that with the loss of the Co-ordinator and change of Principal, it was student involvement that tried to keep the program running. It was felt that the school would continue to be a Sustainability School through the recently established EcoKids Club. It was also widely felt that recycling and Earth Week celebrations would also continue but likely at a lower level, again, largely through the initiatives of the EcoKids Club.

Parental Involvement

Initially parents were consulted and their support sought through the Parent Teachers Association (PAC) and through informational meetings held the spring previous to implementing the Program. These meetings elicited enthusiasm and support from a number of parents. However, when asked if parental approval was sought in any way, as their children would be involved, a parent replied, "I don't remember that going on. It was just something the school was doing."

Julia, a teacher and the Community Board Chair was asked how possible was it for parents and students to be involved in learning content or style she replied:

> Very little on content - teachers decide that, there are issues over teaching autonomy in the classroom. They let their wishes be known through parent teacher interviews and PAC Meetings but as to how much influence they have as to content, none - it's set.

Parents agreed feeling they had very little control or influence over what was taught in the school. In the words of a parent, Bay:

> There are a number of teachers that have been here a very long time as it is a desirable place to teach. I have had conversations about technique that have not been received well and probably as I am a teacher it has created a little turf-war. Our kids tend to be in class and be present and then come home and say how else can I do this.

Basically, parents felt involved only as they were kept informed of what was happening.

In the words of one parent:

> No, we didn't get much input I believe. It was a well-developed program at the school. Maybe if we saw there were things that weren't being paid attention to we might have made some comment. I think that Joan would have been easy to approach in anyway if something was amiss from the curriculum or if anything should have been added. We did get notices telling us what was coming up.

Other parents felt that although they had very little control, their potential input varied from teacher to teacher, depending on how open teachers were as professionals:

I would say if you have teachers who have been at the school for eighteen to twenty years I would say no because they have their set curriculum, but not to say they would not entertain you in a consultation but I think it highly unlikely. The ones that are most receptive to input generally are those fresh out of school where they are still finding their way and do not have boxes full of handouts.

Although it was agreed that there was limited parental involvement, one parent

recognized the educational system the teachers were working within was a contributing

factor. They felt, "The system imposes its class numbers that are needed so no longer is

it about the individual."

To gain a balanced perspective, the Principal was asked how involved parents and

students are in learning content and style. His reply confirms the parents' perspective:

Parents less so, some parents sit on the Advisory Council will be aware, and the PAC group are aware and support it. Occasionally Joan will come or I will mention something at a PAC meeting. But for the most part, in terms of content, not a whole lot. Occasionally there's little tips and hints that go in the newsletter. The students through the Student Advisory Council do mostly projects such as what can we do to improve the school rather than the content behind it.

This accords with what Sterling (2001) has characterized as a mechanistic view that encourages top-down control, curriculum control and prescription rather than participation, empowerment and determination.

When parents were asked if they would have wanted more input as a parent as to how the program was developing they responded positively. The following parent's comments are representative of this view:

> Yes, I would have wanted more information as to how it was being implemented in the curriculum and perhaps I would have gained a better understanding of what their obstacles were if they were explained. Ask parents what their priorities are and what we would like to see. Then with teachers we would know what can and can't be implemented. A little more open communication or the opportunity for that.

This has resonance with what Sterling (2001) indicates to be an ecological view that encourages participation and an open responsive curriculum where the local community is increasingly part of the learning community.

Community Involvement

The community was extremely involved in the Sustainability Program as the Community School at Forest Grove initiated it. Community members are also part of the Community School Board of Directors. The Community School secured the funding for a Program

Co-ordinator and administered the Program, which incorporated a community component

to help involve and educate the community.

Joan, the Program Co-ordinator, described the community involvement in the

Sustainability Program:

> There is community involvement through the environmental fair held on Earth Day last year and through Sample Families. By working with fifteen Sample Families to reduce their hydro, water and waste we hope they will share and pass on their experiences to friends who will in turn tell their friends, etc. The idea is to learn together. We have a meeting every three months with guest speakers who will support those reduction categories.

Caroline felt the community greatly benefited from the Sample Family Program:

> Sample Families has encouraged us to talk to our neighbours, others in the community and to people from other communities. I brought Roger Blackwell in to talk to the Native Band I was working with so it has enabled us to spread the word that there are other ways of doing things. It has facilitated networking to know who to get in touch with about a variety of topics.

Lynn, a community member, chose to be very involved, "I have two involvements in the

Sustainability Program: I went to Peel Island as a green member to have the same

experiences as the kids; and as a Sample Family I took on the commitment to reduce

water, garbage and hydro." When asked if she came up with an idea for the school or community did she think that idea could go through she replied:

> Yes, I do. It is interesting when they were trying to get us to use low-flush toilets I thought, "Give me a break, the school flushes so much more than I do why aren't they installing them?" But they found a way and I think that's great. They are also trying with the lighting.

When Lynn was asked if some of the ideas came from her she showed how much influence she has been able to have, "Well what I do best is connecting people to help something come about. I helped them get a worm-compost going and connect with a Youth Action Team to develop the larger gardening and composting projects." This influence was credited to the fact that Forest Grove Elementary School was now a Government Community School:

> This is a community school, which is a way in, and mentorship is possible. Before the community school we were not allowed in. There has been quite a change.

Beyond the Sample Family Program the community was involved and supportive in a number of ways. The Earthwind Outdoor School staff ran numerous activities throughout the year at the school, and volunteers were active in the school as well as in facilitating the many activities and workshops held throughout Earth Week. The Youth Action Team

of young people aged 18-25 were very committed: actively engaging students of all ages in discussions; gardening projects; designing and painting murals; and constructing an attractive composting center.

Everyday and evening during Earth Week the community attended special events and workshops at the school and in homes throughout the community. Sessions ranging from composting and reducing water consumption to cleaner community air practices and living off the electric grid with alternative energy sources were well attended, generating lively discussion and debate on issues relating to sustainability.

Community involvement had also been reciprocated when some of the Grade 6/7 students who were on the Student Advisory Committee had also been given an opportunity to influence local businesses in the community, "Some of us did an audit at different places. There we made recommendations for them to set up recycling in their offices." (M)

Parents felt there was good communication between the school and community through the Sustainability newsletters, and opportunities to help in classrooms with special projects such as making graphs on how to reduce waste, water and electricity. Dave, a parent and Sample Family member, spoke about his involvement:

> I was in the school with the groundwater testing. I also was in classrooms helping kids make garbage graphs about what they were using and what they could do about saving, what each class was doing. A number of parents got involved with a few things like that.

> The kids were very excited and attentive trying to figure out what we were up to.

This breaking down of the school/ community barriers is a significant component of developing what Sterling (2001) describes as an ecological view.

Joan, the Program Co-ordinator, also spoke about the positive impact the Program has made in not only reducing their own impact but in inspiring others. When she was asked what successes they've had she replied:

> That we've come this far, we're still talking, trying to find our way; we've reduced our waste, water and hydro; that other people, schools, and communities are asking how to do it - they are interested and thinking about doing it themselves. People don't want it to end. Parents are concerned that sustainability will not be continued in their children's next school. We have felt successful and have pulled people together.

The Principal, Dave, recognized how important it was to develop a strong sense of our global as well as our local community:

> Without tying our local community to the global community it is lost because we need to understand if we reduce what we use and live a little more simply, it helps other people across the planet.

Julia, the Community School Board Chair, was also very positive about the community's

involvement in the Sustainability Program. But although they were very willing to be

involved in the Sample Family reduction program or as resource people it was hard to

find volunteers to take on a leadership role to make things happen:

> There is a commitment that it is a wonderful thing and great idea, but
> nobody is willing to jump out and say yes, I will take it on, I'll find
> funding.

Although many were very active in the program, commitment varied for a variety of

reasons. As Lynn noticed:

> From what I see, there could have been more commitment, more
> active Sample Families. Some families are so busy with their work
> and families so you have to understand it.

This seemed to be the case with Dave and Bay who originally thought they might be part

of the program:

> We chose not to be a Sample Family in terms of experiments to
> reduce our garbage, etc. because I could barely get these guys to sort

at that point and figure out our systems. But we try to make low impact choices.

Elizabeth, a Sample Family member, felt most people who stayed with the program were those who were already committed to improving their sustainability practices:

I guess it was hard to get a commitment for people to go to all the meetings. Some only went once. The Sample Families tended to be people who were already recycling and reducing so they got better. Some even bought energy-saving appliances so they could reduce even more. We tried to reduce but there is a limit to what we could do.

Lynn recognized that some might have declined to participate due to feelings of guilt:

There has been a lot of guilt although it was done with the best of intentions but it makes you feel overwhelmed. You have to get used to the information before you contemplate changing. It takes time, but you had to go through, "Ya I want to do better." Many uncommitted people are happy where they are at, spending their money, being consumers.

Lynn recognized they needed to reach more people in the community that are not concerned about sustainability but this would take more than information or networking. When asked how they could do that she replied, "Affecting their pocket book, paying for

water. They are bombarded with television and societal values and to have kids living simply is foreign."

Caroline, a Sample Family member, felt they needed to reach the wider community more. As Caroline explained:

> I don't know if it got out into the community the way we had hoped. That the information got out to the community at large, beyond the Sample Families and beyond the school, so the community itself was pricking up its ears wanting to find out what we were doing. We need a bigger PR program like the carnival but open to the community so that it is well attended.

Dave, a parent and Sample Family member agreed with the need to network with a wider community. When asked about needs to improve the program he suggested, "Possibly newsletters of some kind talking about initiatives in other parts of the world: successes, and cautionary tales." He also recognized they needed:

> More availability of composters outside the school itself to get others involved; recycling bin at the school to get people coming into the school to do their recycling. If there were Community School recycling efforts like bottle drives to get out into the community more.

Given the present climate and the loss of funding for a Co-ordinator, Joan felt the basic need was for the community to pull together to ensure the program continued:

Ultimately people need to say that it is not acceptable that it goes away: community, students, teachers, administration. Then people will need to get creative and committed giving time and volunteering, sharing decisions and jobs. We will not let money be the barrier. It has to come from a group that is willing to carry the torch. We need to refuse to let it go.

In relation to developing the sustainability program further, Lynn felt the Community School was essential. As the future of the Community School was questionable due to a lack of funding from the Ministry of Children and Families Lynn felt local decentralized control of funding was needed:

If our Community School gets cut we would ask for a referendum to increase the community tax base to support the Community School. A lot of people think this is downloading but the reality is it is local control.

Associated Community/ School Programs

While Joan co-ordinated what came to be known as the Sustainability Program a few teachers were involved in their own projects they had either started before the sustainability program or had initiated separately. One such program was an art project funded by the Art Start Funding initiative. Although this project fell within the mandate

to model and teach sustainability it was seen as separate from the Sustainability Program

as it was funded separately and not co-ordinated by Joan, the Program Co-ordinator.

This was also the case with another Community School project, the Water Testers

Program. A different Community School Co-ordinator administered this program and a

community member by the name of Elizabeth taught it in conjunction with a Grade 6/7

teacher. Again it was seen as completely separate from the Sustainability Program. When

asked about the program Elizabeth replied:

> The idea was to introduce it at the school level and then hopefully
> there would be some follow-up in the school curriculum. The testing
> program is no longer happening but we want the community to be
> aware through their kids about septic systems and their
> environmental impacts.

When asked who designed this program and how it came about Elizabeth replied:

> Paul and I developed it. Environment Canada asked us to somehow
> present this as a package to the school. The guidelines were minimal.
> It was to deal with water, septic systems and limited resources on the
> South Coast. We came up with the content, activities and
> methodology. It was a good program but I think it would work better
> in a classroom, as we had to wait for all the kids before we could get
> started. Kids didn't always behave, as we weren't their regular
> classroom teachers.

So once again, a top-down curriculum project that was prescribed, detailed and largely closed was being introduced into the school with little or no involvement from the classroom teacher. In addition, there was no co-ordination of various projects under the umbrella of the Sustainability Program or the sustainability initiative. Instead there were a number of projects being administered separately, with significant defence of control and boundaries rather than developing a variety of activities through collaboration and co-operation. This has resonance with what Sterling (2001) has indicated as a mechanistic managerial approach.

11.4 Buildings Grounds and Resources

In walking into Forest Grove Community School the existence of the Sustainability Program was very visible. A new composting center had taken the place of propane tanks and various gardens and murals had been developed around the grounds. The front lobby of the school housed the recycling containers as well as graphs showing progress on targets for reducing waste, water and electricity. A large mural, done as part of an ArtStarts Grant, emphasized the natural environment valued by the students at the school. Finally, in a few bathrooms low-flush toilets were being piloted for reducing the amount of water consumed.

Dave, the Principal, was also involving students in creating an Outdoor Classroom. Dave describes how this came about:

> It started last year thinking about how we could get the average teacher to take their class outside and make it useable. One day last year a teacher and myself started clearing the space of brush hoping people would start to use it. We talked to a parent to get us the wood. The Student Council two to three weeks ago decided to contribute to Earth Week this year by paying for the wood and finishing it off putting in the benches, etc.

Bonny, the Grade 5/6 Teacher felt the outdoor classroom would be a great place to take the kids for music and writing.

The local school administration has decision-making power over purchasing school resources, and changes they would like to be implemented in the buildings or on the grounds. Dave, the Principal elaborated:

> We could and if we said we want organic fertilizers the Maintenance Department would do it and then charge us the extra amount above what they would normally pay. But we could make that decision. We have asked them to turn down our heat and they have responded to that. We have contacted them to say we don't need the grass watered all summer. They didn't water and within a week of water in September it was green again. Many of those things they are stuck in status quo, it is the way they have always done it.

Respondents all recognized successes of the Sustainability Program related to reducing their waste, energy and water consumption, and the improvements to the buildings and grounds. Garbage had been reduced by 50% through recycling, and water by 38% and energy by 13.2% by conservation measures.

Even with these significant successes respondents identified obstacles regarding the buildings and grounds. These often related to not having a shared philosophy in sustainability, the top-down hierarchical management structure, centralization and defence of boundaries, poor communication, and lack of teacher/ student involvement.

Joan spoke about the lack of a shared philosophy with all the interested parties as an obstacle:

> Then there is the new basketball court where we have poured new concrete: on the other side of the school they are saying ditch the cement. You have to compromise. The Parent Advisory Committee or the Administrator wanted the basketball court to help occupy the students who were bored outside. And just last week we put in a new play structure and the kids love it. It is loud plastic but it keeps kids playing outside.

A lack of student involvement was also apparent with the new playground equipment. When Joan, the Program Co-ordinator, was asked if issues of sustainability in materials came up in planning the playground she replied, "More so a community member raised sustainability concerns. The Parent Advisory Committee and Administrator made the decisions to go ahead with the plastic equipment."

The lack of a shared philosophy and poor communication between the school, School District and Maintenance Department also became obstacles in trying to ecologically manage the grounds.

The Buildings and Grounds are owned and maintained by the local School Board.   Joan, the Program Co-ordinator, felt there were problems with the school not having control over the grounds:

> The leaf blower came for eight hours a day. They go for what is the quickest and cheapest way to maintain the grounds. Maintenance uses leaf blowers to blow the leaves from here to there on a windy day causing excessive noise pollution, and sidewalks are power-washed to get dirt out of cracks when we are trying to reduce our water consumption by 10%. There is not a good connection between our school and the School Board who contract maintenance.

Shannon, the Kindergarten/ Grade 1 Teacher, recognized there were many ecological changes she would like to see but were beyond her control:

> I'd like to see a lot more natural stuff. Carpets on the wall throw me for a loop, worse than carpets on the floor. I'm very aware of kids' allergies, especially in younger children who are sitting or lying on the floor. I would rather go with something biodegradable and not so toxic.

Shannon was also concerned with the chemical cleansers the custodial staff used in the class, especially on the surfaces of the desks and tables, not only in concern for the students but for everyone exposed to them:

> The custodian is developing allergies herself and she is worried about her eye. I suggested she look at what she is using everyday and the gloves she has to put on her hands. I think she would be very open to using other things, trying other products.

Donna maintained that many obstacles came from being part of a complex bureaucratic system. For that reason she felt it was essential they had a Co-ordinator who had the time to deal with the complexities involved in order to make changes.

Julia, the Community School Board Chair recognized there were serious work restrictions due to the hierarchical management structure of the school system with strictly defended boundaries. As Joan, the Program Co-ordinator explained:

> It is also a union issue. It is political. You need to hire a union person to do grounds development and maintenance rather than use volunteers. There is not a budget to pay for that kind of work. If you have a union member on board, paid, you can have a volunteer, or if it is seen as curricular-related and teachers are involved with their students it is okay. There are a couple of loopholes you need to learn.

Initiatives that involve significant economic considerations have not been so simple due

to centralized control. As Dave explained:

> They are starting to change the ballast in the florescent tubes so we
> can put a more energy efficient tube in there. So they are starting to
> respond. They haven't changed them all yet because I think at other
> levels people look at the bottom line of the dollar. To change all the
> ballasts would cost a lot of time and labour.

Unfortunately, the centralized control over buildings and grounds also affected joining

programs that would make retrofitting the school more energy and economically

efficient, as the Maintenance Department refused to support it. As Dave explained:

> I thought it was a great idea. The problem was our Maintenance
> Department would not put the money needed up front even though
> they would recoup it and more in two years.

As a shared philosophy in sustainability did not exist between the school and the School

Board, the School Board used short-term economics as their main consideration. This

often limited what the school could or could not do. As Denise, a Community School

Co-Co-ordinator, noted in reference to the building becoming an example of

sustainability:

> The building itself is huge. We've put in low-flush toilets and energy-saving lighting. We worked with an architect who talked about green architecture but it has been very minimal. Unfortunately there is just no money. Getting money from the District is not realistic.

The Principal, Dave, who controlled the school's resource budget, recognized this to be a problem. When asked if they bought recycled paper he replied:

> No, and that's where we need to get to. Again it's just the cheapest. We investigated a tree-free paper; we had a parent doing the research. But it was going to be double the price and we couldn't afford it.

But as Dave noted, a lack of financial commitment is also tied to the obstacle of not sharing a commitment to sustainable practices:

> Unfortunately decisions are made because it is the cheapest thing to get. We've talked to the custodian and maintenance section as to whether there are things we can use that are more environmentally friendly. The response we are getting is yes but it doesn't clean as well and being an institution we have to have powerful stuff - we are still negotiating that. I think we need to look at the purchases we make, and make the decisions of what it is we buy and the companies we buy from based on good sound sustainability. Unfortunately that takes time to research a company and its prices.

Varying levels of commitment to and understanding of sustainability was also evident in the school itself. Dave recognized this as an obstacle to reducing their use of paper, feeling some teachers photocopied too much having an attitude that paper could be wasted, as it was recycled. In speaking about the amount of paper resources the school used in its day-to-day operation, the Principal was very frustrated they had not yet affected teaching strategies:

> We recycle a large portion of the paper at school here but I think that has encouraged an attitude that we can waste it because we'll recycle it rather than focus on reducing. But the reduce and reuse isn't as strong as recycling. We aren't there yet. There's still too much photocopying going on. There're other ways to deliver a lesson without paper.

This seems to reflect the fact that teachers were not very involved in Sustainability Program developments from the start and so did not make strong connections between their personal teaching practices and issues of sustainability.

This variation in commitment was also evident with the composting program. Most teachers were willing to recycle paper but were not happy composting because of fruit flies. Some put the obstacles in composting down to commitment whereas others felt better container options and more consistent emptying practices were needed.

Julia, the Community School Board Chair, also recognized that union control over

maintenance presented obstacles in maintaining grounds improvement projects due to a

lack of money or time: "They say they need to maintain it but they don't have the time.

The maintenance then has to be with the kids or it doesn't happen." As teachers were not

very involved in the sustainability program, maintenance of various projects became an

issue.

As the school did manage to install a number of low flush toilets the Principal was asked

if the students had been involved with that initiative. His reply shows how little the

students were involved in the decision-making or implementation process:

> They kind of just happened. I wanted to make sure they worked -
> weren't going to get plugged so we put them in the staff washrooms
> first. They worked great so we put one in the boys' and one in the
> girls' washrooms. Then we've ordered two more. Joan has put signs
> up telling them they were there; she has talked to classes about their
> savings and them being part of the video. Most know about them
> because one day there was suddenly a strange toilet in the washroom.

Dorothy, a Support Staff member who assisted special needs students in the classroom,

was asked if she felt the students in her class had much influence over the grounds. Her

response recognized there was little student empowerment and the adults did most of the

critical thinking.

 Not an individual teacher or individual class. It filters down from
the Principal and I think he gets his input from the community and
parent groups.

Decisions and actions to improve the school, grounds and resources were largely due to

the work and commitment of the Program Co-ordinator, the Community School Board

and the Principal.

Even though there was minimal student involvement in decisions regarding the buildings,

grounds and resources significant strides had been made to model sustainability.

Unfortunately, the mechanized hierarchy and centralized control limited what they were

able to achieve in ecological management.

Needs identified with improvements to the buildings, grounds and resources tend to relate

to funding. Dave, the Principal, recognized the school needed to start buying recycled

paper and other purchases based on sustainability, but this would take time to research as

well as money. Joan, the Program Co-ordinator, recognized that although the school

needs to do more to make their resource use more sustainable, economic priorities would

dictate what they will be able to do:

We are looking at tree-free paper but it's expensive. Budgets are
going to dictate how committed we will be. I think people are more
aware with the photocopier. I'm not sure if we use recycled paper -
it's a money thing. I think the next step would be to look at what

> percent of our paper is from treed material and then we need to put
> our dollars towards tree-free paper or some other good cause.

Dorothy, a Teaching Assistant, also saw the need to extend low flush toilets and

composting, depending on funding.

11.5 Curriculum

As a government-run school, Forest Grove Community School follows The British

Columbia Curriculum for Elementary grades. It is defined in terms of Learning

Outcomes for the subjects of English Language Arts, Mathematics, Sciences, Social

Studies, Physical Education, Fine Arts and Personal Planning.

These learning outcomes are specific to grade levels and separate subjects. It does,

therefore, emphasize discipline-centered learning and encourage age-specific

achievement levels in each of the content areas. Rather than promoting an ecological

view, this curriculum shows characteristics of what Sterling (2001) has described as a

mechanistic educational paradigm in that it is prescribed, detailed and largely closed;

incorporates de-contextualized and abstract knowledge; and focuses on subject

disciplines.

The Sustainability Program

As the B.C. Curriculum does not promote education for sustainability, the school decided

to get direction and guidance by adopting the Sustainability Program. Its philosophy

contrasts significantly with the predominantly mechanistic government curriculum.

Blackwell describes the Sustainability Program:

> The Sustainability Program aims to develop the capacity of learners to understand the ecological context in which they live and to act accordingly. It will have learners recognize the limits Nature imposes and encourage the school community to make every effort to thrive within them…The Sustainability Program is a compass that guides students, teachers, administrators and support staff as they make the many decisions and choices that create the future of their school.

It is intended that a Sustainability School will use this ecological philosophy to guide

operational decisions as well as educational curriculum. It is a philosophy that is

intended to permeate all aspects of the school with ecological metaphors of

interdependence, community, and diversity. Julia, the Community School Board

Chairperson and teacher felt they started the Sustainability Program because,

> …of the whole philosophy behind it. It seemed like the right thing to do. It encompasses the values we believe in, making it a better place, looking at the whole child, this ties everything that is out there in to them; it brings our community into our school more, it looks how everything is interrelated which is how I try to teach. It was another vehicle to teach that.

The Natural Step Framework informs the Sustainability Program for Sustainability

(www.thenaturalstep.ca), founded on the LAWS of science:

- L - Loss of order happens (entropy law);
- A - Atoms are forever (once you have them, you have them - they do not go away);
- W - We consume order;
- S- Sun power (includes evaporation, transpiration, etc) + plants = order.

From this foundation the program is based on four pillars of sustainability: Leave It, Eat It, Share It, Spare It (the L.E.S.S. Test). In addition, these four pillars form the four sides of a four-sided mountain, 'The Mountain of More', a model to indicate five progressive levels of sustainability to aim for in each of the four areas. The Sustainability Program did not detail these levels, specific curriculum guidelines or content for various grade levels. It is designed as a decision-making framework to guide thinking and actions. As the actual levels were not clearly defined Blackwell was asked if they had developed a way of moving people through Levels 1-5. His response has parallels in Rauch's (2002) socio-ecological approach as well as an ecological action competence approach (Greig et al, 1989; Orr, 1996; Bonnett, 2002) that sees curriculum should be open, responsive, and generated through negotiation and consent relying on local first-hand knowledge; curriculum empowerment and determination; process, development and action. With this decision-making framework and model for developing a school based on sustainability, decisions needed to be made as to how Forest Grove Community School would implement it.

Dave, the Principal, reiterated how they implemented the program:

There are a couple of areas: one is the actual running of our physical plant here, we want to lessen our impact: by reducing our garbage, the resources we use, we even had a line on a grant to install a solar classroom so I think we will still investigate that. We are looking at all the things we purchase and all the things we do and measuring that against the Sustainability philosophy - does this fit? The other side is the awareness and teaching of our children as the next generation. As they grow up they appreciate nature and as they grow up make decisions about their own consumerism and how they live their lives, well informed.

In addition to the reduction aspect of the Sustainability Program in both the school and community, specific activities were planned each year for Earth Week in March. Joan felt this was important as:

1. It acknowledges what has been accomplished;

2. Is an opportunity for volunteerism;

3. Highlights key people in the community who are good at whatever it is they are good at;

4. It brings the community together; and

5. For the staff and kids it reminds us what we are about and who we are. We get an opportunity, on mass, to show each other what this looks like to us.

It was unanimously recognized that some of the significant successes of the Sustainability Program occurred during these weeks. The first year they organized Celebration Week.

It was a rotational basis for students to do activities that were sustainability based. Students attended and twenty-seven volunteers ran activities for them. Teachers led their kids through the activities, disciplining and helping, and during their class time did special projects such as making bird/ bat boxes and an interpretive trail. These projects were finished, displayed or built that week, often with the help of volunteers. The community joined in with a celebration dinner and display evening.

In the second year, Primary grades were targeted so they and the Student Advisory Committee were focused on during Earth Week. Recycling, composting, mural drawing and game-activities happened for Primaries every afternoon. A group of senior youth from Employment Canada led the activities while teachers attended with their students. An Intermediate teacher had her students teach the Primaries some games; the Intermediate Student Advisory Committee worked extensively with the Permaculture Community group doing the mural, composting and recycling, and gardening.

Joan further explained these weeks provided a special focus for sustainability, helped acknowledge what has been accomplished, and provided opportunities to strengthen community/ school ties. For example, Earth Week celebrations were an opportunity to debut and celebrate Donna's highly successful Grade 4 video with all the other students and community. This video was unanimously recognized as a success of the Program.

Joan recognized some teachers had a deeper level of understanding and/ or commitment to implement an ecological educational philosophy:

> Some of the teachers have really run with it in their own classes. It was not hard for them to think more globally when teaching social studies and make connections to self and local actions. I think a lot of people were already doing things that they did not have a name for. It was nice to give credit for those things already happening yearly and give credit for those actions.

BC Curriculum Integration

In addition to Co-ordinating the reduction program and Earth Week celebrations, Joan

was also given the Grade 6/7 science classes to teach the basic concepts behind the

Sustainability Program. She described how the L.E.S.S. Test components related to the

actual curriculum the teachers work with:

> Seeing that the Sustainability Program specifically incorporates environmental education is the easiest for teachers to understand because it is part of the IRPs or Prescribed Learning Outcomes; it's concrete, it's something they can tangibly deal with. The Leave it/ Eat it/ Spare it are all environmental education slants for me; the Share it is the bigger picture part, the sustainable global aspect. It has a moral dimension that goes beyond factual information and so is beyond the school's remit. Sustainability is a window through which you can broach some of the trickier moral subjects.

Given the fact that Forest Grove was required to teach the B.C. Provincial Curriculum,

Dave, the Principal, was asked how possible it was to bring sustainability into the

provincial curriculum. His reply showed how open the B.C. Curriculum is as well as a

very integrative understanding of sustainability and education:

> It is actually very flexible. Even in math where there is lots of content to get through you can use real life contexts like low-flush toilets to do the math calculations of water reductions. The science curriculum is mainly skills and attitudes. They give suggestions of units but you don't have to do them. Even within those units there is flexibility to bring in sustainability. You can bring sustainability into many subjects, you can always tie it in. Language arts is completely open, which is probably the biggest part of our curriculum; Social studies is another one. There is great potential to tie in other cultures and their philosophies, impacts.

The social studies curriculum resonates with what Sterling (2001) has characterized as a

more ecological view of integrated understanding, responsibility and inclusion and

valuing of all people (Appendix 3). As such it draws from the social sciences and

humanities to study human interaction and the natural and social environments.

Donna, a teacher who was very involved and supportive of the Sustainability Program,

was asked if she had decision-making power over what she did with her curriculum:

> The Grade 4 program in science is wide open and you could relate lots of sustainable issues. The social studies program includes studying a First Nation people before contact so that gives you a chance to talk about culture and its relationship to the land and its resources. There are lots of ways in the personal planning program,

> nutrition, whatever. And you can make windows. You don't need to
> open them but they are there if you want to exploit them.

In trying to promote sustainability in the school, Dave, the Principal noted that the

Sustainability Program report on every staff meeting agenda also seeks feedback as well

as ideas for the future so teachers are given an opportunity to come up with suggestions

about things that concern them with curriculum.

Speaking about opportunities to teach sustainability with the Provincial curriculum,

Shannon, a Kindergarten and Grade 1 teacher, also felt she had a great deal of control,

"Because I teach Primary I think it is easier to go with interests of kids, interests of us.

There are no text books."

> I don't teach separate subjects. I choose a theme and everything you
> do keeps pulling those things in. We are always talking about
> sustainability and pulling it into our themes.

Dave, the Principal, recognized the importance of sustainability being incorporated into

the educational curriculum of the school but also that it should be interdisciplinary to

promote the ecological metaphor of integrative understanding. Roger, the Educational

Consultant for the Sustainability Program, also referred to the importance of the

conceptual framework of the curriculum and in responding to what his ideal form of

education would look like he emphasized a strong ecological view incorporating

ecological metaphors of holism, diversity, interdependence, intrinsic nature through

experiential learning outside.

Parents also felt sustainability needed to be integrated into the curriculum in an

interdisciplinary way. Dave and Bay were parents who also reiterated the ecological

educational philosophy. Their ideal education would be:

> Less of an institution focus and looking out to society more. That would incorporate outdoor learning and service projects. The formal learning and in society learning need to be integrated. The working world should be educating itself all the time as well.

Caroline elaborated on what sort of curriculum approach was needed:

> I would have thought it simply would have focused on the planet ecosystems and how that ties in to social studies so written and reading assignments would have encompassed research and reports on what was being done here and in other places; interviewing people in the community which would have taken it out into the community; science was where it was best covered. So to me, I thought it would focus more on our place, our impact and how we can make choices to live in harmony or not; where we are, where we're not; what we might do about it, what could we do differently. Really get the kids thinking about it, throw it out to them.

Sheri, a Grade 5 student, also felt it needed to be part of the regular curriculum. When asked what other things the school needed to do beyond recycling or reducing she replied, "I don't know if they are going to start up Sustainability classes but I really hope they put it in as a main class next year." (F) The Student Advisory Committee agreed. As one student on the Committee recognized, "Yes, it gets pushed to the side and meetings get cancelled sometimes where math wouldn't." (M)

The issue seemed to be whether the individual teacher took the initiative and had the depth of knowledge and commitment to integrate it into the B.C. Curriculum. Although the Intermediate teachers were not very active integrating sustainability into Grades 5-7, Alice, an Intermediate teacher felt they had the capability of developing a program:

> As an Intermediate team we work very closely and try very hard to link our programs. We would be very happy to sit down and develop a program if that is what we are supposed to be doing. This whole thing I found on the environmental chemistry linked really nicely. I was supposed to do ecology and I found some good books that linked really nicely with things I was doing. As a team we can work out the links in a new program.

Although the Sustainability Program is imbued with conceptual ecological metaphors and there is potential to integrate it into the B.C. Curriculum, the implementation of the Sustainability Program emphasized what might be characterised as a mechanistic perspective. Even though the introductory immersion session on the conceptual basis for adopting sustainable practices for the Grade 6/7 students was aimed at establishing

sustainability as a frame of mind, the enacted curriculum had features characteristic of

Sterling's (2001) mechanistic interpretation. Without a clearer indication of the levels of

sustainability, the Leave it, Eat it, Share it, Spare it directive led to interpreting

sustainability at the school in instrumental, economic terms that maintain the mechanistic

paradigm (Foster, 2001; Webster, 2004). The Grant Proposal, in particular, defined the

Program in terms of clearly measurable reduction targets. Sauvé (2005) identifies this as

the Conservationist/ Resourcist current in environmental education that does not question

but works within the status quo.

Visible evidence of the sustainability program was obvious at the school entrance but less

so in the various classrooms throughout the school. In some, the recycling containers and

composting buckets were clearly marked and visible. In others they were not visible and

in a few cases, non-existent. Most classrooms were filled with photocopied paper for

lessons, and wall displays did not give any indication of teaching for sustainability.

As Sustainability projects typically happened as part of specific Earth Week activities,

they did not seem to be incorporated into the day-to-day functioning of the school or as

an integral part of the school curriculum. Orr (1992) and Webster (2004) identify

curricular integration as an essential pre-condition to achieving an ecologically

sustainable society. Julia, the Community Board Chair and teacher identified that the

maintenance of various projects had been a problem:

> At Sustainability Week we all did different project but there is no real feeling that you need to get out there and maintain them. It will be an individual saying, 'That garden looks awful, I'll take my class out there and weed it.' The outdoor classrooms have been started and then just sat there for a year.

This seems to confirm there was little ownership on the part of either students or teachers and shows how little the Sustainability Program had impacted on the school curriculum.

Even though Dave and Joan recognized the interdisciplinary nature of the Sustainability Program they implemented it from a very discipline-centered perspective through the Intermediate science classes. This disciplinary emphasis echoes what Sterling (2001) has characterized as a mechanistic view that focuses on disciplines and specialization. Bay, a parent and teacher at the high school level, felt the Provincial curriculum was an obstacle, set up as it was with Learning Outcomes in separate subject disciplines. As she explained:

> I don't know if you can be much of an innovator when the rest of the system is looking this way. It is like a felt board, stuck on top of the school system, and what I would like to see it be is something completely stand-alone and completely stir the pot up. To really make its mark it needs to be interdisciplinary, it just has to be.

Given the obvious curricular connections Joan, the Program Co-ordinator, was asked if

there were other classroom teachers incorporating Sustainability into their teaching.

Joan's reply showed how much it depended on each teacher's background:

> It's individual if the teacher takes it on. Some teachers say I really
> don't know what to do with this. It may depend on where you're at
> in the world. For some the big picture is too big for them. They are
> still trying to get up in the morning.

Julia, the Community School Board Chair, summarized her views on the obstacles for

implementing a curriculum relating to sustainability as, "Teachers not buying in to it;

lack of curriculum and lack of knowing what to do next; not a deep enough understanding

of sustainability to know where we want to go."

Given this, Lynn, a very environmentally active community member, felt one of the main

obstacles to developing a sustainability curriculum was the fact that the Sustainability

Program, which was adopted to help model and teach sustainability was not built into the

school curriculum:

> I don't think the program is self-sustaining. It is not built into the
> curriculum. You would have to have complete buy-in that this is
> going to be the Forest Grove curriculum that you are going to use for
> ten years. I don't know if all the teachers have.

This was evident during Earth Week when Joan acknowledged only the few on the Student Advisory Committee were involved, "We are trying to encourage the other Intermediate kids, when they are not busy with the curriculum, to garden and help with the mural. This is dependent on their teachers."

As there were no specific guidelines for integrating sustainability into the elementary school curriculum the Sustainability Program developed as an extra-curricular program. Julia, the Community School Board Chair explained:

> Right now we are trying to fit it in as an extra and it is really important to us but there is no time to fit it so it doesn't get there. And to be part of the curriculum there needs to be a curriculum, which is the other stumbling block. It takes either someone with a huge leadership role to constantly be giving us resources, and teaching us how to teach it or it takes a curriculum that we can go out and learn ourselves.

The lack of a curriculum within the Sustainability Program seemed to be a major obstacle for the teachers. As a guiding framework it lacked curricular detail for focus and direction. As Dave, the Principal explained:

> I see the Sustainability Program just as a framework, just one name of one program and the program doesn't even really exist. It is still in the developmental stage. We are the first school that has taken the

name Sustainability school from Roger Blackwell's program. He's still working on it, there is no real curriculum. He's got the five levels and according to him we are on Level 1, but we have no idea what Level 1 looks like. And neither does he yet.

Roger Blackwell, the designer of the Sustainability Program and Program Consultant, recognized this was an issue:

> A big limitation is that we don't have the Mountain of More really clear yet. There are lots of possibilities that will give people a really clear distinction Between Level 1 and Level 5 on the L face. It just requires focus and time. That is the biggest deficiency in the Sustainability Program right now is some of these really important conceptual pieces in the framework are not getting developed.

Alice, a Grade 6/7 Teacher, felt the Sustainability Program had limited usefulness, as it did not tell her what to teach at the Grade 6/7 level:

> It would be really nice to say the Sustainability Program impacts us this way in each of our classrooms at each of these levels. I don't know what the Sustainability Program says I'm supposed to do at the Grade 6/7 level except to encourage them to recycle. I do my own thing at the Grade 6/7 level to increase their awareness of our environment and our impact on it.

The main need identified by the teachers and the Principal is for a curriculum to help integrate sustainability into classroom teaching. As Dave, the Principal, explained further:

> The teachers need to see a curriculum, it's bringing in issues of sustainability but it is cross-curricular: here are some books that touch on the topics, here's some math, some writing, some history you can work into social studies, here's the science behind it - so then you can teach all the skills you have to teach in those subject areas with sustainability as a thread that goes through them all.

Donna, the Grade 4 Teacher, recognized that a more detailed curricular scope and sequence would be helpful as the teachers and students did not have a very thorough understanding of sustainability in the first place:

> You can teach people to do things but if they have no reason, no understanding of why they are doing them, they are not likely to keep them up. That's in one sense that a scope and sequence would be useful because a Grade 2 kid's understanding of an issue is different from a Grade 8 kid's.

Joan, the Program Co-ordinator, also found the openness and uncertainty to be an obstacle:

> There is no place to go other than the world. You can take anything, anywhere you can come up with that is meaningful to our situation. There is nothing to pull from any specific resource. It is a wide-open choice. You are not limited but you are because you stall out because it is so vast. Where do you start? This has been a limitation for me as a Co-ordinator. It is so huge and the issues are so massive.

As Joan recognized, the Sustainability Program provided only a framework so further curriculum and program development was needed. Dave, the Principal found this to be an obstacle due to time and grant restrictions:

> That has been a tough one because the teachers have really wanted some sort of curriculum or scope and sequence. The grant would not let us write curriculum and Joan has not had time given the grant restrictions so it has been fairly piecemeal which has been a problem.

Joan also identified one of the obstacles to the teachers developing sustainability curriculum themselves was their lack of involvement from the start as well as their lack of understanding sustainability:

> What we learned so far is probably at the very beginning we should have had staff help guide where it should go. The problem with that is nobody knew what it was. I was asked at a meeting recently whether it would have been better to have staff input at the onset. The reply was, "Input into what? There is no manual, we don't know what we are doing. How can we give guidance to something we don't understand yet?"

Mike, an Intermediate Team Teacher, referred to this lack of a clear vision being the main

obstacle for teachers becoming involved in developing curriculum.

Bonny, the Grade 5/6 Teacher was very candid in recognizing the stresses teachers feel in

trying to cover everything they need to and the time that takes. Not having a clearly

defined curriculum for sustainability was an obstacle for this reason. As she explained:

> I stick pretty much to my curriculum just because I feel haggard. If I
> can open a book that says teach this in math today I'm relieved. It's a
> lucky break for me. I'm not about to reinvent the wheel if I am
> under the gun time-wise; Government of Education wise. It might
> not be my philosophy but there are certain times I just go, "Tell me
> what to do."

Joan, the Program Co-ordinator, agreed that it took a significant amount of energy to

develop a new program in sustainability:

> The guesswork and energy put into what are we doing, where are we
> going is an obstacle. It is a lot of energy to initiate something from
> the ground up. Some days I feel like we could fly, some days I feel
> like the world is huge and heavy because I think it is a pretty daring
> thing to accomplish as a community.

This notion that there needed to be detailed curriculum is found within what Sterling (2001) has characterized as a mechanistic view of education (Appendix 3), and has been argued against by Sauvé and Berrymen (2003). The teachers were used to having curriculum detailed and prescribed so seemed very uncomfortable with the Sustainability framework that supported an ecological view that is open based on negotiation, consent and emergence.

Other than Joan's science classes, Donna in Grade 4 and Shannon and Megan in the K/1 classes, sustainability was limited to the reduction program and Earth Week activities on an extra-curricular basis. Caroline, a parent of a child in the Intermediate grades, reinforced this perspective when she was asked if there were many curricular links:

> Not as far as I could see. I was disappointed. I thought there would be more. I thought the whole Sustainability program thing was going to come into the school and the whole curriculum was going to be Sustainability based. It wasn't. It was introduced here and there. There was recycling at the school, low-flush toilets but it didn't come into the curriculum as I thought it should.

The students also felt there was limited curricular integration. Sheri, a Grade 5 student was asked if they talk about sustainability or had lessons on it in their science or social studies classes. Her response shows how little they did: "Well we did a project on plants and did a little bit on sustainability but not a whole lot. We saw a movie about forest replanting for environmental regeneration."

Roger, the Program Consultant, recognized the program at Forest Grove had to develop further if it was to be successful and that it would take commitment and effort from all those involved. Ultimately, he felt teachers' perceptions of their role to be an obstacle if it did not incorporate developing new initiatives but was limited to maintaining the status quo:

> This is going to require curriculum. If you are uncomfortable with that then there is not a lot I can do or say that can improve the situation. It is an irony that schools can be the great change agent but research has shown teachers are typically very conservative maintaining the status quo.

This shows there was potential to develop curricula but as the Sustainability Program was set up to lighten the teachers' workload rather than add to it, and Joan was hired as the paid Co-ordinator, most expected she would develop the program for them. Miscommunication, false expectations and lack of teacher involvement developed in the initial stages of developing the Sustainability Program meant curriculum development was very limited.

Ecological Intelligence

In reviewing the Sustainability Program questions were asked to determine the extent to which it incorporated the various components of ecological intelligence (Orr, 1996). Interview data suggests there were a variety of opinions as to whether and to what degree

they incorporated biophilia, immersing experiences, ecological principles, slow

knowledge, critical thinking, empowerment and other cultural philosophies. When

teachers were asked if the Sustainability Program itself encouraged biophilia or a land

ethic the responses were mixed. When Joan, the Program Co-ordinator was asked if they

consciously incorporated biophilia her reply showed how biophilia was already a strong

aspect of the community and one of the driving forces behind initiating the sustainability

program:

> It has, but the love of the land was there. The program did not spark
> that love. What it has done is provide a vehicle through which people
> can make concrete their commitment, come together and make an
> active decision and go out and do something.

Alice, an Intermediate teacher as well as Patsy, the Grade 3 Teacher were only involved

in the classroom reduction aspect of the Program, and clearly felt the Sustainability

Program did not encourage either. Caroline a parent of Intermediate aged students and a

Sample Family member did not feel it was brought into the Sustainability Program:

> No, not for me. That would tie into the spiritual and come from the
> heart. They were teaching from the heart but it was more around the
> facts, more of an intellectual approach.

Dave, the Principal, also felt they were not being incorporated throughout the curriculum on a day-to-day basis. When asked if they incorporated a land ethic he replied:

> Bits and pieces: often getting our older kids to improve the trails; discussions around whether we would put in a basketball court or if we should pave the parking lot. But day-to-day running, probably not.

The Grade 6/7 students were asked if biophilia, a love of the land, was brought into the Program and all agreed that it was a strong aspect of the three day program at Peel Island and the activities Roger Blackwell did with the students at the school a few times. They did not, however, see it as part of their day-to-day classes.

The exception was Shannon, the Kindergarten/ Grade 1 Teacher who integrated sustainability issues throughout her curriculum:

> One of the things my kids are doing other than weeding is taking the downed logs in the woods and using them for building materials. You don't have to have plastics and batteries to have fun. They are really excited about that.

There was evidence that a form of land ethic was quite pervasive among the teachers, parents and students. Julia, the Board Chair, felt, " I think we have a land ethic. Just the

amount we are talking about it, the kids are using it and giving reasons in their own

language." Bonny, the Grade 5/6 Teacher felt this was also connected to where they were

living. I think probably because of being so close to nature here it makes a difference

where we are."

Donna, the Grade 4 Teacher was very conscious of bringing in an environmental ethic

into her teaching. When asked if she brought it in she replied:

> Oh yes. I think that can be a little bit tricky in being seen as a
> political agenda so we have to be careful about presenting things
> such as logging that make people uncomfortable because parents
> make their living there and it is an ethical issue because many times
> the needs of people and animals come in conflict. Even to know
> there is a conflict and then how to solve it in an ethical way is
> important.

Members of the Sample Family Program also had mixed thoughts on whether a land ethic

was being incorporated. Caroline, a parent and participant in the Sample Family program

felt it was a strong component of the experience at Peel Island. Similarly, Elizabeth, a

parent, felt,

> They definitely tried to bring in a land ethic when they had the
> camp-out this year at the beginning of the term. They had the
> environmental team come to the school and they have done the
> gardens, sporadic activities.

Lynn, a Sample Family participant agreed that the Sustainability Program was trying to incorporate a land ethic in developing green spaces around the school. But when thinking about a land ethic being part of the school and Sample Family program, Dave, a parent and Sample Family participant said, "I don't think so. It was more what we were wasting and how to stop that."

When Joan, the Program Co-ordinator, was asked if many immersing experiences or outdoor education was incorporated into the Sustainability Program it became clear that although they were a strong component of the introductory Peel Island experience, they are not a formal part of the program and depended on particular teaching styles. In Joan's words:

> It isn't really happening in a formal way. There are a lot of activities done outdoors like the kids biking club; there are teachers who are willing to take their kids to learn outdoors but there is not an outdoor curriculum.

Julia, the Board Chair, verified it was depended on the attitudes of various teachers and was more commonly part of the activities Roger Blackwell and his staff did with the students. A number of parents also verified the inconsistent nature of immersing experiences.

When the Student Advisory Committee was asked if they felt the Sustainability Program developed a love of the land, the negative response of one of those students showed there was a need for more immersing experiences: "No. If we went out more to lakes and hikes more it would show us the reason for caring."

Orr (1992) argued that immersing experiences in the natural world are an essential component in developing ecological literacy. As it is so informal and inconsistent at Forest Grove Community School this seems to be one of their weaknesses in developing an ecological educational approach.

Although ecological principles are the foundation of the Sustainability Program classroom follow-up showed they varied greatly from teacher to teacher. These principles were the basis of the science classes Joan was assigned to teach on Fridays to the Grade 6/7 students. In speaking about ecological principles Joan, the Program Co-ordinator, thought there was certainly the potential to incorporate them but as the Sustainability curriculum was not specific it depended on the background of individual teachers and their areas of interest.

Dave, the Principal, recognized that ecological principles are the foundation of the Sustainability Program as they are the basis of the L.E.S.S. Test and Natural Step Science. He affirmed:

That is a big part of the program. The kids have heard of them through Roger Blackwell's kid-friendly language of the L.E.S.S. Test. The kids have heard that a lot but need to keep hearing it and examples of what that is and applying different problems to it.

Shannon, the K/1 Teacher was the only teacher other than Joan or Donna who

consciously incorporated ecological principles:

With my class I think talking about animal habitat and where things go. These kids are a little young to understand why we recycled and where things go, how things come back to us. Going to the landfill would be a good place for the class to go. We talk about food chains and cycles of life with our families and tadpoles.

Patsy, the Grade 4 Teacher, verified the fact that the inclusion of ecological principles

was largely dependent on the background of individual teachers. When she was asked if

her students were learning the full cycle of what happens to the recycling from when it

leaves the school through to it being reprocessed into recycled products they could buy

she replied, "No. And that has not been a responsibility I have taken on because of the

curriculum I have to teach, and because I would need to have more direction to do that."

Slow knowledge, or wisdom that has taken time to develop, did not seem to be a

conscious component of the Sustainability Program either. It was, however, brought in to

varying degrees by Roger Blackwell and various community members. As Joan, the

Program Co-ordinator, recognized:

> We have community members who have a lot of experience in dealing with nature, especially last year during Celebration Week; and we've had Roger Blackwell come with ecological wisdom for people to think about.

Dave, the Principal, recognized, however, that this was a limited aspect of the program, "It is more just a fast here it is, here is why you do it, go to the next class." Julia, the Board Chair, agreed with Dave but also showed it had not been consciously considered in replying, "We have focused more on facts, know how rather than know why." These quotes reiterate the instrumental, mechanistic focus of the program.

Lynn, an Elder herself, recognized the important role various community members had been able to play in this regard but also recognized the pivotal role the Co-ordinator played in making this possible. Overall, slow, inter-generational knowledge seemed to be a minor aspect of the school program

When the staff was asked whether critical thinking was incorporated into the Sustainability Program the responses varied according to how involved people felt the students were. Joan, the Program Co-ordinator, felt:

> If anything it has gotten people to think critically. Even kids are saying, "That's not a Sustainability thing to do", or when visiting another school, "This is definitely not a Sustainability school."

Julia, the Board Chair, and Patsy, the Grade 3 Teacher supported this level of awareness. As Patsy said, "If they see something in the garbage that shouldn't be there someone will clean it out. Some think about pollution and the impact that has on wildlife." Caroline a parent and Sample Family participant felt, "Oh yes, they posed a lot of questions and tried to get kids to come up with answers and solutions. They asked a lot of open-ended questions."

Lynn, a Sample Family participant, felt the Sample Family Program did encourage critical thinking as community members were directly involved in making decisions to reduce their personal waste, energy and water:

> In the Sample Families there has been a core of families who are thinking of things differently, looking at your bad habits, inefficient heating systems and deciding to improve it and spend a lot of money so it works efficiently now. And deciding we should have designed our houses better.

Although Joan, the Program Co-ordinator, felt critical thinking was one of the strengths of the Program, parents, Dave and Bay, felt there was very little critical thinking involved. Instead they felt they were being instructed to support the reduction program.

When asked about critical thinking they replied, "We get the feeling that these guys are more like receptacles for the Sustainability Program."

This perspective seems to support the Principal's viewpoint. He felt there was great potential to involve students more doing the background research and deciding what projects the school should undertake to model sustainability. Dave felt the students were very minimally involved and this affected the degree of critical thinking. When asked if critical thinking was incorporated in the Sustainability Program he replied:

> Not a whole lot. That's something as a school I think we are not strong at. Coming back to the science of it, we could give it to the kids to figure out the problem, come up with solutions, talk to people on the phone - then they are going to own it.

The Intermediate students tended to agree with this analysis. They voiced their frustration at not being involved in decision-making if they were not on the Student Advisory Committee. Many felt they were being told to recycle and so were specifically not co-operating. With adults deciding on how to implement the Sustainability Program, it seems more adults than students were involved in critical thinking. Once again, Orr (1992) and Sterling (2001) emphasized the need to engage students in critical thinking and creative inquiry if they were to be empowered and develop ecological intelligence.

Joan, the Program Co-ordinator felt empowerment was a central component of the

Sustainability Program:

> A program like this does empower people. It has given our whole community a place to put their energy in times of crisis. It is also an opportunity for teachers and community to heal together because you work together as volunteers side by side - if the political position isn't so strong and they refuse to volunteer.

She also felt the recycling program was definitely empowering as well as the Christmas

Gift-giving Program that encouraged sustainable purchasing/ making of gifts.

This was echoed by two Grade 6/7 students who agreed that the recycling program had

initially developed a degree of empowerment but they felt this was only a beginning and

not nearly enough:

> Our school is doing all the recycling but that is only one part of it. We're not even going near all the other stuff like actually cleaning the forest or composting. We're just at the first level.

Donna, the Grade 4 Teacher, also felt there was empowerment in some of her students

but this was largely related to their home environment, "The ones that are the happiest to

be involved in sustainability issues are the ones where it makes sense within the whole

context of their lives, not just their school life."

Whether students felt involved in and had a sense of ownership of the program seemed to

influence various teacher's opinion on whether the Sustainability Program incorporated

empowerment. Shannon, the K/1 Teacher felt empowerment was created when the

students felt their classroom recycling was adding to the larger school program. Bonny,

the Grade 5/6 Teacher thought there was empowerment as she felt the students were

really proud of the school.

Even though empowerment was central to the Sustainability Program, as with critical

thinking, empowerment was limited to those adults and few students who were involved

in decision-making. As student involvement in Sustainability was not consistent

throughout the Intermediate grades, the Principal, Dave, felt empowerment was being

incorporated for some kids: the Advisory Group, the Student Council; and when kids had

been involved in a project where they could see a real result.

Elizabeth, a parent of an Intermediate student, reinforced this:

> I know that some of the kids did environmental audits for companies
> to help them set up recycling systems and reduce their waste. My son
> never got to do that because the group that went to Peel were the
> core group. But being in charge of recycling was enjoyed by my
> son; it was sort of a prestige position.

So although the variety of Sustainability Earth Week activities, the reduction program, the Grade 6/7 science classes as well as the Stream Testers project seemed to be making the students aware, not all students were necessarily committed or empowered. The Principal, Dave, noted:

> It needs to be brought at the level where the kids own it. The kids are well aware. They talk about Sustainability, make reference to it here and at home so they are aware. But they need to own it a little more. In terms of the reduction, if the kids have done the math they would use it more, own it and go home encouraging their parents to install low flush toilets.

Alice, the Grade 6/7 Teacher, confirmed this acknowledging that she had not seen much empowerment and ownership yet with the Intermediate students. Generally, many students were involved in Earth Week activities but they were not very involved in decision-making when it came to bigger initiatives such as installing low-flush toilets or replacing the propane tanks.

Sheri, a Grade 5 student, was very frustrated with the lack of empowerment opportunities for students. Her class was not active beyond the school reduction program and she was not able to join the Student Advisory Committee as it was only for Grade 6/7 students. Being motivated by the Sustainability Program she gained the support of her mother to initiate an Environmental Kids Club so more students like herself could become involved.

Interestingly, the Sustainability Program in the school provided the motivating force but

not the avenue for empowerment. It took real student initiative to develop an extra-

curricular means to be involved.

In relation to the Sample Family Program Lynn, a Sample Family member felt very

empowered:

> I think you need to talk about these things and find like-minded
> people. There is strength in numbers and when you want to bring an
> issue forward you know who to connect with.

Dave, a parent and participant in the Sample Family Program recognized the

Sustainability Program was empowering but it was also a result of who took part in the

program:

> My feelings relate to my feelings about the program and who was
> selected for Sample Families. A lot of the things involved with
> Sustainability we were already doing and it spurred us to greater
> efforts but our children were already very actively involved from an
> early age, composting, saving energy and water. These things were
> already part of our regular family life.

Similarly, other cultural philosophies were incorporated to varying degrees. Joan, the

Program Co-ordinator explained:

It would depend on individual teachers. There is nothing to bring in,
it is what we pull out. There is no resource that dictates how to run
this program.

Generally, it was not part of the program, as it was not considered by the various

teachers. The one area it seemed to be incorporated was in Donna's Grade 4 class where

the exploration of Aboriginal Culture is part of the B.C. Curriculum's Prescribed

Learning Outcomes for Grade 4 social studies.

When asking Caroline a parent and Sample Family member about the inclusion of other

cultural philosophies she felt it was an element that was needed:

I felt it missed that spiritual aspect of the sacred. Not religion but the
sacredness of our planet and of life. The principal said they could not
touch that with a ten-foot pole. I disagree but I can see where they
are coming from. I think it is seriously missing in our schools. We
talk about the whole child but we only address three quarters of
them, leaving out the spiritual side of them.

Concepts of global citizenry were brought out in Intermediate social studies classes and

potentially throughout the social studies curriculum as the Prescribed Learning Outcomes

incorporate social and economic aspects of sustainability to varying degrees from

Kindergarten to Grade 7 (Appendix 16). Unfortunately these curricular links to the

Sustainability Program had not been made so teachers were often unaware of potential

connections to enhance teaching as well as modelling sustainability.

Evaluation and Assessment

When asking about assessment of the Sustainability Program, the obvious evidence was

instrumentally based relating to the degree the school was meeting the reduction targets

set for the Grant Proposal or how well it was modelling sustainability (Foster, 2001).

Julia, the Community School Board Chair saw this as the most formal aspect of

evaluation:

> We have our grant evaluation to show whether we have met our
> funding remits, showing what we have done. We haven't looked
> much at self-evaluation, how effective the program has been
> although there are constant conversations about it, looking at what
> has worked so far, where we have done well, where we are falling
> down.

This is associated with what Sterling (2001) has characterized as a very mechanistic

perspective that focuses on external indicators, narrowly prescribed through quantitative

measures.

When Joan, the Program Co-ordinator, was asked how the program was evaluated it was

clear she had also been very active in getting feedback from those involved with the

Program:

A survey was done of directors, staff and students on what they liked and didn't like, what they would like to see happen. A Sample Family survey is yet to be done. Intermediate staff feedback showed their expectations were not in line with the Co-ordinator's job description and limitations. They expected B.C. Curriculum. I didn't know they expected that and they didn't know I couldn't provide it.

In terms of assessing how effective the teaching of sustainability has been, Joan, the

Program Co-ordinator voiced an ecological view that emphasized more qualitative

aspects. She felt they would know the program had succeeded:

When you hear kids say that is not a Sustainability thing to do; or going out of their way to pick up garbage; when community volunteer their time and are willing to share the experience; you can make partnerships and people say this is worthwhile; when I feel, personally, that this is right for me then it is successful.

This is supported by Bonny, a parent and the Grade 5 Teacher, who used this informal

method of evaluation. She felt the Program was having a positive impact on the students

and community:

The Sustainability Program helped initiate some things at home. Because we have two kids at the school they have come home with information for two years and we've talked about it. We may not

have started those kinds of conversations if it hadn't been initiated at school - to the point now that we don't burn unnecessarily.

The Grade 6/7 Students acknowledged their learning in the Sustainability Program was not formally evaluated. As one student reiterated:

We haven't been tested on it. We don't have a mark on it on our report card. I find it's more just a course for us to learn about.

This instance points towards a transformative level of teaching and learning that is associated with what Sterling (2001) describes as an ecological view of education.

11.6 Teaching and Learning

Although the B.C. Ministry of Education has developed a curriculum of Prescribed Learning Outcomes, teachers have complete control over what resources are used for teaching and learning as well as what strategies are used. In many cases even the topics are optional. Even with this degree of professional freedom, teaching and learning in terms of sustainability was very limited. Only those teachers who were personally committed to issues of sustainability before the school adopted the Sustainability Program tended to consciously integrate it into their teaching.

Teaching Methods

Julia, the Special Education Teacher, recognized a variety of teaching methods such as group work, project-based co-operative learning, and experiential learning were very effective. When she was asked if there was much active learning in the Sustainability Program she replied, "Yes, there is some. On the days there has been, the kids have bought into it a thousand times more that when they've been given direct instruction. There has been a lot of cognitive activities but I think the affective or spiritual ones stick with them." Regarding manual activities she felt, "A little bit: orienteering, gardening, some classes take the recycling to the bins from the classrooms."

Bonny, the Grade 5/6 Teacher, also voiced a belief in diverse learning strategies that immerse students in the natural environment:

> If you think of how kids can demonstrate learning it doesn't need to be with pen on paper. I think that teaching some outdoor education, with where we live, is far more relevant to showing them a book on the rainforest. There's a huge need for educating the kids outdoors, orienteering, survival. I think the more comfortable kids are outside the more they will want to be out there and the more they will respect where they are and treat it better.

The Intermediate students felt most of their learning took place inside the school building but acknowledged that some did take place outdoors. When asked where most of their lessons occurred one Grade 5 student replied, "Mostly indoors but when we had our

Sustainability classes on Fridays we talked about what we were going to do and then went outside to do some of our activities." (F)

Having a convenient natural setting to learn in seemed to be a factor that encouraged a few teachers to teach students in the natural environment. Bonny felt the outdoor classroom was a great asset as it would be a great place to take the kids for music and writing. Donna felt she taught outside frequently as the school was in a rural setting near the ocean, surrounded by forests. But, she felt whether students got out or not also depended on what was being taught.

Even though much of the Sustainability Program was extra-curricular and curriculum development was extremely limited, there was a degree of teaching of sustainability over the first two years. The Grade 6 and 7 students all went to Peel Island for a four day introduction to sustainability and then this was followed-up for these same students by lessons taught through science classes. The whole school was also introduced to sustainability through the school-wide grounds improvements; the recycling, reducing program; and through special Earth Week activities held once a year.

As mentioned earlier, other teachers brought in sustainability to varying degrees through special units or in the case of the Kindergarten/ Grade 1 classes as a background philosophy integrated into all their teaching and classroom practices. This classroom was set up in terms of activity centers rather than individual desks in rows. Round tables encouraged a number of students to work together on a wide range of group and

individual activities that emphasized cognitive as well as affective, manual, and active learning styles through critical and creative inquiry of a particular theme. Centers focused on baking, art, mathematics, language, building, problem solving, and nature studies. In this way multiple intelligences were encouraged daily. Teaching and learning was very interactive, participative and democratic. Community was continually reinforced as was critical thinking and empowerment through social interactions and learning activities. This form of teaching has the characteristics of what Sterling (2001) describes as ecological.

Donna's Grade 4 class seemed to be most active through their Art Start project to make an outdoor video. In explaining how this project came about Donna emphasized the importance of taking a positive approach and empowering students:

> I didn't want to do a whole lot about recycling because it has pretty much been done to death and I didn't want to do air pollution because it is hard for students to understand. So I focused on the water, we went to the hatchery about salmon. And it has to be age appropriate. There's no point in talking about how logging is polluting the watersheds because they have no control over it. They do have control over throwing rocks in the creek when the salmon are spawning. It's trying to open the door at the ground level in an appropriate, positive way rather than a guilt trip about what people shouldn't do. I think that is the hardest thing about getting people to deal with sustainability is it becomes a guilt trip and a negative. Then people just feel guilty and don't want to hear about it.

Donna described the constructive approach she took for a special unit on Water:

We didn't write the script until two thirds the way through because the kids had choices all the way through as to what they wanted to do, for example no one was interested in doing some writing from Chief Dan George so that didn't happen. I knew what themes that we wanted, but how it would be presented, how it would work out wasn't known. I would push some things but nobody was made to do certain things. So I had to see what we had and how we could knit it together. When we realized what shape the video would take, we realized we needed scenes of nature in there. So I took pictures of nature that were edited in.

When Donna developed her unit on water and sustainability she incorporated many aspects of ecological literacy: immersing experiences, intergenerational slow knowledge from Native elders, ecological principles, critical thinking and empowerment. This was, however, a unique unit and was not representative of her typical discipline-centered teaching as she stated she was not a thematic teacher.

 Bonny also showed a tendency to incorporate strategies that could easily be used to encourage sustainability had she incorporated it into her teaching. In describing teaching approaches she commonly used she said:

I like to as often as possible be a facilitator rather than a lecturer telling them do it this way; try to instil a sense of pride in the student's work. But I really like to find resources for them and get them to do their own digging, putting together projects. I love projects and the independence some kids are ready for. I like to give them some choices as that is empowering.

Although it is not a central focus of her social studies curriculum Bonny has been successful incorporating sustainability incidentally as students bring ideas relating to sustainability up in the classroom themselves:

> Kids will bring in relevant news articles from time to time; if there is something happening globally they want to talk about global warming. We bring issues of pollution into the social studies curriculum. I just want them to have a bit better idea of how lucky they are so we kind of bring it in incidentally into the social studies program.

The Grade 6/7 students felt the Sustainability science classes introduced more hands-on activities, "It has more hands-on stuff and the teachers listen to you. The hands-on happen just about everyday in science." They were also very supportive of the activities Roger Blackwell and his staff did at the school. As one Grade 7 student put it, "We did do the LESS Test Fest with Roger Blackwell which was fun: we were outside and with our classmates running around." (M) Another group of Grade 6/7 students spoke about their preference for the Earth Week activities that were taking place at the time. As one student summarized, "This week when we get to go out and garden it is better than just sitting and listening to them talk." (M)

Elizabeth, a parent, spoke about the introductory experience at Peel Island, "I think they really responded well. I think the majority left feeling they had an experience that made them think a little bit about their whole philosophy of take, take, take."

Although teaching and learning about sustainability in day-to day classroom activities was limited, the Sustainability Program did provide a unifying theme for the school as well as a catalyst for a few teachers like Shannon and Donna to significantly highlight sustainability through thematic units. Megan, a K/1 Teacher, also recognized the benefits of working together as a success of the program:

> We benefit from the Intermediates as buddies, peer helpers, and acting in a real leadership role. So a lot of that trickles down in formal sessions as well as informally and through modelling. It's quite nice to benefit from a whole school approach.

The Program has also benefited some of the older students. A Grade 6/ 7 student's comments were representative of the majority:

> The Sustainability Program has made me think more about it. I used to throw all my compost in the garbage because we don't have a compost at home so now I throw it in the back of my backyard so it won't go to waste. (M)

Julia, the Community School Board Chair, summarized the successes of the

Sustainability Program well:

> Huge raising of awareness; developing a passion in many kids; environmental impact with the positive results; has brought the community together, giving it a bit of an identity, a focus.

Elizabeth also recognized that the Sustainability Program had a direct impact on

decisions her family was now making:

> We are consciously making decisions like choosing not to get a newspaper because they would pile up on the front porch because no one had time to read them.

Bonny, a parent and Grade 5 Teacher at the school had similar experiences at home. As

noted earlier, her two children have brought information home that has initiated various

family conversations and caused them to think twice about burning garden rubbish. Joan,

the Program Co-ordinator, recognized this to be a common outcome of the Program as

students have recognized various actions as in line with or against the teachings of the

Sustainability Program. Although not all students voiced this same level of commitment,

the Sustainability Program obviously did have a positive impact on some.

Even though there were examples of some teachers incorporating education for

sustainability into the K/1 class or into units in Grade 4 or 5, there were limitations

related to the dominant teaching/ learning approaches. As noted earlier, John Miller (in

Greig et al, 1989) identified three basic positions of curriculum and instruction:

transmission, transaction and transformation that indicate underlying values and

assumptions of the teacher. Many Intermediate teachers and parents commented that

much of the sustainability teaching was at the level of transmission of knowledge, which

Miller associates with a mechanistic view rather than transformation of the students,

which is associated with an ecological view. The Program was imposed rather

dogmatically as it was designed from the outset to meet reduction targets and students

were not involved in this decision-making process. Caroline, a parent, felt her son's

rejection of the Program was largely because it was imposed.

Nancy, the Grade 5 Teacher, recognized that a transmission approach was commonly

used at the school:

> I think in terms of sustainability what we do in the schools is limited to teaching kids about reducing, reusing, recycling. Environmental education in the schools seems to be divided between putting our things in the recycling depot versus throwing it in the garbage because it is easier, and on the other side love the outdoors, smell this tree, don't you feel wonderful. The whole space in between which is everything else in terms of taking ownership of the creek bed, and saying that's our creek and we rebuilt it; and those are our fish because they are coming back. That sort of ownership in nature I don't see happening in schools.

Joan, the Program Co-ordinator, also recognized the sustainability program was introduced very dogmatically right from the introductory program at Peel Island, telling students they would be role models for the new philosophy and program they must participate in. The Grade 6/7 Students felt the approach created negative feedback that affected their interest and participation. This was particularly evident when these students were asked about the recycling program:

> I think we sort of get picked on because we are a Sustainability school. Other schools don't do anything but no one says anything to them. (F)
>
> If some teachers see you put recyclables in the garbage they send you to the homework room or keep you in at recess. I don't think they should do that because then we just don't want to do it because we don't want to do what they've told us. They remind us 24/7 and it gets so annoying that we just disobey them. (M)

The Principal, Dave, recognized they still had improvements to make in their teaching methods. Interviews with the teachers and parents revealed an instrumental, transmission view to be the most prevalent. The educational focus was product rather than process oriented, emphasized teaching, and functional rather than critical and creative competence. Dave recognized a transmission approach that dogmatically told students to recycle was not as effective as it was intended to be:

> Some of the older students said they were not recycling to be defiant because they were being told to recycle. Part of the problem is the adolescent mentality but because there hasn't been the science behind it and it hasn't been made really real to the kids it is just someone saying you need to put that in the recycling. With the reduction program kids are not doing the background research, generally, although there are pockets of that. It has focused on them becoming aware.

This is suggestive of instruction in Sustainability that tended to rely on passive, non-critical inquiry. Nancy, the Grade 5 Teacher, agreed there had been little connection between the Sustainability Program and what had been going on in teaching and learning, honouring previous knowledge:

> I don't see much connection to teaching and learning. I think the first year they tried. I guess they were assuming everyone and the kids are at zero. That's a big assumption. Most of the kids had some great ideas. I have been recycling at this school for five years. We sell our Tetra Packs and that's how we help fund our fieldtrips.

Another Intermediate student referred to the fact that learning at Forest Grove was also very teacher focused with little student empowerment. Although there was an Independent Learner program this student was not able to get permission to learn in this way:

> I am stuck in the class that has to go along with the teacher because you have to get 80% or better on tests to be in the Independent Learner class. But I think I'm much better at learning individually. I completely lock up for tests.

Although Donna's approach supports ecological strategies of empowerment, when asked further questions relating to the purposes behind the sustainability curriculum Donna emphasized transaction rather than transformation. She felt:

> To create awareness and change habits with a conscious intention you first need awareness, you need to educate kids. I started the fund-raising in the fall for Doctors Without Borders and I was lucky enough to get some relevant slides to show kids what a refugee is and what their needs were. They need this basic understanding so any compliance has grounding.

In keeping with this emphasis, critical thinking was also of secondary importance. When asked if students were involved with critical thinking she replied:

> Not unless they are posed those kinds of questions. I can't speak for other classes but it is a question of time. You don't do it all the time. Of course the problem with kids is something they may endorse in their thoughts they may not carry through with their actions so it is easy for the parents or teachers to confuse the two. I think you need a combination of building habits as well as critical thinking.

Miller recognizes this approach as representative of a transactional approach to curriculum and instruction where education is seen as a dialogue between the student and the curriculum. The focus is on teaching strategies that facilitate problem solving. With this approach the student is seen as rational and capable of solving problems, if given the right tools. An ecological view would move beyond this to transformation (Greig, et al, 1989).

A mechanistic educational style was most obvious as learning was structured through separate subject disciplines in all but the Kindergarten/ Grade 1 classes. This was exemplified when the Program Co-ordinator taught sustainability classes to the Grade 6/7 students in science classes. In speaking about how she developed learning in sustainability Joan recognized the integrated nature of sustainability in saying, "When I taught the science curriculum to Grades 6/7 on sustainability I would bring in social aspects of scientific considerations." But when she was asked if she was incorporating the social studies learning outcomes (IRPs) into her science teaching she showed how heavily discipline centered her teaching was:

> I don't know because when I did the science with them I didn't teach the social studies so I'm not familiar with the social studies IRPs. But a social studies teacher saw social studies as perfect for teaching sustainability.

Joan noted that cross-curricular concerns had not been discussed, as other teachers were not comfortable with sustainability and cross-curricular teaching. As mentioned earlier, the Intermediate Team specialized in separate subject disciplines. Bonny, the Grade 5/6 Teacher was asked if she brought sustainability into the teaching she was doing. Although she did bring it into her social studies classes to some degree, again she showed how discipline centered her teaching was:

> It's happening, not really as part of my subject curriculum in terms of the recycling. I don't teach science so don't get involved with some of the science aspects. In my socials program we are talking a lot about social responsibility - it is everybody's air so we need to think about our actions and not using more than our share. It's been great letting kids know things can be done without having to use pesticides and poison the air and the Earth. Also when you go Christmas shopping students could buy from a Ten Thousands Village Store so the profits go back to a developing country.

Alice, a Grade 6/7 Teacher who is part of the Intermediate Team felt there was very little integration with sustainability concepts:

> It depends on the teacher. It is difficult to tie it in. It is tied into the management side of the school in recycling. It is not incorporated into the learning. When I teach math I'm not teaching environmentalism, when I teach reading, maybe a little bit because you are thinking and writing. It varies with the group of students you are working with.

Even Donna, the Grade 4 Teacher who had her class make a video on water that focused on ecological literacy, was very discipline centered. When she was asked if she integrated subject disciplines around themes she replied:

> No. I'm not one of those thematic teachers in the primary sense where the whole room becomes a rainforest. I tended to be an Upper Intermediate before I was Grade 4 so I teach my subject areas separately.

The Intermediate students confirmed that most of the teaching was discipline centered with little integration of sustainability issues. A Grade 6/7 student also recognized there were, however, links between the B.C. Curriculum and the Sustainability Program:

> The Sustainability Program and day-to-day lessons are pretty much separate to me. It is kind of the same though because we learn about some of the same ideas in science. Last year we did patterns in nature in math and in science we learned about the water cycle.

Dorothy, a Teacher's Aid in an Intermediate classroom, was asked if sustainability ever came up in classroom lessons. Her response supported that when it did, it was very discipline centered:

> Yes in science and social studies but more so in science. It doesn't come up in math or language arts.

Not only was there minimal integrated sustainability teaching, there were also minimal active, immersion experiences. Two parents, Dave and Bay were surprised with the lack of outdoor learning experiences and student involvement:

> I'm surprised that it hasn't focused on service projects or activities because I do think we learn physically. I'm just wondering if some days these guys feel like receptacles? Where is the ownership? I think that if these guys were part of the process and understood processes they would learn and remember, especially if they owned it. Sometimes I think the Sustainability Program is still surface and has a way to go.

When Patsy the Grade 3 Teacher was asked if she incorporated manual or physical activities in her teaching she felt there were time constraints, "I think that is where I fall short. I don't do too much of that as there is so much to do."

Joan, the Program Co-ordinator recognized most of the teaching and learning at the school took place indoors as there were many difficulties controlling classes outside. When asked what percent of school lessons are outside she replied she confirmed it was not many as it was harder to teach outside, trying to contain thirty students without the four walls of a classroom.

As the introductory program at Peel Island involved a great deal of outdoor experiences in the natural environment the Principal, Dave, was asked how much follow up there had been to incorporate teaching outdoors back at the school:

> Not as much as I had hoped when we started this. There is so much to learn out there. I think even having the outdoor classroom finished will make a difference, to be able to take your class out to the bush to do your writing class. We want to continue to foster kids working and learning outside and from others as much as we can.

Although Bonny, the Grade 5/6 Teacher, saw the importance of teaching outside, she felt there were obstacles due to the discipline specialization of her job and being constrained by other teacher's schedules and weather. She felt she did not teach outside much because:

> I don't teach P.E., science. I have had them out for language arts and poetry. It is something I should do more of. It's a weakness. But time just flies so quickly and part of my day is locked in with other teachers as someone else does science, I do French while they take my class for P.E. With the weather improving it is something I need to work on.

Julia, the Community School Board Chair agreed when she was asked if teachers were consciously bringing in outdoor immersing experiences. She replied:

> A little bit. Not as much as we thought we would. There is still that attitude that we can't take them outside because they will get noisy, it's unstructured. The Earthwind consultants came last fall and the kids loved it but it took a lot of work.

When Nancy was asked why active, empowering teaching was not happening she replied she recognized the reality of class sizes and make-up was a contributing factor but felt it was mainly due to personal views of teaching and learning:

> I think teachers are lazy, they don't get outside enough, they don't feel free enough from the curriculum to get out and do stuff. They feel it is wasted time in the day.

Students seemed to pick up on this perception. Sheri, a Grade 5 student, thought part of the problem was teachers not having time as they prioritize traditional subjects:

> I think we could be getting out there and working out there more but I guess the teachers probably have a reason for that. We have to do reading and math and so don't really have time for that.

Roger, the Program Consultant, felt this was due to how teachers perceive their jobs and the Provincial Curriculum rather than limitations of the B.C. curriculum itself:

It comes down to having to defend and articulate what you do. A lot of teachers come up short because it is easier just to do what they have been asked to do because if they do something different they could be brought to task by parents. It is fear that keeps them from unclipping their wings and going for it. I'm convinced the basic Grade 5 curriculum could be taught in a month!

If kids are outside they are making connections. And if they are making connections they don't need to know everything. It's the ability to make connections that is the most significant thing they could learn. Teacher perceptions of what I can do, what I have to do, what should I do are all limitations.

In speaking about empowerment and the recycling program Julia, a teacher and the Community Board Chair, acknowledged that student involvement was limited to putting recycling in the class containers and possibly collecting it. But, "Bagging and watching it get taken away gets done by adults."

These teaching approaches: cognitive, passive experiences, non-critical inquiry and a restricted range of methods have associations with Sterling's (2001) mechanistic model. The students in Grades 5-7 confirmed that most of their classroom experiences, either Sustainability Program focused or otherwise, were based on cognitive experiences through passive instruction. Further evidence was gained in observing three of the Intermediate Grade 5/6/7 teachers as well as the Grade 4 and 3 teachers in their classrooms. The desks were all laid out in rows facing the teacher's desk or blackboard at the head of the class. The emphasis was on didactic teaching by way of passive instruction encouraging individual cognitive learning. The walls of the class displayed

examples of this logical, linguistic work. Environmental content, if it was incorporated, was taught dogmatically through simple statements focusing on awareness rather than investigating concepts at a deeper level through critical thinking and empowerment.

Alice, a Grade 6/7 Teacher, also felt students were not being involved so had little ownership, insight or concern about the changes the school was trying to make:

> Joan has done a lot of really neat work in the low-flush toilets and getting the power changed but how are those things incorporated into the children? That is something that people up there can do but how does it impact on their education? Do the kids care about the toilets? NO. Do they care about the hydropower? NO. They don't even know about the power. They know the propane tanks are gone. Do they even care? No. Do parents care? Maybe. But the Sustainability Program to me is supposed to be aiming at the students so we can change their way of thinking. This is what we are not measuring or achieving success in my opinion.

Dave, the Principal, felt teachers themselves needed to look at what changes they could make:

> We can do this without a Co-ordinator, we need to internalize it more, change what we do in our classrooms but we can do it.

Bay, a parent of a Grade 6 and a Grade 7 student felt many teachers were not very diverse

in the methodology they used. She felt that as the program developed, there were less

and less diverse learning opportunities:

> There was excitement when they were creating spaces and trails and
> they were learning the whole time. I almost wish that could be the
> standard. The Friday lessons were boring.

Although teachers were sympathetic to diverse teaching strategies the Grade 6/7 students

wanted more hands-on experiences as well as more learning in the outdoors. As one

student said, their ideal form of education would be, "an outdoorsy way of living rather

than desks inside; be able to take the chalk board out; way more hands-on stuff."

Nancy, the Grade 5 Teacher, also recognized teaching methodology to be an obstacle:

> In Grades 5/6/7 I think in terms of them having more knowledge
> about the environment, not in terms of filling an empty vessel - that
> teacher sort of thing is where it falls down. We need some sort of
> easy program for teachers that honours kid's knowledge and uses
> tactile experiences. The kids' impressions is what are we doing
> wrong. It has to be more fun and positive. I would like to see more
> kids taking ownership of local property, so they get more of the
> picture of why we are even bothering about recycling.

The Student Advisory Committee who unanimously agreed with one Grade 6 Student's

perspective backed this up, "I think they shut down the Sustainability classes because

most of the kids weren't interested anymore. People were bored." (F) The Grade 6/7

students were all in agreement that the learning activities were far more interesting when

students were active and involved. The following comments from Grade 6 and 7 students

show how consistently this was felt amongst the senior students:

> "I don't like it because it is boring. The compost stinks. We used to have a Sustainability class on Fridays but it was very boring. We didn't do anything. People don't all recycle. The garbage can is closer so I use it." (M)

> "I think it's good because we get to see what effects we have on the world but most of the time we don't do too much. We only have recycling once a week and recycle our lunch. " (M)

Elizabeth, a parent of two senior students, also felt the lack of variety at home:

> One of the impediments in our family is it was almost too much. I was already doing that kind of stuff at home; there was more and more of it at school; and it was too repetitive for the kids, the same things came up over and over. The speakers that came in were always the same. The kids got frustrated with that. When I would bring recycling up at home and remind them I would get negative feedback, mostly from the older one.

A few students and parents also felt that some of the teaching for the Grades 6/7 students was aimed too young. As a group of Grade 6/7 students reiterated in a conversation:

> "I didn't really get why they started singing the song. It was probably for the little kids. Ya, it was really babyish (all in agreement), really boring. They always underestimate us." (M)

Caroline, a parent of a senior student agreed:

> My son, 12, found the program a bit young. I though it was directed below their level. He mostly enjoyed the walks. I think the older kids might have got more out of it if they had been approached more as young adults than older kids.

The Grade 6/7 Students seemed to concur. The words of one Grade 7 student accurately summarized the general feeling:

> I think the Sustainability Program is a really good idea and we should be doing it at school. But we didn't get much out of the classes we used to have because the activities that we did were not very interesting and most of the kids just did their own thing and socialized during the activities. But the one day we did the games in the gym were better. We got more out of it when it was active. (F)

Generally, the Grade 6/7 Students felt, "The projects like the L.E.S.S. Test Fest with Roger Blackwell and the pictures and painting are much better".

It seems that although there were some immersing, experiential and manual activities as part of the initial program at Peel Island, at special activities run by the Earthwind Outdoor School Staff and during Earth Week, the Intermediate students were mostly given direct instruction through their science classes. Joan, the Program Co-ordinator recognized this was possibly due to their objective: "We just want to make people aware."

Although awareness was emphasized, Mike, an Intermediate Teacher, felt the approach of Roger Blackwell, the Sustainability Program Consultant, was also centered on guilt. This, he felt, limited his effectiveness:

> Yes, he's got a lot of vision, he's got a lot to say, a lot to do but you can only listen to that sort of thing before you stop hearing it. It's judgemental; it bases itself on judgement of what I am doing. I don't need to feel guilty. Guilt isn't going to make me become sustainable I'm going to have to decide that on my own because I see it as valuable change. Guilt doesn't work.

This feeling of guilt and the dogmatic emphasis on needing to recycle seemed to negatively affect the Intermediate Teacher's involvement in the Sustainability Program, particularly as they were not involved in teaching sustainability themselves.

Parents felt teachers needed to do more in making the learning more interesting. Elizabeth, a parent, supported the need to be more active, "Sometimes rather than feeding the kids so much information, you could give them the chance to do the learning, experiential learning."

When Grade 6/7 Students were asked for suggestions on how to make it better the consensus was, "To do more active stuff." One Grade 7 girl was quick to add, "Do something to help actually make a difference!" When others heard this suggestion they were all in agreement feeling they had not had the chance to be involved in making any meaningful decisions or taking real action.

Orr (1992) emphasized the need to involve students in critical thinking and empowerment and Sterling (2001) characterized curriculum empowerment and determination, negotiation and consent as aspects of an ecological educational approach. This was echoed by one of the teachers when she said, "You have to give the kids the ownership, it has to come from the kids."

Nancy, the Grade 5 Teacher, recognized that not only teachers but also students needed to develop a sense of ownership to be committed to the Program. In acknowledging the

Sustainability Program had not been as accepted as they had hoped at the beginning, she

explained:

> I think that was partly because it wasn't teachers and students' own idea. There is no ownership. Kids need to feel ownership. If they thought of school-wide recycling, look out because there wouldn't be one kid who would put things in the wrong place. It would be theirs and they would feel offended if someone did not put something in the right place or vandalized their containers.

Dave, the Principal, also recognized there needed to be more student ownership:

> It needs to be brought at the level where the kids own it. The kids are well aware. They talk about the Sustainability Program, make reference to it here and at home so they are aware. But they need to own it a little more.

Mike, an Intermediate Team Teacher, agreed:

> I think the Sustainability Program was supposed to be bigger and that was just the first step in a process. It hadn't needed to be bigger; it just needed to be more meaningful for the people we are here for.

Even though the Student Advisory Committee was more involved in the Sustainability

initiatives, they also felt the need to be involved at a more significant level. As one

student on the Advisory Committee summarized, "I think the students should have to do

more of the thinking because that gets us more involved." (M)

They also recognized other students should be more involved. The group agreed with

one of the Student Advisory Committee member's comments:

> We need to get the other students involved, they need to know what
> we are doing. We don't tell them what we do here so none of them
> know what we do. We don't tell them unless we are told to tell them.
> (F)

As another Student Advisory member recognized involvement might well lead to a

greater level of commitment and caring:

> If the teachers just do all the work then the Grade 7s when they come
> back the following year vandalize stuff. So I think if you are more
> involved you won't want to vandalize it because you helped work on
> it. (M)

As Dave, the Principal, recognized students were not very involved in their learning, he

felt they needed to make learning for sustainability real to the students by involving them

directly in decision-making and making real changes to the school. Dave was very clear

that students needed to be more engaged in critical thinking and empowerment:

> In many ways, we have an Advisory Group of students, but even with the reduction targets I think the students could have been more involved in collecting the data, making phone calls, all those things.
>
> There are two sides: we need to bring it home at the school level to the kids but we also have got to get them to think big picture: why are we doing this and getting them to do the science behind that. Why is it important to conserve water here when we have tons of rain? Get on the Internet; find the research.

Mike, an Intermediate Teacher, agreed seeing the need for a more participative approach

focusing on critical thinking and empowerment:

> In my view, what should be, would be a program approach where kids get to examine things and themselves in the environment in a non-judgemental way and then get to make some decisions on how to connect: does my life affect say, the air we breathe. If it does then how can I make that a more positive connection. Because the concept then has purpose and the locus of control for that purpose is internal, not because a teacher told me to do that.

Students agreed feeling they needed to go about it differently so they did not always have

to be told to recycle.

A follow-up visit in October 2003 showed that the Sustainability program seemed to be a background philosophy. Recycling was still happening but to a lesser degree. The recycling bins had been moved from the entrance hallway to a back port-a-cabin. Composting was not happening except in the Kindergarten class due to trouble with fruit flies.

Earth Week continued to happen as a special Community School event. Teachers were given an opportunity to have more involvement in planning and doing class projects in 2002 but the Intermediate Team was not very involved. Exams took precedence although teachers originally had choices in scheduling.

The only evidence of development was through the EcoKids Club that was started by Sheri. The Club was jointly run by Sheri and a fellow student, Thomas and supervised by Sheri's mother, Lori. It is an initiative that grew from seven to thirty students but as valuable as this student initiative is, it is very limited being one lunch hour a week. The EcoKids Club may be the extent of the Sustainability Program in the future, as the teaching staff did not seem to be taking up the challenge to continue the sustainability program on a school-wide basis. Various teachers continued to incorporate sustainability into the Primary classes as they have always done and other Intermediate teachers were involved in various trail building or Stream Keeper activities but there had been no meetings to vision or plan how they could move forward without a Program Co-ordinator.

Future Planning

When the administration and teaching staff were asked about how the program was going

to evolve there were no clearly developed ideas. Curriculum development had not been

taken up as a group or by specific staff members. The Co-ordinator's position was not

funded beyond June 2002 and there was no plan on how they would proceed to either

secure further funding or continue without a Co-ordinator. Once again it depended on

individual teachers as to whether or not they would incorporate the Sustainability

Program into their teaching. It was generally felt the recycling program would continue

but likely at a lower level. The reduction program for water and electricity would depend

on another individual deciding to take it on. As the Intermediate teachers felt

disillusioned and not comfortable without a scope and sequence of what to teach, it was

questionable if they would develop the teaching of sustainability further.

Denise, a Community School Co-ordinator, felt after the initial two years of the program,

as the Program Co-ordinator position would no longer be funded, it was time to evaluate

the program before deciding how to develop it further:

> For us, having a day where we can all sit back and look at what has
> happened is needed. I think it is really important for people to look
> back objectively and see where we could have done things
> differently without beating ourselves up about it and bite off
> manageable chunks without feeling overwhelmed. Keeping it fun,
> you have to feel good to keep wanting to do it year after year.
> Understanding change helps, understanding what it takes to initiate
> lasting change. It takes eight to ten years and so we are just starting.

In order to move ahead Denise also felt they needed a clear vision of where they want to

go:

> Now we want to continue environmental sustainability but we probably need more staff and funding in addition to our Community School funding but we need a clear idea of what we want to fund. And we also want to say how does this fit; what is our mission now? Our mission was to create a sense of belonging for community members. Now we want to create a sense of belonging and we want to be a leadership organization in environmental sustainability. Unfortunately we are also looking at huge instability in terms of our own funding. We have to take what we have done and build on it. But we have no clear picture of what to do next.

Roger, the Program Consultant, agreed that a vision and future plan was essential for the

program to continue. As he explained:

> When the achievement targets are no longer attractive there is potential for the program to atrophy. That is why we need to get past garbage. Forest Grove is so far ahead of any other school in that department but if we are interested in the long-term viability of this program then we have to begin to think beyond garbage, hydro and water. The school is multi-facetted and there are many things we can do.

Overall, Julia, a teacher and the Community School Chairperson felt the staff needed to

recuperate from the stresses and intensity of the conflicts developed over the first two

years, and then they needed strong leadership with everyone involved in planning. It was felt that conflicts arose due to the obstacles identified and the loss of the Co-ordinator position, as well as personal reactions all around. This led to hard feelings and stress on all those involved so that time was needed to settle, heal and rejuvenate. Issues that arose over the two years of the program had not been laid out and dealt with and there was no debriefing as to what worked and what did not.

Unfortunately, there did not appear to be enough commitment and interest from the teachers to move to this next stage in developing the program. This seems to concord with what Sterling (2001) indicates as a mechanistic view where it would need to be prescribed to be developed. In contrast, an ecological view would emphasize positive synergies and a strong sense of emergence in the learning environment/ system (Sterling, 2001, Appendix 3).

The new Principal planned to hold a Community Forum in February 2004 to articulate the school vision and find out whether or not the community and staff want to incorporate the Sustainability Program. The Community School funding was threatened from December 2003 and this would threaten the program further as it was directed through the Community School. Even if the Community School continued to be funded, in order for the Sustainability Program to be included as a Community School program, it would need to be approved by the school Superintendent and the Area Manager of the Ministry of Children and Families, and the target population must also be shown to be at risk. Other programs were, therefore, taking precedence over the Sustainability Program.

11.7 Conclusion

Ultimately, critical thinking, empowerment and action – hallmarks of ecological literacy

(Bell, 2005; Fontes, 2004; Tilbury & Wortman, 2004; Webster, 2004; Orr, 1992; Rauch,

2002) were limited to involved community members and those few individuals who were

involved in the development of the Sustainability Program. The hierarchical

management and organization of Forest Grove Community School became a factor in

limiting the involvement of teachers and students in this process. This in turn influenced

the curriculum, teaching and learning, and as a result, the scope of the Program and its

longevity. Rauch (2002, p. 49) notes,

> …it is imperative that knowledge and the enormous wealth of
> information are used critically and effectively, and that dynamic
> (key) skills are developed. Moreover, teachers need greater
> willingness and ability to handle learning processes which are not *a
> priori* structured.

Although involvement in critical thinking and empowerment was limited, the intended

curriculum through the respondents' philosophies and the Sustainability Program

incorporated theoretical ecological frameworks of socio-ecological action competence

considering the whole child, transformative learning, ecological intelligence and

empowerment, constructing knowledge through cooperation and collaboration,

sustainability as a frame of mind and nature as a source of wisdom with intrinsic value

(Sessions, 1983; Greig et al, 1989; Orr, 1992 & 1996; Benyus, 1997; Bonnett, 2002;

Foster, 2002; McDonnaugh & Braungart, 2002). As enacted it had specific impacts on

reducing their waste, water and electricity consumption, and encouraging the

development of an Eco-Kids Club, community involvement and some ecological changes

in the buildings and grounds. These actions resonate with some aspects of Sterling's

(2001) characterization of an ecological view of education,

The lack of depth, extent and longevity of this case seems to suggest that the context

within which a school operates may preclude or act as a strong obstacle to change

because the metaphors seem to seep into the school's culture and systems. Those

involved with developing Forest Grove's enacted curriculum did not seem to be metaphor

aware in terms of management structures, the B.C. curriculum and teaching/ learning

methods. Not being metaphor-aware appeared to be associated with non-inclusive

decision-making, top-down centralized management structures in the Sustainability

Program, and the acceptance of the quantifiable instrumental focus of the grant proposal.

The enactment of sustainability education became a serious obstacle identified by the

teachers who had no ownership or involvement and tried to interpret it in mechanistic

terms wanting a scope and sequence. These enacted aspects of the program, tended to

contradict and undermine the intended curriculum and resonated with what Sterling has

characterized as mechanistic. Once again, the obstacles the respondents identified in

developing their pioneering program resonated with some of the literature on education

for sustainability (Bower, 1995; Orr, 1996) and what has been characterized by Sterling

(2001) as a mechanistic view of education thereby suggesting some grounding of

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theoretical frameworks. Although the mechanistic/ ecological dualism has been helpful

for analysis it can tend to conceptually polarize. Therefore, it is important to recognize

practices fall along a continuum.

As these two case study schools were very different in their pioneering programs it is

worth reviewing their programs side by side in a cross-case conceptually ordered display

to provide insights for further analysis (Miles and Huberman, 1994).

Chapter 12 - Cross Case Analysis

This extensive analysis has shown that there are striking differences between the sustainability initiatives of Discovery Bay Bioregional School and Forest Grove Community School. Both schools are pioneers in developing a whole school approach in education for sustainability. As neither school had solid models of education for sustainability to work from their efforts are commendable and may be extremely valuable as their experiences provide important examples from which other schools can learn. Both schools faced different obstacles resulting from their different management structures and initiatives, so comparing the two should prove useful for both Independent and Government-funded schools in that they may recognize similarities between themselves and one or the other case study schools.

A cross-case conceptually ordered display (Miles and Huberman, 1994) provides a useful summary and comparison of each case study school, in judging whether various aspects of a school resonate with a mechanistic or an ecological view. Sterling's template (Appendix 3) and the ecological and mechanistic metaphors identified through the literature search (Appendix 4) have been used for this purpose. As noted earlier, examples of mechanistic metaphors include an anthropocentric perspective, linear thinking, centralization, top-down hierarchical control, disciplines and defence of boundaries, individualism, transmission of knowledge and a deficiency model. In comparison, ecological metaphors are strongly associated with non-linear, dynamic, complex living systems. As such they incorporate ecological principles of honouring and celebrating diversity; iterative cycling with emergent properties unfolding and enfolding

providing constant feedback, adaptation and change; and collaboration and interdependence within and between systems as dynamic community relationships. An ecological worldview encourages an emergent, transformative, holistic, integrative view of knowledge and learning.

This cross-case conceptually ordered display is displayed in Figure 4. The upper case X indicates a major influence and a lowercase x indicates a minor influence. Although this dualistic comparison is an oversimplification it can be helpful as a means of informing rather than defining. The indication of both minor and major influences is important as it indicates movement along a continuum.

Discovery Bay						
	Philosophy	Mgt.	Curriculum	Build/ Grounds	Community	Teach/ Learn
Ecological	X	X	X	X	X	X
Mechanistic			x	x		x

Forest Grove						
	Philosophy	Mgt.	Curriculum	Build/ Grounds	Community	Teach/ Learn
Ecological	x			x	x	
Mechanistic		X	X	X	X	X

Figure 4: A Cross-case Conceptually-ordered Display of Dominant Metaphors in
         Each Case Study School

This cross-case analysis shows clearly how different the two schools are in terms of their ecological or mechanistic resonances. In focusing on an ecological view, it is important to keep in mind these cross-case analysis findings highlight this particular perspective of education for sustainability. They also reveal the intended and, minimally, the enacted curriculum rather than experienced curriculum.

Discovery Bay displays features that are characteristic of a strong ecological perspective that are evident in most aspects of the school. It does, however, also have some characteristics associated with mechanistic metaphorical approaches as manifested in its application of the B.C. curriculum; the building, as developing it ecologically has been limited by finances; and in teaching and learning when specific disciplines are emphasized through subject-specialist teaching.

Forest Grove Community School differs markedly in that it shows the strong emphasis of mechanistic views in management, curriculum, building/ grounds, community involvement, and teaching/ learning. It does, however, incorporate a basis of ecological philosophy but not consistently amongst all those involved or to a deep enough level to develop substantial changes throughout the school. The buildings/ grounds/ resources showed some ecological management as well as positive community/ school links that were developed through the Sample Family Program. These links, however, were limited, as they did not apply to the whole school.

As an Independent school, it seems Discovery Bay had an advantage over Forest Grove Community School in trying to pioneer a new educational approach. Discovery Bay was founded and designed from its management structure right through its curriculum design, community involvement and teaching/ learning approaches to specifically educate for sustainability. This allowed their ecological, bioregional approach to be incorporated, to varying degrees, into each aspect of the school identified in Figure 4.

Forest Grove, being a state school, was attempting to graft modelling and teaching sustainability onto an existing school system that is imbedded in a complex hierarchical system with its roots in the dominant mechanistic views of society. Many of the mechanistic obstacles Forest Grove faced, such as the centralized controls, top-down management hierarchy and discipline-focused teaching, seemed to stem from this. The hierarchy of the public school system is complex, was not supportive of an ecological approach and was not based on sustainability. In teaching and learning through the mechanistic BC Curriculum, students and teachers, with the exception of a unit in Grade 4, were not involved in developing and constructing sustainability curricula and an integrated approach to learning. As such, the Sustainability Program was implemented as an extra-curricular initiative. In other levels of the hierarchy the Maintenance Department and School Board were not supportive of making sustainable changes to the heating and lighting systems, and they commonly used pesticides and supplied toxic cleansers. As Forest Grove was not able to integrate sustainability easily it was dropped.

It can be argued that the mechanistic school system presented significant obstacles that undermined the pioneering attempts as Orr (1994) and Jickling (2001) predicted.

The internal management structures were also significantly different. Forest Grove had no control over the top-down hierarchical structure of the school system with its centralized controls. It did, however, have control over how it developed and managed the Sustainability Program and interestingly, imposed a similar top-down, centrally controlled model. As such, it took an instrumental, resourcist, information-deficit approach to reduce their waste, water and electricity. In contrast, Discovery Bay had the freedom to design a more egalitarian model based on inclusion and collaboration. As sustainable development is a process rather than a goal (Scott, 2002) education for sustainability needs to have a transformative, process orientation rather than an instrumental interpretation (Reid, 2002; Bonnett, 2002). This did not seem to be recognized or incorporated at Forest Grove as they replicated the mechanistic management structure and educational approach they were familiar with.

These differences influenced how each school handled involvement of those affected by the program. Forest Grove took a very mechanistic approach of top-down control and prescription, where those in disagreement were excluded, whereas Discovery Bay was founded on a management structure that included all groups in decisions at all levels through consensus-based decision-making. This latter approach led to a sense of ownership and commitment, which would prove essential for success and development. As Forest Grove did not develop ownership and commitment, their pioneering effort only

lasted two years. Administration, teachers and students at Forest Grove all recognized a more inclusive approach involving critical thinking in meaningful decisions was needed.

The difference in teacher commitment was also affected at Forest Grove Community School by the central control exerted by the teachers' union during contract disputes. As the teachers were not part of a union at Discovery Bay they were free to make their own choices and needed, in fact, a high level of commitment to the bioregional philosophy and approach to work for one third the typical teaching salary. This may have influenced the unhappy teacher at Forest Grove to leave after six months. She could have stayed and tried to work out her issues within the egalitarian consensus-based framework, but to work at Forest Grove one needed to be committed to work within their philosophical basis that emphasized teaching/ learning through self-direction.

Being an Independent school, Discovery Bay also had complete control over the role of the Principal in leading the development of the sustainability program. In contrast, the Principal in the state-run Forest Grove Community School was limited by the centralized control of the School Board; the Teachers' Union influencing staffing; the Ministry of Education controlling the implementation of more ecological curricula; and teacher autonomy controlling teaching methods. These obstacles were identified as needs to overcome by both administration and teaching staff at Forest Grove.

The respondents in both schools also identified professional development in education for sustainability as a key element for success. This was not built into the program at Forest

Grove and became a major identified obstacle by the administration and teaching staff. Conversely, at Discovery Bay, professional development for teachers to be competent in educating for sustainability was recognized as a prerequisite for any new teacher. Moreover, when they hired a new teacher with this background, they ensured that person was willing to be mentored into the approach Discovery Bay had developed.

Religion and spiritualism was another area where Discovery Bay had more control. Being an Independent school gave them the freedom to consciously promote eco-spirituality. With the official separation of church and state, Forest Grove, as a state school, was very sensitive to their limitations in promoting spirituality.

Class size was also a factor worth considering. Forest Grove was much larger with approximately twenty-five students per class. As the teachers indicated, they felt this made teaching outside and developing more creative, empowering methods and activities more challenging. Discovery Bay, in comparison, had only ten to fifteen students per class. Being an Independent school they also had the ability to maintain low teacher/ student ratios.

Interestingly, there were some similarities between the two schools in teaching through separate subject disciplines. Although there were examples of a few teachers in Forest Grove using thematic approaches and Discovery Bay encouraging interdisciplinary learning, particularly in the Primary class and through fieldtrips and independent projects, the B.C. Provincial curriculum seemed to exert a powerful mechanistic, discipline-

centred influence in both schools. Scott (2002) supports working within discipline boundaries as it is pragmatic, being in tune with school life and teacher professional learning, and it recognizes and works with distinct disciplinary perspectives. Moore (2002), however, argues this reflects a static social construct that serves to perpetuate the unsustainable status quo. This research data seems to support Moore as teachers and parents at both schools identified the discipline-centred curriculum as an obstacle to developing their pioneering models in education for sustainability. At Discovery Bay the incorporation of the B.C. Curriculum was the aspect of the enacted curriculum that did not model the intended curriculum. At Forest Grove the Sustainability Program became extra-curricular with minimal impact as teachers found it difficult to integrate it themselves into the prescribed curriculum.

Both schools identified this dominant societal paradigm as an obstacle in promoting a more ecological worldview. Discovery Bay was very conscious of the powerful effect it had on challenging them to be true to their philosophy in a culture dominated by a mechanistic paradigm. As a result, they were thoughtful as they expanded and were being careful to develop a strong emotional and intellectual environmental grounding to give a basis for students to deal with complex social and economic dimensions. Although the influence of the dominant societal paradigm did not seem to be as widely recognized in Forest Grove, some staff, parents and community members were aware of the irony in trying to pioneer a new educational initiative to change society within a system that has been recognized for its role in maintaining the status quo.

The difference in teaching approaches also exemplified the difference in the schools maintaining or challenging the status quo. Discovery Bay developed transformative approaches based on an ecological worldview that encouraged critical thinking and empowerment, with knowledge and meaning being constructed. Contrastingly, Forest Grove typically used transmission approaches based on an information deficit model even though they spoke of 'transformation' and often modeled it through adult action and empowerment.

Chapter 13 – Conclusions, Reflections and Recommendations

Through the theoretical influences of phenomenology, ethnomethodology, hermeneutics, systems theory, and ecological psychology two exemplary schools have been examined and analysed in terms of how they function as pioneering educational systems in education for sustainability. The research has also incorporated how administrators, teachers, students and those involved in the school accomplish their goals through specific behaviours in specific environments and how they make sense of their environment and experiences. While not attempting to foreground an ecological perspective, there is a strong, although not exclusive, thread of the need for an ecological paradigm running throughout the literature from environmental education through to education for sustainability. Accordingly, it is worth considering, as many authors have (Webster, 2004; Palmer, 1998; Tilbury & Wortman, 2004; Jickling, 2001; Orr, 1996; Bowers, 1995), how these schools' intended and, to some degree, enacted curricula resonate with an ecological view. This is particularly relevant, as both schools have tried to implement an ecological model.

However, it is also important to recognize that this research is not definitive, as critical questions around other issues were not investigated due to time limitations. The study did not, for example, incorporate whether alternative philosophical views that challenge biocentrism and self-directed learning would be tolerated at Discovery Bay, (that considers itself to be very inclusive), given our knowledge may evolve to seriously question the validity of an ecological view. If, in fact, other philosophical perspectives were excluded, a school such as Forest Grove that tolerated divergent philosophies or

approaches may offer richer learning opportunities for developing models in education

for sustainability.

As the previous chapter revealed, the cross case analysis has identified metaphorical

differences as well as many other aspects relating to management and organizational

structures that may be associated with the enacted curricula in both schools. Although

there is considerable metaphorical evidence in these findings, the experiences of the case

study schools cannot be attributed to metaphor alone; it is through a combination of

factors, of which some may be dominant, that some tentative conclusions may be made.

Whilst many of these conclusions that follow may be attributable to taking a metaphorical

lens, they could also be attributable to personnel, schools having a unified vision (or

otherwise), particular management structures, or as Fullan (1993) emphasizes, issues

related to change management theories such as influences in society or at other levels in

the management hierarchy.

Other alternative perspectives using for example socially critical or constructivist lenses

might also offer further insights. A socially critical lens may suggest the dominant top-

down authoritarian approaches used at Forest Grove to dogmatically impose the recycling

program was a major factor that may have affected the implementation of their

Sustainability Program. Using this lens, the egalitarian, consensus building approach of

Discovery Bay might be seen as conducive to transformative educational initiatives

associated with education for sustainability. The schools also differed markedly in the

extent to which those involved in the schools (administrators, teachers, parents, students

and community members) were empowered to be involved in constructing their pioneering programs or making significant changes.

The cross-case analysis has highlighted pertinent differences in the case study schools in terms of their freedom to design a pioneering model that incorporated different management structures and a consistent whole-school ecological philosophy. The mere fact that Discovery Bay generated a unified initiative, the freedom to limit class sizes, and decentralized controls may account for many of the differences in the enacted curricula. Not having these freedoms may well have been a major factor limiting Forest Grove developing their pioneering model to a greater extent. The complex top-down hierarchical management system, with its centralized controls severely restricted financial controls, local empowerment and decision-making as well as teacher involvement due to union directives.

However, this research also suggests that root conceptual metaphors are significant and can be associated with various intentions and enactments of the whole curriculum (content, pedagogy, educational system and structure, and learning environment). Discovery Bay intentionally incorporated ecological metaphors based on bioregionalism into their management structures, their curriculum, their buildings/ grounds/ resources and their teaching/ learning approaches. Although this was associated with specific enactments in the curriculum that emphasized ecological principles, bioregionalism and self-directed learning, the mechanistic conceptual metaphors of the B.C Curriculum were associated with discipline-centred teaching at various times in the enacted curriculum,

even though this contradicted the declared intention that students need not be aware of subject boundaries.

Forest Grove, imbedded in a mechanistic system, found it very hard to model and teach sustainability as intended. Their mechanistic system, based on centralized controls and delivering a prescribed curriculum was not consistent with the ecologically focused Sustainability Program that needed those involved to actively construct curricula through transformative processes. As such, many were not involved and those who were developed centralized, top-down management structures and dogmatic, transmission teaching approaches that can be characterized as mechanistic.

In light of this, the research has emphasized the conceptual metaphors that resonate with various practices. Gubrium and Holstein in Denzin and Lincoln (2000) note that ethnomethodologists see all actions and objects as being dependent upon context. "It is through contextualization that practical meaning is derived. Second, the circumstances that provide meaningful contexts are themselves self-generating." (Denzin and Lincoln, 2000, p. 491). This is quite significant to this research given that one of the case study schools has been trying to teach and model an innovative ecological approach whilst operating in a mechanistic structure. O'Riordan (1989) has identified a faith in the adaptability of institutions to accommodate to environmental demands as 'technocentrism'. Chapman (1996, p. 96) argues this is ineffective in developing sustainability since,

> …technocentric environmentalism is part of the existing social and environmental paradigm that has caused environmental problems. As such it lacks the transformative capacity for change demanded by environmental education goals.

Chapman (2004, p. 105) further maintains, "…schooling actively reproduces existing social relations and affirms exploitive structures through implicit messages buried in curriculum and in school organization and practices." It seems that the lessons from the literature review, as well as the case study research, indicate there are significant conceptual metaphors we need to pay attention to, not only in developing curriculum for sustainability but also in teaching methodology, learning environments, management structure, and the underlying, guiding philosophy. As John Huckle (1996) emphasized, schools are modern institutions in a post-modern world. Organized with complex, mechanistic bureaucracy and centralized controls the school system tends to maintain the status quo and promote the same unsustainable society we are trying to modify through Education for Sustainability (Huckle, 1996).

The literature search in this study has addressed the first research question by revealing a theoretical framework and ecological cultural metaphors identified by Greig, Pike and Selby (1989); Bowers (1995); Swartz and Swartz (1995); Bechta (1998); Sterling (2001); and Webster (2004) that can be associated with an ecological model in education for sustainability (Appendices 3 and 4). They take into account Orr's recommendations

(1992, 1994, 1996) on changing the substance and process, the structure, the architecture and the purposes of education.

This research has made a significant contribution to the field of education in showing a metaphorical analysis is possible and desirable. The diverse pioneering initiatives of Discovery Bay Bioregional School – a school designed specifically to develop education for sustainability; and Forest Grove Community School – a school that decided to graft modelling and teaching sustainability onto an existing government-run public school, have provided rich insights into the extent to which educational practice can be analysed as being imbued with different conceptual root metaphors. The study has shown that it is possible to do this analysis and that it is fruitful.

In earlier work used as a reference point in this study, ecological and mechanistic metaphorical perspectives have been associated with policy formation, organization and management structures, decision-making and communication, curriculum development, community involvement, changes to the buildings and grounds, teaching and learning practices, and the incorporation of the elements of ecological intelligence as identified by Orr (1992). In addressing the second research question, whilst some claim causal links exist between conceptual metaphors and practice it is difficult to evidence this from the data. The data analysis does, however, suggest school practices where ecological metaphors were in play were more strongly associated with the promotion of an ecological view of education for sustainability.

This was exemplified at Discovery Bay where ecological metaphors were in play in their philosophy, management structure, curriculum, grounds and resources, as well as the majority of their teaching/ learning practices and analysis showed these were strongly associated with an ecological view of education. Forest Grove, as the cross-case conceptually ordered display shows, did not have as many ecological metaphors in play. Accordingly, their practices did not resonate very strongly with an ecological view of education. Although they tried to model and teach sustainability through their Sustainability Program that was based on strong ecological metaphors, its impact was limited as it was overpowered as Orr (1994) predicted, by the management structure, curriculum and teaching and learning approaches that resonated with mechanistic metaphors.

Although this research suggests that where ecological metaphors were in play school practices were more strongly associated with an ecological model in education for sustainability, it has also shown that this may not be sufficient. Being aware of the underlying conceptual root metaphors in all aspects of the educational approach is also a critical step. Significantly, Discovery Bay Bioregional School paid specific attention to conceptual root metaphors in all aspects of their pioneering approach as the school was designed and as it continued to evolve. Forest Grove seemed unaware of the taken-for-granted mechanistic conceptual metaphors in their management structure, the B.C. Curriculum, teaching/ learning methods and how pervasive these were. They grafted a sustainability program imbued with ecological metaphors onto the accepted educational system, one founded on contradictory 'mechanistic' metaphors. It was not until they tried

to implement the sustainability program that they began to identify those foundational frameworks as obstacles. In both cases the conceptual metaphors were associated with how the pioneering practices emerged.

The case study of these two very different schools has addressed the third research question as it has provided valuable insights into what the teachers, administrators, pupils, parents and community members perceive to be the successes, obstacles and needs in developing models of good practice in education for sustainability. These insights provided methodological triangulation as they reinforced the literature review and analysis findings that suggest practices associated with ecological metaphors in philosophy, management, curriculum, buildings/ grounds/ resources, and teaching/ learning are strongly associated with the promotion of their different ecological models of education for sustainability. Significantly, most obstacles identified by both those involved in Forest Grove Community School and Discovery Bay can be characterized as resonant with what Sterling (2001) has indicated as mechanistic.

These perceptions are also very valuable as they provide a realistic perspective, from those involved, of developing pioneering models from the ground up, or from within an existing mechanistic educational structure. As Merriam (1998, p. 19) asserts, this form of naturalistic inquiry reveals, "…how people make sense of their lives, experiences, and their structures of the world". As such these perceptions provide further information for readers to judge the implications of the study for themselves, given their circumstances.

Tilbury and Wortman (2004, p. xii) recognize the value of perceptions or stories from

those involved:

> Reading the stories of others is a good way to learn about ourselves. The stories of others can serve as mirrors into which we can see our own context, hopes, plans and experiences reflected. The situations in a story will not be the same as ours, but identifying the similarities and differences can help us contextualize the stories and take from them the lessons that can enrich our own ways of developing educational responses to the challenges of sustainable development.

When one considers the successes the respondents of Forest Grove Community School's

sustainability program identified, they are in line with the actions of 'Eco-schools' such

as St. Mark's Primary School in East Renfrewshire, Scotland that was awarded the

'Green Flag' Award, the top award in the Foundation for Environmental Education in

Europe (FEE) Eco-schools program (Keep Scotland Beautiful, 2004). Although these

schools are heralded as models to emulate (Henderson & Tilbury, 2004), this research has

shown that the underlying metaphors in philosophy, organization/ management,

curriculum, building/ grounds, community involvement, teaching/ learning need to be

addressed if an ecological model in education for sustainability is to be developed.

This is supported by Webster (2004) who argues school 'greening' and dealing with its

ecological footprint is not enough. Webster outlines four stages in developing a school

based on sustainability. The first stage deals with traditional eco-activities such as those

at Forest Grove, "…with the proviso that in mainstream school these ideas are probed and

tested in the everyday curriculum" (Webster, 2004, p. 97). This is the level Forest Grove focused on, although curriculum integration was minimal. The second level incorporates widespread mainstreaming of education for sustainability in the curriculum with management accepting responsibility for some of its financial choices as, "There is no sustainability without 'closed loops' and purchasing eco-products and services is surely essential." (Webster, 2004, p. 98). Forest Grove could not reach this level as Webster (2004) predicted due to centralized controls and what was considered 'economic reality'. Stage three would see significant capital expenditure in heating, lighting, water systems and their control technologies. Stage four goes well beyond to rethink the very idea of schools, as we know them. Webster (2004) maintains education for sustainability challenges us to question centralization of power and education, questioning whether our businesses, institutions and systems are appropriate; whether they are economically, socially and ecologically effective. Moore (2005) argues,

> Shifting to models of collaborative and transformative learning is necessary if we are shifting towards models of sustainability education…The focus of teaching and learning in a collaborative model shifts from information transfer (transmission and reception) or discussion (cooperative model) towards a model in which all participants are involved in a shared process of constructing knowledge.

Significantly, this is precisely the stage Discovery Bay has attempted to achieve. It has re-envisioned what a school should look like from its management structures right through to its curriculum, teaching and learning. Those involved in the school have

identified the mechanistic society the school is imbedded in as an obstacle. As Webster

(2004) realized, the move to education for sustainability is a process. Even though

Discovery Bay started working at stage four, it has faced financial obstacles so that it has

not yet been able to implement more ecologically sustainable systems for heating,

lighting and water (stage three). This research has also shown much of their focus has

been on the hidden curriculum and they have not completely integrated education for

sustainability into the mainstream B.C Curriculum (Stage 2) although their documents

show this to be an objective.

Forest Grove is also developing along a continuum towards sustainability education but

faces even greater obstacles. This research has shown that grafting education for

sustainability curricula or environmental education activities onto a mechanistic school

structure resulted in minimal impacts rather than significant changes. Chapman (2004, p.

105) notes, "many environmental education initiatives…are micro-level initiatives that

seldom persist because they are unsupported at deeper levels." Bell (2005) agrees

emphasizing the need to focus on the conceptual root metaphors. Unaware of the

influence of root metaphors, Forest Grove focused on an information deficit model,

second moment knowledge metaphors (Bell, 2005), and then significantly - through their

experiential accounts - corroborated the literature by identifying the root mechanistic

metaphors as obstacles. The mechanistic structure at Forest Grove Community School

seemed to be so pervasive it was associated with the diminishing of well-intentioned,

optimistic energies and efforts of those wanting to develop a pioneering program in

education for sustainability.

This research has particular importance as most education for sustainability initiatives are simply grafted onto the mechanistic educational system. Without addressing the conceptual root metaphors these well-intentioned efforts may be destined to have minimum impact as exemplified by Forest Grove Community School. As Gough (2002, p. 71) recognizes, schools such as Forest Grove have "…an indispensable contribution to make to our wider understanding of society's options and how these become available or are foreclosed." Jickling (2001) argues when we do not pay attention to all the messages in the implicit and null curriculum we create situations where we can negate our declared intentions.

It has often been the case that society has taken an instrumental approach and turned to education and the school system to bring about necessary changes by implementing new curriculum or teaching approaches. This has been the approach taken by Forest Grove when they decided to model and teach sustainability. With an emphasis on emergence in learning and the current UN Decade on Education for Sustainable Development, Reid (2002, p. 73) challenged this instrumental approach in stating, "Rather than what education might do for sustainable development, what might sustainable development do for education." The findings from Discovery Bay's ecological holistic approach and Forest Grove's mechanistic instrumental approach highlight the validity of this challenge. This research underscores Reid's challenge to rethink education and its guiding metaphors if it is to, in turn, help guide sustainability. Many involved in education take

for granted the conceptual root metaphors, not realizing how pervasive they are. These metaphors need to be considered, as they can be associated with how practice emerges.

In order to change the conceptual root metaphors so as to promote an ecological model in education for sustainability, each aspect of the educational process would need to incorporate ecological conceptual metaphors such as those outlined in Appendices 3 and 4. Such an approach would incorporate, for example, emergent, transformative, holistic, and integrative philosophy, management structure, curriculum, and teaching/ learning approaches. Sterling et al (2005) have shown how systemic thinking can be brought into curricula, teaching and learning. McDonough and Braungart (2002) have exemplified how changing conceptual metaphors have effectively and dramatically altered practice in industry. By changing the mechanistic linear concept of resource use, from 'cradle to grave', to the cyclical ecological metaphor of 'cradle to cradle' industries such as Ray Anderson's Interface Carpets (1998) are revolutionizing their industrial practices. Being an Independent school, Discovery Bay School was able to exemplify a particular whole school educational example based on these ecological metaphors and bioregionalism. Many other educational approaches are obviously possible and would be valuable additions to the learning process.

Forest Grove Community School had stronger ecological metaphors in play in their intended educational philosophy and Sustainability Program than in their enacted curriculum as they contended with more challenges as part of a larger system that resonated with mechanistic metaphors. Being metaphor-aware leads one to considering

how a school is designed, how it is part of a larger system that influences it and what metaphors may be in play at this level. The taken-for-granted metaphors are important. One questions whether the mechanistic obstacles imbedded in the public school system are insurmountable.

Given that the school system has been identified as a mechanistic modern institution in a post-modern world, if education is to drive any change we may need to seriously consider metaphorical resonances in all aspects of education. This will entail significant commitment, collaboration and transformative education at all levels in the educational system hierarchy. Experiences at Forest Grove suggest there may be benefits to setting up structures such as decentralized control, smaller class sizes and appropriate teaching methods, backed by professional development, to support and develop transformative education and ecological curriculum development within the state system if these schools are to play a positive role in advancing an ecological society. This, however, implies that there needs to be freedom and room to challenge significant systemic obstacles.

In order for these changes to happen in the government-run school, there would need to be significant changes in the socio-political structure that is in play in these schools. Schools would need to be free to adopt their own vision of education, ethos and particular organizational structures. Significantly, one of the parents in Forest Grove identified this to be an obstacle in that they were trying to pioneer a new way forward in a system that is known for its maintenance of the status quo. This presents the irony of a classic double bind (Bateson, 1991, Bowers, 1995) where schools need to break free of their

mechanistic root metaphors and systemic limitations in order to lead changes in those conceptualizations they are caught in. One can also question whether such change is possible as we are often unaware, by definition, of our taken for granted metaphors. However, the mere fact that Forest Grove has attempted to challenge the status quo may indicate initial shifts in mainstream practice and the dominant paradigm. It can also be seen as a very valuable contribution as it has afforded critical insights into the obstacles they face.

As Forest Grove Community School did not develop education for sustainability further the possibility of changing from a mechanistic to an ecological system remains to be seen. This research is in no way conclusive but suggests that a valuable next step for Forest Grove might be to work specifically with the conceptual metaphors at all levels in their system. It would be worth doing a follow-up study should Forest Grove decide to develop further in this way. Alternatively, it would be valuable to do similar research on other whole-school initiatives that specifically try to change mechanistic conceptual metaphors to ecological metaphors at all levels in the system to see what results are realized.

Reflecting on this research process, which started in 1997, highlights the importance of incorporating emergence and development in education as it shows how dynamic and evolving knowledge and life is. The ideas, worldviews and efforts of all those involved in this research have continued to evolve and develop. Many respondents commented on how being part of the research process, consciously articulating their philosophies,

programs, successes, obstacles and needs, helped them reflect on their programs, stimulating further discussions amongst themselves on their progress.

The method of data collection allows thick descriptions of practice as viewed through the eyes of a range of actors at a particular point in time. Whilst this produces rich data, it has its limitations and with more resources and time, a longitudinal study involving more frequent interviews would be ideal in following the development of these programs into the future. In light of this it is important to realize the data reflects a segment, phase or stage along the temporal axis in an overall complex process.

Recognizing the research has necessary limitations inherent in the phenomenonological tradition, in the subjective responses from the various participants, triangulation in the data collection processes (incorporating document analysis, interview of all groups involved in the educational process as well as field observations) provided checks and balances. Similarly, basing the interpretation on multiple sources minimizes the researcher's subjectivity. Significantly, as noted earlier, these findings are corroborated by the views of the participants themselves on the successes, obstacles and needs of their programs as their knowledge developed over time. However, while illumination of practice from these two cases might have application elsewhere, any transferability to other situations should be treated with caution.

Evolution of knowledge in the literature was also evident. Biocentric views have been challenged by constructivism as our understanding of sustainability has evolved. The

nested metaphor model has superseded the concept of sustainability represented by the three-legged stool or Venn diagram model. Mechanistic metaphors of the dominant societal paradigm are being challenged by economic metaphors of 'Natural Capitalism' and 'Real Options' that incorporate ecological considerations. Bell (2005) challenges us to continue the process and move beyond economic metaphors to improve our understanding of the environment-human relationship. Webster (2004) sees this as essential if we are to develop an economy that serves society rather than a society that serves a global consumer economy.

The dynamic nature of Earth and its evolving, changing systems have also been evident with clear indicators of how interdependent our social and political systems are with the Earth (IPCC, 2007). In light of this report it is imperative we reconsider our educational processes. Now more than ever, it is important to continually evolve and construct our knowledge and educational responses to be in synchronization and balance – to be contextually relevant - in light of this dynamic interchange.

Given these dynamic relationships, openness to learning, as an emergent process will help position this work as a contribution to further dialogue, interpretations and insights. As mentioned earlier, reviewing the data from other perspectives such as a feminist, a socially critical or constructivist critique may develop further fruitful knowledge by providing different critiques and analyses. As well, other ecologically designed approaches that emphasize different approaches such as active citizenship in education for sustainability may offer further insights. Although the two case study schools

incorporated bioregionalism or natural step science as foundations for sustainability

education there are likely many other frameworks worth considering. Further research

could also investigate the importance of consensus or self-direction in developing critical

thinking and empowerment, balanced or challenged by the incorporation of elder's

wisdom and input.

As this work has illuminated how guiding and root metaphors resonate with educational

practices, it will be important to use hindsight, critical thinking and interacting with

further pioneering approaches to develop new insight in our ever-evolving process of

educating for sustainability. Bell (2005, p. 66) suggests,

> The lesson we need to learn is that developing our capacity for environmental sense-making and action is not a matter of finding *the* right conceptual framework. Instead, we make most progress – we learn most – when we work cooperatively to deliberate and discuss new and existing conceptual and metaphorical frameworks and the relationships among them.

In light of this it is important to reinforce and highlight elementary, secondary and

tertiary educational centres of excellence that develop and model education for

sustainability as a dynamic educational process between and within all levels of

education, society and the natural environment. Focusing on these exciting places of

innovation and inspiration offers a diversity of models and a network for others to learn

from as they continually develop and model emergent ideas in the ever-evolving process of education for sustainability.

The predicament we are in requires a new worldview. For education to drive that societal change and revision the world, it is clear the conceptual metaphors that frame and guide that educational process must be a conscious part of the revisioning process. Centres of excellence can help identify new ways forward, guiding this educational paradigm shift by influencing education at all levels, regionally and nationally. For this to happen, a widespread awareness of the need for, and commitment to innovation in education is essential. Although only time will tell if education will play this active role in driving rather than delaying the paradigm shift necessary to developing an ecologically sustainable society, the reality of climate change is accelerating the realization that change is needed. As the 21st Century and the implications of what many have described as a mechanistic society unfold, the need to develop an ecologically sustainable society is evident (IPCC, 2007). An educational system built on ecological conceptual metaphors, one that learns from, and is in balance with Nature, offers hope, inspiration and guidance for an exciting, optimistic future. The opportunity to redesign education and that future is at hand.

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Appendices

Appendix 1 – The Green School Conceptual Model

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Appendix 2 – The Gaia Curriculum Model

A GAIA MODEL OF CURRICULUM DEVELOPMENT

Gaia

Natural Systems

Plants

People

Animals

Time

Change

Gaia

Gaia

Gaia

Energy Flow

Diversity

Community

Interdependence

Cycling

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Appendix 3 – Mechanistic / Ecological Template

Mechanistic View	Ecological View
Educational Paradigm **Core Values**	
Preparation for economic life	Participation in all dimensions of the sustainability transition – social, economic, environmental
Selection or exclusion	Inclusion and valuing of all people
Formal education	Learning throughout life
Knowing as instrumental value	Being/ becoming (intrinsic/ instrumental values)
Competition	Cooperation, collaboration
Specialization	Integrative understanding
Socialization, integrating to fit	Autonomy-in-relation
Developing institutional profiles	Developing learning communities
Effective learning	Transformative learning
Standardization	Diversity with coherence
Accountability	Responsibility
Faith in 'the system'	Faith in people
Modernity	Ecological sustainability
Organization and Management of the Learning Environment **Curriculum**	

Prescription	Negotiation and consent
Detailed and largely closed	Indicative, open, responsive
Discursive knowledge	Non-discursive knowledge also valued
Decontextualized & abstract knowledge	More emphasis on local, personal, applied and first-hand knowledge
Fixed knowledge and 'truth'	Provisional knowledge recognizing uncertainty and approximation
Confusion of 'data', 'information' and 'knowledge'	Ultimate concern with wisdom
Disciplines and defence of borders	Greater transdisciplinary/ domains of interest
Specialism	Generalism and flexibility
Evaluation and assessment	
External inspection	Self-evaluation, plus critical support
External indicators, narrowly prescribed	Self-generated indicators, broadly drawn
Quantitative measures	Qualitative as well as quantitative measures
Management	
Synergies & emergence not considered	Positive synergies sought
Architecture, energy and resource use, and institutional grounds neither managed ecologically nor seen as part of the educational experience	Ecological management, linked to educational curriculum and experience
Scale not considered	Human-scale structures and learning

	situations
Curriculum control and prescription	Curriculum empowerment and determination
Top-down control	Democratic and participative
Community	
Few or nominal links	Fuzzy borders; local community increasingly part of the learning community
Learning and Pedagogy **View of teaching and learning**	
Transmission	Transformation
Product oriented	Process, development and action oriented
Emphasis on teaching	Integrative view: teachers also learners, learners also teachers
Functional competence	Functional, critical and creative competencies valued
View of learner	
As a cognitive being	As a whole person with full range of needs and capacities
Deficiency model	Existing knowledge, beliefs and feelings valued
Learners largely undifferentiated	Differentiated needs recognized
Valuing intellect	Intellect, intuition, and capability valued

Logical and linguistic intelligence	Multiple intelligences
Teachers as technicians	Teachers as reflective practitioners and change agents
Learners as individuals	Groups, organizations and communities also learn
Teaching and learning styles	
Cognitive experience	Also affective, spiritual, manual and physical experience
Passive instruction	Active learning styles
Non-critical inquiry	Critical and creative inquiry
Analytical and individual inquiry	Appreciative and cooperative inquiry
Restricted range of methods	Wide range of methods and tools
View of Learning	
Simple learning (first order)	Also critical and epistemic (second / third order)
Non-reflexive, causal	Reflexive, iterative
Meaning is given	Meaning is constructed and negotiated
Needs to be effective	Needs to be meaningful first
No sense of emergence in the learning environment/ system	Strong sense of emergence in the learning environment/ system

(Sterling 2001, p. 58/59)

Appendix 4 – Ecological / Mechanistic Metaphors

Ecological Metaphors

Ecological metaphors are strongly associated with non-linear, dynamic, complex living systems. As such they incorporate ecological principles of honouring and celebrating diversity and development as increasing complexity within a systemic context; iterative cycling with emergent properties unfolding and enfolding providing constant feedback, adaptation and change; and interdependence within and between systems as dynamic community relationships. An ecological worldview encourages an emergent, transformative, holistic, integrative view of knowledge and learning.

Intrinsic Nature

- Nature as nurturing family, Mother, Gaia

- Integration of people and nature, mind and body.

- Nature has intrinsic value

Community

- Community will be re-conceptualized as an ecology of all life forms held together through interdependence, with hierarchical levels being responsible for those levels below and responsible to those levels above (as organs and cells are to the body, and the person is to the their environment and social community).

- Freedom needs to be re-conceptualized with the understanding of the interdependent self as part of a larger mental ecology.

- "Individual" as giving individualized expression to cultural patterns.

- Individualizing of cultural patterns may occasionally lead to reconstituting received cultural patterns through critical reflection and creative interpretations.

Interdependence

- Limits of technology, incorporating the precautionary principle, recognizing technological impacts are not totally predictable in a dynamic system;

- Technology will be valued in terms of its environmental and cultural sensitivity; honouring diversity it should be decentralized and take into consideration traditional knowledge, wisdom, and material achievements within the context of renewable resources of energy and collective skills.

Systemic

- Ecological intelligence uses a nesting metaphor where individuals are nested in the symbolic systems of culture, and cultures in the natural systems that they are reliant on.

- Knowledge will be understood as multidimensional and interconnected within a larger context.

Diversity

- Diverse forms of knowledge (tacit, theoretical, technical, folk, encoded -in genes, language, cultural artefacts, plants, animals, etc., poetic, spiritual, bodily) are honoured within a systemic context.

Qualitative

- Holistic incorporation of that which cannot be quantified in recognizing the whole is greater than the sum of its parts, and emergent properties contribute to complex systems;

- The more qualitative elements of reality need to be given legitimate consideration: feelings and intuition, aesthetic appreciation, loyalty, friendship, sentiment, empathy and charity.

Cyclical

- Iterative cycles giving constant feedback loops; closed loop thinking; systemic interdependence (e.g. waste = food).

Organic

Integrative

- Systemic, interdependent view of knowledge recognizing context is important

Mechanistic Metaphors

Anthropocentric

- Anthropocentrism

- Human domination of nature is good

- Material progress is our right

- Nature-as-a-Resource

Linear

- The linear sense of time, change, and progress

- Change as inherently progressive

- The belief in unending progress

- Growth of the economy is natural

- The belief that linear, rational thought (neutral, natural, and culture free) is the epitome of intellectual achievement

- Atomistic thinking, that generates the notion of developing knowledge in progressive building blocks

- The belief in market economics (both capitalist and socialist).

Mechanistic

- Progress through technological innovation

- The belief in the metaphor that society functions like a machine and that humans function as individual, independent units of this machine.

- The belief that society is best controlled when power is centralized.

- The belief in market economics (both capitalist and socialist).

- Associating intelligence with processes occurring within the brain (mind) of the individual.

- Mental processes, techniques and procedures are what need to be understood

- Empowerment through data based thinking

Individualism

- Increasing autonomy of the individual

- Individual as the basic social unit and source of moral judgement

- Individually-centered view of intelligence

- Individually-centered rational thought is superior to the collective intelligence sustained through long traditions of cross generational communication

- All knowledge, regardless of its consequences, is equally valuable

- There is no privileged body of knowledge or values essential to the educated person

Dualism

- The belief in the dualisms of mind/ body and humankind/ nature

Quantification

- Modern and progressive cultures possess the only knowledge for living fully in the present, and for controlling the future.

- Modern cultures are superior to oral-based forms of coding and cultural storage.

- The belief that linear, rational thought (neutral, natural, and culture free) is the epitome of intellectual achievement

Based on the work of Webster (2004); Greig, Pike and Selby (1989); Bowers (1995); Bechta (1998); Capra (1982).

Appendix 5 – Interview Schedules

Administrator's/Teacher's Interview

School/class: Date/time: Duration: Name:

Educational ideals and philosophy

- In your view, what is the purpose of education? Why should children come to school? (transmission/transaction/ transformation)

- Why did you go into education/teaching? (transmission/transaction/ transformation)

- ***Why did you start/ get involved with this school/ program?**

- **What is environmental education? Sustainability? (transmission/transaction/ transformation)**

- *In your opinion, what do we (society) need to do to become environmentally sustainable?

- ***Why is the natural environment important?**

- *In what ways are nature important/ valuable to you?

- **What would your ideal form of education look like?**

- *To be considered an "educated" person what abilities would one have?

- What are your overriding objectives with the program? (knowledge, wisdom, skills, ecological intelligence, transformation)

- *How is the topic of technology incorporated in your program?

- ***Do you consciously incorporate aspects of ecological intelligence?**

Land ethic   Slow knowledge

biophilia   empowerment

Immersing experiences   Critical thinking

ecological principles   other cultural metaphors/philosophy

Evaluation and assessment practices

- **How is the curriculum evaluated at your school?**

- **How is this program evaluated?**

- (Teachers) How do you evaluate your own programs? students?

Community involvement

- ***What would you describe as your community?**

- **Is there much involvement with the local community in the school curriculum/ school in the community? Examples?**

- ***How possible is it for parents and students to be involved in decisions about learning content and how it is taught?**

Buildings and grounds

- **How much control/ influence do you have over the buildings and grounds?**

- **Are they ecologically managed?**

- Do they exemplify ecologically sustainable energy and resource use? If so how?

- **Are the buildings and grounds and their ecological management linked to the curriculum? If so how? Could this be improved?**

Views of teaching (*as appropriate for administrators)

- ***What do you see as the/your main purpose in teaching? (transmission/action/formation)**

- *In your opinion, what are the most important things to teach children? How?

- ***Is there certain knowledge that is important to learn? (ecological intelligence)**

- *How does learning occur? (from being taught/ reciprocal roles)
   Draw a diagram of how people learn

- **How do you decide on/plan activities? (student involvement)**

- **What teaching approaches do you commonly use? Why? (philosophy, whole person-head/ heart/ hands, multiple intelligences)**

- What's your favourite approach? Why? (philosophy)

- How do you decide what approach to take? (multiple intelligences?)

- *How do you know when the school/you have succeeded (functional, critical, creative competencies)?

Views of the learner and learning

- **What do you take into consideration when planning for the learning (administrators)/learners in your class (teachers)? (whole person/ background knowledge, feelings, beliefs/ intellect, intuition/ multiple intelligences/ wide range methods, tools)**

- How do you develop the learning? (feedback/ interconnections)

- *What emphasis do you place on individual rights and freedoms?

Unit plans/ lesson plans/ teaching materials / activities (teachers)

Following observations, get clarifications, discuss impressions for feedback on the possible incorporation of: ecological intelligence

- land ethic;   *slow knowledge

- biophilia;   *critical thinking

- immersing experiences;   *other cultural metaphors

- ecological principles (interdependence, change, cycling, energy flows, community, diversity) *empowerment

- **active learning**

- **cognitive as well as affective, spiritual, manual, physical experiences**

- **wide range of methods and tools**

Language used

- Following observations of teaching/ interview

- What did you mean when you used the phrase...

Where learning occurs

- **Where do your lessons typically occur? What percentages?**

- **Why do you teach there?**

Perceptions

What, in your opinion, are the successes, failures, obstacles, and needs in developing your school further?

Feedback

Do you have any further questions or comments?

Parent's Interview

Educational ideals and philosophy

- **In your view, what is the purpose of education? Why should children come to school? (transmission/transaction/ transformation)**

- **Why did you choose to send your child to this school?**

What in your opinion is environmental education? Sustainability? (transmission/transaction/ transformation). Why is it important?

- What would your ideal form of education be like?

Administration/management structure and distribution of power

- **How did this school become involved in environmental education programs?**

- **How are decisions made regarding curriculum/ new initiatives/ special projects?**

- **How much control/involvement do you have over curriculum, learning environment, new initiatives?**

- **Are developments in the program shared with parents, and if so what types and how? Examples?**

- How are decisions made on what is taught and how it is taught in your school/ class?

- **How involved are parents and students in decisions of learning content and style?**

Curriculum design

- **How is the curriculum designed and developed?**

- How is environmental / sustainability education incorporated? Who makes these decisions? How?

- How are changes initiated/ incorporated? (from NGO/ admin/ teachers/ parents/ students)

- **What, in your opinion, is the focus of the environmental/ sustainability curriculum?**

- **What, in your opinion, are the purposes behind the environmental / sustainability curriculum?**

- What are your overriding objectives with the program? (knowledge, wisdom, skills, ecological intelligence, transformation)

- **Is environmental/ sustainability education integrated into the curriculum?**

Evaluation and assessment practices

- How is the curriculum evaluated at your school?

- How is this program evaluated?

- **Are parents involved?**

Community involvement

- **Is there much involvement with the local community in the school curriculum/ school in the community? Examples?**

Buildings and grounds

- **How much control/ influence do you have over the buildings and grounds?**

- Do you feel they are ecologically managed?

- **Do they exemplify ecologically sustainable energy and resource use? If so how?**

- Are the buildings and grounds and their ecological management linked to the curriculum? If so how? Could this be improved?

Views of teaching

- **What do you see as the main purpose in teaching? (transmission/action/formation)**

- How do you feel learning occurs? (from being taught/ reciprocal roles)

- **How are activities planned/ decided on? (student involvement, parent/community involvement)**

- What teaching approaches do you like most? Why? (philosophy, whole person-head/ heart/ hands, multiple intelligences)

- What's your favourite approach? Why? (philosophy)

- **Do you feel your child is challenged with:**

    o   diverse activities,

    o   engaging the whole person,

    o   encouraging a variety of talents? (multiple intelligences?)

- How do you know when the school has succeeded? (functional, critical, creative competencies)

Views of the learner and learning

- What do you like teachers to take into consideration when planning for the learners in the class? (whole person/ background knowledge, feelings, beliefs/ intellect, intuition/ multiple intelligences/ wide range methods, tools)

- In your view, how is learning best developed? (feedback/ interconnections)

Unit plans/ lesson plans/ teaching materials / activities

Do you feel any of the following are being incorporated into the program? If so

which ones and to what degree?

- ecological intelligence

    o land ethic;   *slow knowledge

    o biophilia;   *critical thinking

    o immersing experiences;   *other cultures/ metaphors

    o ecological principles (interdependence, change, cycling, energy flows,

      community, diversity)   *empowerment

- active learning

- cognitive as well as affective, spiritual, manual, physical experiences

- wide range of methods and tools

Language used

- Following interview if metaphors used:

- What did you mean when you used the phrase...

Where learning occurs

- Where do lessons typically occur? What percentages?

- Why do they occur there?

Perceptions

What, in your opinion, are the successes, failures, obstacles, and needs in developing your school further?

Feedback

Do you have any further questions or comments?

Student's Interview

School: Date: Number students: Age:

Involvement in interview:

Location: Comfort Level:

Educational ideals and philosophy

- In your view, what is the purpose of education? Why should you come to school? (transmission/transaction/ transformation)

- Why do you come to this school?

- What would your ideal form of education be like?

Administration/management structure and distribution of power

- **How much control do you have over what is taught, where it is taught, new projects?**

- How are decisions made on what is taught and how it is taught in your school/ class?

- **How involved are you and your parents in decisions of what and how you learn?**

- ***How open are teachers to your ideas?**

Curriculum design

- **If I talk about the environment what does that mean to you? Discuss, clarify my use.**

- **How/ when are lessons about the environment/ bioregion/sustainability brought into your lessons?**

- **Can you make suggestions about how to improve what or how you're taught? Do you feel these suggestions would be listened to? Why?**

- **What, in your opinion, is the main things/topics you are learning about the environment/ bioregion/ sustainability?**

- **Why are you learning about the environment/ bioregion/ sustainability? (knowledge, wisdom, skills, ecological intelligence, transformation)**

Evaluation and assessment practices

- **How is learning evaluated at your school?**

- Are you or your parents involved? If so, how?

Community involvement

- **Is there much involvement with the local community in your learning? Examples?**

- **Do you do much in the community? Examples?**

Buildings and grounds

- **How much control/ influence do you have over the buildings and grounds?**

- **Are they ecologically managed? In what way?**

- Do they model good energy and resource use? If so, how?

- **Are the buildings and grounds and their ecological management linked to the curriculum? If so how? Could this be improved?**

Views of teaching

- How are activities planned/ decided on? (student involvement, parent/community involvement)

- What's your favourite type of activity? Why? (philosophy)

- **How could teaching be improved at your school?**

Unit plans/ lesson plans/ teaching materials / activities

- **Do you feel any of the following are being incorporated into the program? If so which ones and to what degree?**

    o **ecological intelligence**

        ▪ land ethic;   *slow knowledge

        ▪ biophilia;   *critical thinking

        ▪ immersing experiences;   *other

        cultures/metaphors/philosophy

        ▪ ecological principles (interdependence, change, cycling, energy flows, community, diversity)

    o **active learning**

    o **cognitive as well as affective, spiritual, manual, physical experiences**

    o **wide range of methods and tools** (multiple intelligences)

Language used

Following interview if metaphors used:

- What did you mean when you used the phrase...

Where learning occurs

- **Where do lessons typically occur? What percentages?**

- Why do they occur there?

Perceptions

What, in your opinion, are the successes, failures, obstacles, and needs in developing your school further?

- **Feedback**

  Do you have any further questions or comments?

Appendix 6 - Teaching Observations

School: Teacher: Date: Time:

Location: Weather: Students (#, gender, age):

Subjects: Topic:

Diagram of class setup: (what behaviour does it encourage, permit, discourage)

Purpose of teaching (transmission, transaction, transformation):

Description of activities:

Activities, teaching methods, tools, multiple intelligences

Learning styles incorporated into lessons:

Whole-person incorporated?: Cognitive, Affective, Spiritual, Manual, Physical

Student Interaction with activity/ each other:

Teacher positioning throughout lesson:

Teacher/ Student interaction (didactic, interactive, reciprocal):

Classroom Management (prescriptive, participative, democratic):

Types of questions (confirm understanding, clarify, feedback, critical thinking,

empowerment); when questions are used:

Materials used: (recycled, sustainable, plastic/ natural)

Environmental content:

In/ About/ For the environment

Awareness/ Interaction/ feelings/ action

Ecological Intelligence:

- Land ethic

- Biophilia

- Immersing experiences

- Slow knowledge

- Critical thinking

- Empowerment

- Ecological principles

  (interdependence, change, cycling,

  energy flows, community,

  diversity)

Evaluation examples:

Community involvement:

Copies of unit plans, lesson plans, activities, materials?

Comments:

- My role: observer vs. participant

- Subtle factors:

  Unplanned activities; dress; title; symbolism used

Appendix 7 – Discovery Bay School Manual Guiding Principles

- We believe in children's intrinsic ability and need to learn.

- We trust the children to choose what, how and when they learn within the learning environment.

- We strive for education of the whole child: body, mind, heart and spirit.

- We strive to create a safe and inclusive environment where children, parents, teachers and mentors can teach and learn together.

- We value democracy: children and adults participate equally in age-appropriate decisions.

- We strive to create an educational culture that is tolerant and supportive of individual expression.

- We support cooperative learning and cooperative play above competition.

- We value simplicity and support local, ecologically sound economies.

- We respect the integrity of the natural environment in which we live.

- We strive to connect children to nature and to a diversity of people in their community.

- We believe that a bioregional focus will give children the tools to work toward a more sustainable and fulfilling society

(Discovery Bay School Website, http://victoria.tc.ca/~yj383/oakandorca.html)

Appendix 8 – Coding Scheme

Codes are grouped by category.

The following categories incorporate descriptive codes.

Roles

- Administrator
- Consultant
- Co-ordinator
- Director
- Parent

- Principal
- Sample Family
- Secretary
- Support Staff
- Teacher

- Volunteer
- Younger
- Student
- Older

Philosophy

- Philosophy of bioregionalism
- Philosophy of Community
- Philosophy of Education
- Philosophy of Education for sustainability
- Philosophy of Environment

- Philosophy of Environmental education
- Philosophy of Learning
- Philosophy of Society
- Philosophy of Sustainability

Management

- Management of buildings
- Management of community
- Management of curriculum
- Management of evaluation

- Management of grounds
- Management of resources
- Management of staff
- Management of the organization

Learning and Pedagogy

- Curriculum content
- Curriculum focused
- Learning skills
- Teaching classroom management
- Teaching management
- Teaching philosophy
- Teaching style

Perceptions

- Perceptions of needs
- Perceptions of obstacles
- Perceptions of successes

The following categories incorporate inferential and pattern codes

Ecological Intelligence

- Biophilia
- Critical thinking
- Ecological principles
- Empowerment
- Immersing experiences
- Land ethic
- Other cultural philosophies/ metaphors
- Slow knowledge
- Wisdom

Mechanistic View

- Anthropocentric
- Centralized control
- Competitive
- Discipline centered

- Dualism
- Hierarchical
- Individualism
- Linear
- Mechanistic view

- Objective
- Prescriptive
- Quantitative
- Transmission

Ecological View

- Aesthetics
- Community
- Consensus
- Cooperative
- Cyclical
- Decentralized control
- Diversity
- Ecological view
- Emergence in learning
- Holism
- Holistic
- Integrative
- Interdependence

- Intrinsic value
- Issues
- Iterative
- Negotiable
- Openness
- Ownership
- Qualitative
- Student focused
- Sustainability
- Economic aspect of sustainability
- Environmental aspect of sustainability

- Social aspects of sustainability
- Systemic
- Transformation
- Whole person
- Affective
- Cognitive
- Manual
- Physical
- Spiritual
- Active learning
- Multiple intelligences

Miscellaneous

The following may be descriptive, inferential or pattern codes.

- Commitment

- Event

- Knowledge

- My comments

- Structure

- Transaction

- Weakness

- Written

  Document

Appendix 9 – Contact Summary Forms

Contact Summary Form: Discovery Bay Bioregional School

Site: Discovery Bay School, BC, Canada

Date: March 18-22, 2002

Today's Date: May 16, 2002

1. **What were the main issues or themes?**

- Bioregional education, self-directed learning and empowerment.

- Trying to develop and execute a holistic educational alternative in a heavily prescribed, mechanistic system:

- Motivating / engaging students through non-coercion and self-direction

2. **Summary of information in each category:**

- **Philosophy**: A holistic, ecological philosophy based on bioregionalism permeates the school at all levels and is shared by all those involved.

- **Management/ Organization**: The management of the school is co-operative and non-hierarchical based on consensus decision-making.

- **Curriculum and Teaching**: A framework based on the seasons guides the bioregional curriculum. The BC curriculum is dealt with as a parallel

curriculum. Fridays are always outdoor fieldtrips that concentrate on bioregionalism.

Teaching happens through optional workshops and in trying to support self-directed studies. There seem to be contradictions in using mechanistic teaching approaches and uncertainty in how to teach while honouring self-directed objectives. This area is one the staff are conscious of and working on.

3. **Perceptions**

Administration, teachers, volunteers and parents identified the school becoming established and its continued existence as successes. Obstacles are finances and trying to provide a holistic alternative in a mechanistic Provincial system.

4. **Salient / interesting / illuminating points.**

Significant community/school interaction; all totally committed to the philosophy and feel ownership; power struggles between students and staff regarding self-directed learning and appropriate learning activities.

5. **Obstacles or issues needing further attention**

- Older students were quite angry and seemed to be led by a student who was no longer attending but was visiting that particular week. It will be good to go back and re-interview those students at a later date when they are not influenced by this ex-student.

Contact Summary Form: Forest Grove Community School

Site: Forest Grove Community School, BC, Canada

Date: April 22-26, 2002

Today's Date: Aug. 3, 2002

What were the main issues or themes?

- The extent to which the program was implemented throughout the school.

- Power struggles; hierarchies; poor communication

- Lack of ownership and empowerment

Summary of information in each category:

Philosophy

- Most believed in an ecological philosophy

- Program has strong holistic, ecological foundations

- Concept of sustainability not shared and understood by all

- Conflicts from trying to implement a holistic, ecological philosophy in a

  mechanistic system

Management/ Organization

- Hierarchical; poor communication; defence of boundaries

- Run by a Co-ordinator; limited by grant requirements

- Parallel programs not incorporated

Curriculum and Teaching

- Discipline-centered; limited to extra-curricular and special events

- Minimal student empowerment

Perceptions

- Community directors, administrators, some teachers and parents thought it was an excellent program.

- Students did not like it, did not feel ownership or empowerment.

- Many teachers felt left out, and felt no ownership

Salient / interesting / illuminating points.

- Initial interest and commitment extremely high

- Teachers who felt left out made little attempts to be involved; it was not incorporated into the curriculum although the need was recognized.

- A defence of boundaries, lack of communication and a team effort minimized implementation to the physical functioning of the school.

- Grant support dictated the extent of implementation.

- Hierarchies had negative impacts throughout.

- Student perspectives were very different from the majority of adults'

Obstacles or issues needing further attention

Need to interview more parents.

Appendix 10 – Follow-up Visits

Discovery Bay Follow-up Visit: October 20/21, 2003

During these two days I interviewed:

Directors: Tara   Parents: Tara

       Albert   Alysia

       Carl   Betty

Teachers: Carol (Administrator, Core Teacher)

       Diane (new core teacher)

       Dave (part-time teacher)

The Directors, Parents and Teachers were provided with the preliminary results for comment and then were asked about the following to determine how the school has developed and what its present status is:

- Student enrolment;

- Staffing;

- Curriculum development and structure;

- The extent of critical thinking, empowerment and ecological intelligence being encouraged;

- The school grounds;

- Communication structure, organization and management;

- A future action plan; and

- Successes, Obstacles, and Needs.

Student enrolment

The enrolment has increased to near capacity, 27 regular students and 4 home-schoolers. The maximum is 35 students. Even more encouraging is that the families of these students share the philosophy of the school so the lack of a shared philosophy is no longer an obstacle.

Staffing

In response to the increased enrolment another full-time teacher has been hired. There are now 2 full-time core teachers, one for the Primary students, grades 1-3; and one for the Intermediate students, grades 4-7. The criteria for hiring a new teacher identified the need to be B.C. Certified to ensure they could manage a class, embody the Bioregional philosophy, and have an openness to be mentored in Discovery Bay's approach. One of the main challenges identified was to organize a class while providing individual choice. They also required someone who could take initiative and develop curriculum as the curriculum is still developing and is not totally laid out. Diane, the teacher they hired, saw value in this mentoring approach, as she felt new teachers don't often get that type of support in the formal government school system.

Dave continues to teach part-time, offering science workshops in the afternoons, math to the Intermediate students in the mornings, and Bioregional fieldtrips on Fridays. Carl volunteers in the classes part-time; parents and community volunteers present workshops from time to time; and many parents are involved in other aspects of running the school either as Board Members or as work trades to offset tuition expenses.

There is still a potential for the staff to be overworked although hiring another full-time teacher has relieved a lot of the stresses. Carol continues to deal with the Administration as well as being a full-time teacher. Albert does give her some Administrative relief time. Carol noted the time it takes to train someone is a deterrent especially if she needs to do it every year. She is also reluctant to hand things over and find they aren't done to her standards.

Curriculum development and structure

As noted above, the Bioregional curriculum is still developing. The teaching job description states that teachers are to teach the B.C. curriculum within a Bioregional context, but this has yet to be clearly defined. Even though they are working towards this ideal, the Intermediate curriculum in particular, continues to be discipline centered along B.C Government guidelines. This is particularly evident for science and math in the Intermediate class as they are identified as separate and taught by a different teacher. Carol, however, starts the Primary class' day with 'Investigations' that integrate math, science and social studies, and then she continues with 'Communications'.

The science curriculum, taught by Dave, is identified by afternoon 'Science Workshops'. Within the science curriculum, Dave is not sure yet whether the Primary and Intermediate programs are going to be different and taught separately. This needed to be decided in the Visioning Meeting with all staff and Board Members. Either way, group as well as individual study options would be available.

Although the curriculum is subject centered at times, it is not at others when projects are developed. With more planning and structure now, projects and themes are being scheduled with workshop options. These often connect to science and social studies themes and incorporate art, music, drama and language.

The Fieldtrips also provide more integrated options, striving to teach science or social studies in a bioregional context. Particularly this year, the core teachers are working together with Dave, the fieldtrip co-ordinator and Intermediate Science teacher, to link the fieldtrip content to the classroom learning with cross planning between science and social studies. Due to the increased enrolment, students now go to two out of three fieldtrips. More advanced planning has been needed to facilitate students choosing which fieldtrips they would like to attend. As the Bioregional Curriculum is not clearly defined and laid out, topics or themes come from the B.C. Curriculum in science or social studies. Fieldtrip, then, are either nature oriented, or culturally oriented.

Diane, the new teacher has also insisted on there being a plan for during each fieldtrip. Within each fieldtrip there are 2 required workshops in the morning that may involve

sensory experiences or wilderness skills as well as optional workshops in the afternoon that develop as an emergent curriculum from earlier experiences and interests or from a theme of Nature Explorers that may involve mapping, tracking or bird language for example. These workshops would be more in-depth than the more general required workshops. If they choose, the students can opt for free time to explore on their own.

Independent Studies are a continuing challenge. Carol noted that it is easier to do independent studies when kids have deadlines for completion. "In keeping with natural rhythms we're finding completion is not as important to them. The process of looking into something, getting information, reading about it is important to them but finishing the project isn't important. We're trying to develop ways to motivate them to finish things but we don't want to require them to finish everything they start."(Carol, Oct. 2003). One of the main reasons for bringing a second core teacher in was to help students develop learning skills for self-direction.

The extent of critical thinking, empowerment and ecological intelligence being encouraged:

Critical thinking, empowerment and ecological intelligence are still central to the day-to-day experiences of each student. Although there is far more structure and planning evident it is always in conjunction with individual choice. Students continue to have the option to choose which workshop they would like to attend or negotiate a different individual learning option. "The aim is to develop a planning framework that is flexible so it can incorporate organic development of learning and empowerment. There is

individual choice to opt out of a workshop by negotiating an educational option that meets their needs and works for others." (Carol, Oct. 2003). Ideally, they would like to have two main teachers in each core group: one that provides a group option and one that oversees individual initiatives and projects. In addition to these core teachers they would also like to continue to have various volunteers. Currently they provide three afternoon workshop options and core supervision for those who want an individual choice.

As mentioned earlier, there is also significant choice in what fieldtrips students participate in and what workshops they choose during that day. These fieldtrips also focus on developing aspects of ecological intelligence.

This individual empowerment and critical thinking are key elements of the school but all are very conscious to insist that the community takes precedence. "Our aim is for personal learning and goal setting, and personal choice- not allowing something at others' expense. Our philosophy and guidelines state that there is self-directed learning in a community context." (Carol, Oct. 2003). There has been a positive shift in students' attitudes in the Intermediate grades in this respect, as they no longer have students who don't want to come and learn. In the first visit in March, 2002 there were a number of students who did not want to be there or who did not want to learn. This attitude affected others, leading to conflicts between teachers who were trying to encourage learning and students who were trying to spend their day playing and disrupting others.

The school grounds

The grounds have been developed by expanding the gardens and building the soil from gravel. This was done through parents adopting a plot, student workshops in the spring, and help from staff and volunteers. Most of the gardening continues to be done by Dave although some enthusiastic students helped with the planting and weeding. A pumpkin and some potatoes were harvested in the autumn but Dave and some parents took them home, made a pumpkin pie and potato dish and brought them back for the Equinox Party. Not having a kitchen organized at the school yet the students were not able to cook the vegetables themselves.

Communication structure, organization and management

With the school's growth communication and consensus has become more of a challenge. As a result they do not always get together as a whole group. The teaching staff will get together and smaller groups will find consensus. More specialized decisions are being made by those involved. It is still consciously non-hierarchical. In this way various groups are empowered with decision-making powers: the teaching staff meet to decide on teaching matters while the Board makes decisions relating to the running of the school. The Board will often ask students for their input with matters that relate to them, such as whether a particular tree should be cut down.

The only frustration voiced concerning communication came from the new teacher, Diane. She is finding that with the extent of co-planning and parent involvement everything takes twice as long. Decisions are all jointly made and therefore they take time to come to consensus. The social studies curriculum was delayed because of joint

planning and finding the time to meet. Dave, on the other hand, who is team-teaching for the first time, is finding it a positive experience teaching and sharing ideas with others.

The amount of co-operation and extensive communication is evident in the planning of the science curriculum. Even though Dave is the science teacher and has many ideas of his own he could not tell me how science was going to be taught until he spoke more with the core teachers and the parents at the Visioning Meeting, due to be held the following week.

Although the core staff are trying to co-plan continually and they are trying to co-ordinate curriculum and fieldtrip content, Dave plans his science and math content quite independently. This was glaringly apparent when a workshop on solar cookers was happening in the core classes upstairs while Dave was busy downstairs planning his science workshops for the afternoon. He was unaware the workshops were happening and when they were called to his attention he did not go see what was happening. Even though some really exciting math and science was being introduced and taken up by the students, it had to be dropped, as Dave did not incorporate it into the following math or science lessons. Instead he had the students drop their investigations and get involved in some completely unrelated math and science concepts.

A future action plan

The future action plan was due to be discussed at the upcoming Visioning Meeting. This school is very forward looking, thinking about how to develop with such a specific

meeting being planned as an integral part of running the school. Two thoughts that are being discussed are the possibility and implications of expanding to a high school level as the students mature; and expanding the school through a Distance Education program. This type of program would provide curriculum through the Internet to distance students. In this way it would provide enrolment income while not exceeding the maximum physical number of students the building can accommodate based on fire regulations.

Successes, Obstacles, and Needs

Successes

Over the past year and a half the school has achieved an enrolment increase with families who share their Bioregional philosophy. They have continued to maintain a happy community with adult unity. Many of the management and organizational obstacles and needs have been met due to this increase in enrolment: increased finances, decreased teacher workload, steady enrolment, another teacher, and a larger school community. The school has also been able to maintain access for all. Amazingly, the school has been able to succeed in spite of collecting only 45% of the tuition fees.

The success of the school's increased enrolment, leading to the hiring of another full-time teacher, has allowed Dave, who specializes in science, to concentrate on his area of interest and work part-time. The new second core teacher has also allowed the school to address many of its teaching and learning obstacles and needs by offering more learning options, encouraging more self-direction and learning skills, offering more help to students, more in-depth learning, and developing more direction and planning.

Parents were unanimous in praising the school for its openness. They felt welcome to be in the class at any time for as long as they wished so they could stay in touch with their children's development and learning. In support of the students' love of the school, they all said they could not get their children away at the end of the day. School was no longer a place their children did not want to be at.

Obstacles

One of the main obstacles continues to be a lack of finances. Even though the school is able to operate effectively, the new teacher has stated she cannot afford to stay with the school for too long, due to the low wages.

Needs

Stabilizing and securing a sound financial base continues to be a top priority. To ensure continuity of teaching staff it is recognized that teacher wages need to be increased to a living wage, at least 2/3 of the Provincial Wage scale. There is also the need to develop a depreciation account for building maintenance as the building continues to need repairs and upkeep. In addressing financial needs, Carol identified the need for help or direction in running and developing independent schools in terms of accounting and fundraising so they are able to access grants and information on finances.

With the increased enrolment comes the need to manage the larger numbers of parents and students while maintaining their philosophy of non-hierarchy, consensus and

community. They are aware of the need to keep necessary bureaucracy under control so that it doesn't become an obstacle to communication. Last year saw a need to involve parents more in sharing the bioregional philosophy, the teaching philosophy and approach. It was felt that they were missing resources in the parent-community, as they were not pulling them in by making it easy for them. Many parents were contributing in work exchanges for tuition but more could be involved in curriculum and workshops.

The increased number of students has also meant changes in managing fieldtrips. More volunteers are needed so that all students can go on each fieldtrip rather than only two out of every three.

In terms of curriculum more work needed to be done on integrating the B.C. Curriculum and the Bioregional Curriculum, especially as they had new staff now. The teaching staff also felt the need for more time for individual projects backed up by self-directed and project planning skills. As the school year with the new teacher was just getting underway, these needs were likely to be addressed as the year progressed.

The final need voiced was in evaluation. The teaching staff wanted to know how they were doing in their Bioregional Education and ecological literacy, and what steps they can take to improve.

Comments

This interest in evaluating how well they are doing in promoting bioregionalism and ecological literacy points to the sense of development and interest in learning. In visiting the school one gets a sense of development, genuine lifelong learning by all involved, commitment and dedication.

Discovery Bay has started with a solid philosophy and management structure that results from the philosophy. This has given it a solid foundation to develop from and within. They are working with the B.C. Curriculum while developing the Bioregional curriculum to embody their philosophy and ecoliteracy. No curricular guidelines have been worked out yet so there is not much to hold onto other than the philosophy and what feels right and consistent in living sustainably and ecologically with our natural world. Although Albert has a stronger sense of direction having immersed himself in wilderness skills and nature studies, the curriculum is still developing.

Forest Grove Community School Follow-up Visit Oct. 22/23, 2003

The following people were interviewed during the follow-up visit:

Admin: Joan	Teachers: Shannon	Students: Thomas (Grade 6)
Denise	Alice/ Don	Sheri (EcoKids)
Lori	Julia	
Julia		

Follow-up telephone interviews: Dave (past Principal)

                                       Ann (present principal)

As the program is no longer incorporated in student lessons but mainly through the EcoKids Club that was started by Sheri, the students were asked about the club and its activities as well as about the extent sustainability was incorporated in the school curriculum.

The Administrators and Teachers were provided with the preliminary results for comment and then were asked about the following to determine the extent of the current program:

- Whether the Sustainability Program was happening and why or why not;
- What was happening with recycling and reducing;
- Other school/ community projects;
- Integration of sustainability with the school curriculum

- Earth Day events;

- Classroom composting;

- The EcoKids Club;

- The extent of critical thinking, empowerment and ecological intelligence being encouraged;

- The school grounds;

- A future action plan;

- Communication structure; and

- Successes, Obstacles, and Needs.

Sustainability Program

Sustainability seems to be a background philosophy but not expanding in action except through the EcoKids initiative. The recycling and Earth Week are still happening. There are no Community/school projects happening. Curricular integration is happening in Shannon's primary class and minimally through obvious science and social studies opportunities in the Intermediate grades. Intermediate teachers see it happening through teacher's personal values and the values of the community.

At the Consultant's Meeting in June, 2002 it was decided they wanted to continue to be a Sustainability school, but without a Co-ordinator. The new Principal is not keeping it on the agenda and sharing ideas because she was not in on it originally. No orientation was given to her. Sustainability is seen as extra programs.

In September 2002 a special Sustainability Week started the school year in an effort to replicate Peel Island activities. The staff of the Earthwind Outdoor School came and did workshops. The Intermediate Team was involved in planning it.

Roger Blackwell, with very little notice, talked to the EcoKids Club and presented the Sustainability Initiative Challenge. This focuses on Solid Waste for November. The EcoKids agreed to do what they could. It is a huge challenge for just one month involving four different projects in five levels. As the Club meets only once a week for one hour the impact is expected to be minimal. This has not been taken up as a whole school initiative.

Recycling

Recycling is still happening but to a lesser degree. The recycling bins have been moved from the entrance hallway to a back port-a-cabin. Composting is not happening except in Shannon's kindergarten class due to trouble with fruit flies.

Other Special Projects

EcoKids is the initiative of two students and a Mom (Community School Co-ordinator). This is where the leadership is coming from. It is a growing initiative from 7-30 students now but, as valuable as this student initiative is, it is very limited being one lunch hour a week. It also seems to be a way out for the teachers not needing to do anything themselves.

The Community Carnival was shifted from the traditional format to a sustainable format

There are no other special sustainability projects happening from the Community School. The Intermediate Team continue with the Sprockids Club and Trail building as they did before the Sustainability Program

Curriculum Integration:

The Intermediate classes are trail building through Sprockids program

Science:

Mike is doing Tree Studies and building interpretive trails with permanent boxes that will hold interchangeable studies.

Alice did Stream Keepers program in the science curriculum in 2002.

Social Studies:

Alice – used Global Citizen textbook last year with grade 6s in 2002. Not sure if she'll use it again although she thought it was great.

There was no evidence of integration of science and social studies. Sustainability is only a part of the curriculum in these obvious ways in the Intermediate grades with no plans in Social Studies for 2003/04 yet. Shannon seems to be the only teacher integrating sustainability throughout her Primary curriculum as she has always done.

Earth Week

Earth Week continues to happen as a special event. Teachers were given an opportunity to have more involvement in planning and doing class projects in 2002 but the intermediate team was not very involved. Exams took precedence although they had choices in scheduling.

School Grounds

Lori the Community School Co-ordinator has taken responsibility for the school grounds. As part of Earth Week, 2003 the Eco-Tech Team came and helped weed, lay bark mulch and plant zeroscape plants.

Action Plan

There are no action or future plans. The new Principal plans to hold a Community Forum in February 2004 to articulate the school vision and find out whether or not the community and staff want to incorporate the Sustainability Program. The Community School funding is threatened from December 2003 and this will threaten the program further. A Sustainability inclusion proposal in the Community School programs needs to be approved by the school Superintendent and the Area Manager of the Ministry. The target population must also be shown to be at risk. Other programs are, therefore, taking precedence over Sustainability funding.

Ecological Intelligence/ Critical Thinking/ Empowerment

The Eco-Kids Club is encouraging both critical thinking and empowerment. Other

aspects of ecological intelligence do not seem to be addressed (ecological principles,

biophilia, immersing experiences, land ethic, slow knowledge).

Communication

Communication remains hierarchical. Boundaries continue to be defended and

maintained.

Successes/ Obstacles/ Needs

Successes

- Eco-Kids Club

- Integrated into Grades 1-3 due to Shannon and Megan's philosophy

Obstacles

- Administrator did not lead or re-direct the Sustainability Program when Co-ordinator left

- Lost other teaching staff

- New Principal took over; not her passion – no co-ordination/ planning/ familiarization meeting

- Personality clashes took away from the program.

- What was program versus process related is hard to sort out

- Conflicts arose due to obstacles and needs and loss of Co-ordinator's position and personal reactions all around

- Hard feelings and stress on all those involved

- Issues not handled well, not laid out and dealt with

- Lack of communication Between all parties

- Hard to get buy-in from teachers (they have their own pet passions)

- Being spoiled by the Community School in they are not needing to do things themselves

- No debriefing after – what worked and what didn't

- Staff doesn't buy-in or plan anything together. Segregated working. Not a whole-school co-operative effort

- This is a time of adjustment and maintenance so they are not pressing forward with new initiatives

- There was room for creativity around the grant proposal but that did not happen

- There were personality conflicts and influences

- The management structure was not ready/ able to deal with the extra position of the Co-ordinator. Her role and responsibilities were not clear. When conflicts arose open communication did not happen. Others shut down

- They had information on initiating change in an organization and how to sustain it but not the relationships

- People had paid positions with different sets of responsibilities already so resentment built. **(defence of boundaries)**

- Never identified where the leadership for change would come from and how – only assumed so resulted in conflict

Needs

- Need to recuperate from stresses and intensity of conflicts

- Time to settle/ heal/ rejuvenate needed

- Strong leadership with everyone involved in planning

- Advanced planning for Earth Week, 2004: buying into a small co-ordinated piece now so advanced planning happens

- Co-ordinator job description, roles and responsibilities

Summary Quotes in response to the preliminary summary:

- "The talk is here but it isn't as deep. We have a distorted self-image – open, caring, holistic - but I think we are more mechanistic than we'd admit."

- "Communicating is a skill – it was a test and we failed. We weren't able to work together."

Appendix 11 - Discovery Bay Bioregional Curriculum Model

Appendix 12 - The Discovery Bay Bioregional Curriculum

The Bioregional Curriculum is defined in terms of the four categories of: Taking Care of Self, Building a Community, Knowledge of Our Bioregion, and Global Understanding. These are defined more specifically in the Manual (2002, pg.8) as:

TAKING CARE OF THE SELF

- self confidence
- self expression
- self awareness
- understanding feelings and emotions
- skills in traditional subject areas
- knowledge in traditional subject areas

- wholistic understanding
- cultural identity
- spirituality and beliefs
- understanding one's place in nature

BUILDING A COMMUNITY

- meeting the needs of a community
- consensus decision making
- participating in a group
- cooperation to reach goals
- bringing concerns to the group

- finding solutions
- interpersonal relationships
- communication skills
- understanding natural communities

- human reliance on the natural world

KNOWLEDGE OF OUR BIOREGION

- soils, rocks & water
- insects, birds, plants & mammals
- seasonal cycles
- harvest & forage cycles, food storage
- limits to the natural resources
- fragile & less fragile areas

- cultures, social & economic patterns
- energy, matter, flow & change
- carrying capacity (land & water)

GLOBAL UNDERSTANDING

- the interconnectedness of life, oceans, water, land & air
- systems of life
- sun/moon cycles, geologic time

- sun = energy = life
- Gaia - living earth
- global issues & concerns
- developed & developing world

Appendix 13 - Discovery Bay Teacher's Job Description

Teachers are expected:

- To design, create and maintain an environment in which students learn about what interests them, and to help them place this in a bioregional context.

- To help students learn how to learn and be self-directed.

- To develop and lead workshops and educational activities designed to help students learn the outcomes from the B.C. Curriculum and our own Bioregional Curriculum; and to ensure that the B.C. Curriculum is taught within a bioregional context.

- To contribute to the development of the Bioregional Curriculum.

- To ensure student progress in all curriculum areas, when the student is ready and at the student's own pace.

- To maintain health and safety standards.

- To manage student interactions in accordance with school culture/ethics/policies.

- To interact with parents in a way that supports the school community and the particular student. To provide parents with information both written and oral, about their child's progress and achievements.

- To do basic maintenance of school facilities, i.e. cleanup after workshops and activities.

- To provide peer supervision for other teachers.

- To supervise students during free time, lunch, etc.

To ensure that student records are up to date, complete and reflect the progress of the

student at school. (Discovery Bay School Website,

http://victoria.tc.ca/~yj383/oakandorca.html)

As the school was advertising for a new full-time teacher it also identified the ideal

candidate for these positions will possess:

- Elementary teaching degree and experience with 4 – 12 year olds

- Respectful attitude towards children

- Understanding of open, self-directed, wholistic learning and mentoring

- Understanding of bioregionalism and why it's important

- Respect for the importance of practical ecological literacy

- Administrative, clerical and organizational abilities

- Excellent cooperative and communication skills

- Initiative and enthusiasm

- Willingness to be mentored in the philosophy of the school

- Ability to create and maintain a safe, engaging learning environment

- Ability to teach B.C. Curriculum within a bioregional context, to a multi-aged group

- Strong ability as a cyclist, able to pull loads as well as cycle distances

- Skills and knowledge in the following areas would be an asset:

- Creative arts (music, drama, movement, story-telling, visual arts)

- Languages (French, Spanish, Coast Salish)

- First Nations Perspectives

- Swimming, Lifeguarding, Martial arts, Warrior arts

- Wilderness Skills (tracking, awareness, survival)

- Healing arts, Organic farming, Native plants

- Ecopsychology, Ecofeminism, Social Ecology, Deep Ecology

- Nonviolent Communication (NVC), Consensus Decision Making

Appendix 14 - Discovery Bay Child-Directed Learning Model

CHILD-DIRECTED
LEARNING

Science

Writing

Inquire   Question

Mathematics

Communicate   Through a   Conceptualize
Wholistic Approach, Learning
Occurs Naturally and In Context   Concepts

Skills

Reading

Children's
Understand   Natural Curiosity   Gather
and Innate Need to   Information
Learn

Social
Studies

Art

Experiment

Seek New
Perspectives   Understanding
Knowledge

Students Need Not Be Aware
of Traditional Subject
Areas

Express   Problem Solve
Music

Plan   Take Action   Physical
Education

Drama

NATURAL LEARNING

Appendix 15 – Discovery Bay Progress Wheels

Progress Wheel Evaluation
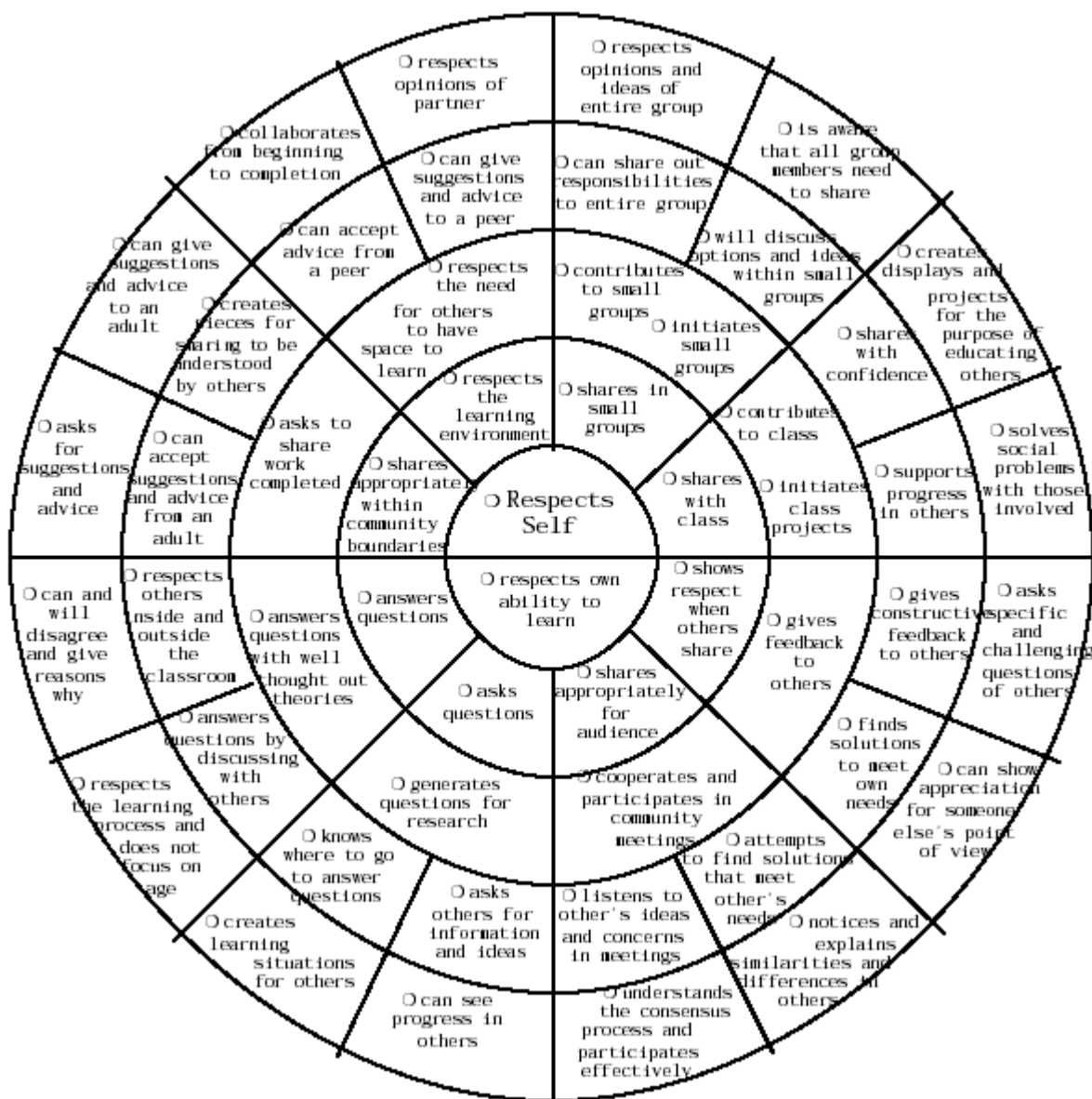## Progress In Independent Skills

Name: _____

Year: _____

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Progress Wheel Evaluation
Progress As A Community Learner

Name: _____

Year: _____

○ Respects Self

○ respects own ability to learn

○ respects opinions of partner

○ respects opinions and ideas of entire group

○ collaborates from beginning to completion

○ is aware that all group members need to share

○ can give suggestions and advice to a peer

○ can share out responsibilities to entire group

○ can give suggestions and advice to an adult

○ can accept advice from a peer

○ respects the need for others to have space to learn

○ contributes to small groups

○ will discuss options and ideas within small groups

○ creates displays and projects for the purpose of educating others

○ creates pieces for sharing to be understood by others

○ respects the learning environment

○ initiates small groups

○ shares with confidence

○ asks for suggestions and advice

○ can accept suggestions and advice from an adult

○ asks to share work completed

○ shares in small groups

○ contributes to class

○ solves social problems with those involved

○ shares appropriately within community boundaries

○ shares with class

○ initiates class projects

○ supports progress in others

○ respects others inside and outside the classroom

○ answers questions

○ shows respect when others share

○ gives constructive feedback to others

○ asks specific and challenging questions of others

○ can and will disagree and give reasons why

○ answers questions with well thought out theories

○ gives feedback to others

○ answers questions by discussing with others

○ asks questions

○ shares appropriately for audience

○ finds solutions to meet own needs

○ can show appreciation for someone else's point of view

○ respects the learning process and does not focus on age

○ generates questions for research

○ cooperates and participates in community meetings

○ attempts to find solutions that meet other's needs

○ knows where to go to answer questions

○ listens to other's ideas and concerns in meetings

○ notices and explains similarities and differences in others

○ creates learning situations for others

○ asks others for information and ideas

○ can see progress in others

○ understands the consensus process and participates effectively

Progress Wheel Evaluation
Progress As A Bioregional & Global Learner

Name: _____

Year: _____

○ understands about gardening, planting & harvesting cycles

○ respects diversity in spirituality

○ understands seasonal cycles and changes over time

○ knows about some issues relating to the developed & developing world

○ geologic time

○ knows how plants grow and what they require

○ respects diversity in cultures

○ understands concepts associated with the cycling of matter

○ knows about water and water cycles

○ knows about geology

○ shows an interest in learning about local first peoples

○ knows about different people and places

○ knows about global climate change

○ understands the concept of carrying capacity

○ shows interest in learning about jobs & careers

○ shows interest in learning about different cultures

○ understands population growth

○ understands the limits of some local natural resources

○ understands concepts associated with the changing of forms

○ shows an interest in learning about local history & heritage

○ knows about soils and soil science

○ enjoys learning about our community

○ respects our community outside the school

○ contributes to class activities

○ shows interest in other peoples' ideas

○ understands how people rely on the natural world

○ understands the concept of energy flow and exchange in systems

○ knows about local birds and their habitats

○ understands about ecosystems and habitats

○ shows interest in learning about local birds & insects

○ enjoys learning about nature

○ looks for connections amongst things

○ studies details in the natural world

○ understands the concept of ecological footprint

○ understands the concept of ecological sustainability

○ knows about local animals and their habitats

○ shows interest in learning about local plants

○ shows interest in learning about local animals

○ knows about the Gaia hypothesis

○ shows appreciation for Gaia as the provider of all life

○ respects and understands the inter-relating of all life

○ demonstrates an awareness of the fragility of some ecosystems

○ cooperates and participates in field studies

○ generates questions for field studies

○ knows about local plants and plant communities

○ knows which local natural areas are fragile & why

○ knows about insects

○ knows about pond life

○ takes notice of changes and issues at the local and global level

○ creates maps

○ understands maps & projections

Appendix 16 – B.C. Prescribed Learning Outcomes

Science Learning Outcomes

<u>Earth and Space Science</u>

Earth and Space is the study of the universe and the structure of the Earth. By using the skills, processes, and attitudes of science, students develop and understanding of the forces, processes, and dynamic life-supporting qualities of the Earth.

It is expected that students will:

K to 1

- Describe the characteristics of rocks, soil, and water
- Classify rocks and soil according to their physical characteristics
- Identify the living and non-living materials found in soil
- Describe the effects of water and wind on rocks and soil
- Describe the properties of air
- Describe the effects of weather on living things
- Identify characteristics of each season
- Infer the relationship Between the position of an object, its shadow, and the sun

Grades 2 to 3

- identify the Earth as part of a system of planets
- describe the unique features of the Earth that sustain life.
- demonstrate how the movements of the Earth cause day, night, and the seasons
- distinguish Between the features of the day and night skies
- construct a model to show that the Earth is composed of many layers

- give examples of how the Earth's surface changes constantly

- classify rocks as sedimentary, igneous, and metamorphic

- demonstrate a knowledge of the composition and formation of soil

- demonstrate an understanding of the factors involved in the composition and formation of rocks (e.g., minerals, temperatures, forces)

Grade 4

- categorize the various uses of water

- outline the importance of water for life

- use the physical properties of water to describe or illustrate the water cycle

- compare and contrast fresh water and salt water environments

- describe human impacts on the Earth's water resources

Grade 5

- identify factors responsible for weather systems both locally and globally

- describe the key features of a variety of weather conditions

- identify and measure the factors that influence local weather

- use instruments to measure local weather conditions

- describe the consequences of extreme weather conditions

- identify the methods of extracting and processing non-living resources

- describe how non-living resources are used in society

- describe the environmental impacts of using non-living resources

Grade 6

- describe the history of piloted and unpiloted flight

- identify the human and technological requirements for space exploration

- list the contributions that space exploration has made to everyday life

- describe Canada's contributions to space exploration

- evaluate piloted space exploration in comparison with unpiloted exploration

- describe the primary features of our solar system

- compare and contrast the conditions that support life on Earth with those on other planets and our moon

- relate the movement of the sun, moon, and Earth to seasons, tides, eclipses, and the phases of the moon

Grade 7

- identify characteristics of known objects outside the solar system

- outline the changes in human understanding of the universe from early times to the present

- illustrate the seasonal position of various constellations

- identify changes that occur to the Earth's surface due to earthquakes and volcanoes

- compare and contrast the geological features found on the ocean floor with those on the surface of the continents

<u>Life Science</u>

Life Sciences the study of the diversity, continuity, interactions, and balance among organisms and their environments. By using the skills, processes, and attitudes of science, students extend their understanding of the living world and their place within it.

It is expected that students will:

K to 1

- describe the characteristics of a variety of plants

- describe the diversity of plants within the home and school environment

- collaborate with others in the care of a plant or animal

- describe the appearance and behaviour of a variety of animals

- determine the requirements of healthy plants and healthy animals

- identify similarities and differences among animal species

- identify the stages in the life cycle of a plant and of a pet or other animal

- demonstrate how plants and other organic material can be recycled back into the environment

- compare the life cycle of an animal hatched from an egg with one born from the mother

Grades 2 to 3

- demonstrate a knowledge of how plants take in water, nutrients, and light

- compare and contrast different types of plant life cycles

- describe structures that enable different plants to survive in different environments

- compare and contrast plant fossils with living organisms

- suggest reasons for the endangerment or extinction of a plant species

- compare and contrast different types of animal life cycles

- compare and contrast plant and animal life cycles

- describe structures that enable animals to survive in different environments

- demonstrate a knowledge of what animals need to survive

- explain how animals interact with one another

- compare and contrast animal fossils with living organisms

- suggest reasons for the endangerment or extinction of an animal species

- describe the basic structure and function of the organs involved in hearing and speech

- relate the nature of sound to hearing

- describe ways to protect their hearing and speech organs from damage

Grade 4

- relate the structure and behaviour of local organisms to their survival in local environments

- discuss how changes in an organism's habitat can affect the survival of individual organisms and entire species

- give examples of how the differences in individuals of the same species may give an advantage in surviving and reproducing

- relate the growth and survival of organisms to a variety of conditions

- describe the basic structure and function of the organs involved in digestion

- compare and contrast the digestive systems of humans and various animals

- describe the basic structure and function of the skeletal and muscular systems

- compare and contrast the skeletal and muscular systems of humans and various animals

- relate the life processes of an organism to its use of nutrients, water, and oxygen

- describe the changing requirements of organisms as they grow

- relate dietary habits and behaviour to an organism's health

Grade 5

- identify living resources in the local environment

- describe how humans use B.C.'s living resources

- describe the known and potential environmental impacts of using B.C.'s living resources

- devise a strategy for sustaining a living resource

- describe the basic structure and function of the organs in the respiratory and circulatory systems

- compare and contrast the respiratory and circulatory systems of humans with those of other animals

- describe the relationship Between the respiratory and circulatory systems

- describe the basic structure and function of the organs in the sensory system

- compare and contrast the sensory systems of humans with those of animals

<u>**Grade 6**</u>

- describe how all living things belong to one of five kingdoms (Plants, Animals, Monera, Protista, Fungi)

- classify plants and animals according to their internal and external features

- develop common classification systems for organisms

- describe all living things as being composed of cells

- identify the characteristics of various single-celled organisms

- describe the similarities and differences in plant and animal cells

- analyze the effects of micro-organisms on other organisms

- describe the human body's various defences against harmful micro-organisms

<u>**Grade 7**</u>

- describe all organisms in terms of their roles as part of interconnected food webs

- describe ways in which species interact with each other

- compare and contrast the major biogeoclimatic zones of B.C.

- determine the limiting factors for local ecosystems

- outline the stages of recovery of a damaged local ecosystem

- compare and contrast asexual and sexual reproduction in both plants and animals

- describe the growth and changes in the development of an organism

- outline factors that influence the length and quality of life

Kindergarten to Grade 1 Social Studies

Grades K-1	
Applications of Social Studies	**It is expected that students will:** • collect information from a variety of sources and experiences • draw simple interpretations from personal experiences, oral sources, and visual representations • identify and clarify a problem • present information using oral, visual, or written representation • identify strategies to address problems
Society and Culture	**It is expected that students will:** • describe differences Between individual needs and wants • describe changes in their lives and their reactions to them • describe some of the purposes of families • describe how families can be similar and different • identify some characteristics of their community
Politics and Law	**It is expected that students will:** • describe their roles, rights, and responsibilities in school • describe purposes and functions of school

	• demonstrate awareness of Canada
Economy and Technology	**It is expected that students will:** • demonstrate understanding of money as a means of exchange • identify different occupations in their community • describe the role of technology in their lives
Environment	**It is expected that students will:** • use picture maps to identify home and school within the community • demonstrate awareness of natural and human-built environments • describe how they interact with different environments • practice responsible behaviour in caring for their immediate environment

Grade 2 to 3 Social Studies

Grades 2-3	
Applications of Social Studies	**It is expected that students will:** • collect and record information from a variety of sources

	and experiences • draw simple interpretations from personal experiences, oral sources, and visual and written representations • identify an issue and provide several reasons to support a position • organize information into sequenced presentations that include a beginning, middle, and end • identify and implement strategies to address class problems or projects
Society and Culture	**It is expected that students will:** • describe ways members of a community meet one another's needs • identify changes in the school and community throughout the year • describe the historical development of various BC communities • demonstrate awareness of British Columbia's and Canada's diverse heritage
Politics and Law	**It is expected that students will:** • explain their roles, rights, and responsibilities within the

	community
	• describe functions of local governments
	• explain the significance of Canada's symbols
Economy and Technology	**It is expected that students will:** • demonstrate understanding of the use and value of money as a means of exchange • describe ways in which communities are interdependent • describe the development of various BC communities in relation to their location and availability of resources • identify contributions of various occupations to BC communities • describe how technology affects individuals and communities • describe the influence of mass media on their choices as consumers
Environment	**It is expected that students will:** • create and interpret simple maps using cardinal directions, symbols, and simple keys • identify and describe major landforms and water bodies in British Columbia and Canada

	• identify and locate British Columbia in Canada, North America, the Pacific region, and the world
	• identify and locate the provinces and territories of Canada
	• describe how physical environment influences human activities
	• demonstrate understanding of their responsibility to local and global environments

Grade 4 Social Studies

Grades 4	
Applications of Social Studies	**It is expected that students will:** • identify and clarify a problem, issue, or inquiry • locate and record information from a variety of sources • identify alternative interpretations from specific historical and contemporary sources • assess at least two perspectives on a problem or an issue • organize information into a presentation with a main idea and supporting details • design and implement strategies to address school problems or projects
Society and Culture	**It is expected that students will:**

	• describe how people's basic needs are met in a variety of cultures • demonstrate understanding of timelines • demonstrate awareness and appreciation of various Aboriginal cultures in Canada • demonstrate understanding of contributions of Aboriginal people to Canadian society
Politics and Law	**It is expected that students will:** • compare the "discovery" and "exploration" of North America from European and Aboriginal peoples' perspectives • describe the structure and functions of the BC provincial government • describe a traditional and a contemporary Aboriginal form of government
Economy and Technology	**It is expected that students will:** • compare bartering to a monetary system of exchange • demonstrate understanding of factors that influenced early European exploration of North America • describe traditional technology used by Aboriginal people

	in Canada • describe technology used in exploration • identify economic and technological exchanges Between explorers and Aboriginal people • evaluate the influence of mass media on stereotyping
Environment	**It is expected that students will:** • locate and map world continents and oceans using simple grids, scales, and legends • demonstrate understanding of Aboriginal people's relationship with the land and natural resources • demonstrate awareness of Aboriginal place names • identify and compare physical environments and cultures of various BC Aboriginal groups • analyse how people interact with their environment, in the past and in the present

Grade 5 Social Studies

Grades 5	
Applications of Social Studies	**It is expected that students will:** • identify and clarify a problem, issue, or inquiry

	• gather and record a body of information from a variety of primary and secondary sources • develop alternative interpretations from varied sources • defend a position on a regional issue in light of alternative perspectives • use an outline to organize information into a coherent presentation • design, implement, and assess strategies to address community problems or projects
Society and Culture	**It is expected that students will:** • demonstrate understanding of Canadian culture • explain ways people preserve and transmit culture • demonstrate appreciation of contributions of Aboriginal peoples, the French, and the British to the development of Canada • demonstrate understanding of why immigrants come to Canada, the challenges they face, and their contributions to Canada
Politics and Law	**It is expected that students will:** • explain citizenship in terms of participation in the

	community, province, country, and world
	• demonstrate understanding of equality and fairness in Canada with respect to the Canadian Charter of Rights and Freedoms, the BC Human Rights Code, and the Ombudsman Act
	• summarize the purposes of municipal, provincial, federal, and Aboriginal governments
	• demonstrate a basic understanding of the Canadian Constitution
	• demonstrate understanding of Canada as a bilingual nation within a multilingual society
	• demonstrate awareness of the history of Aboriginal peoples' rights
Economy and Technology	**It is expected that students will:** • analyse the relationship Between development of communities and their available natural resources • explain how supply and demand are affected by population and the availability of resources • analyse factors that influence use and development of transportation and communications systems in different regions of Canada • analyse the influence of technology on lifestyle and work • analyse how people are influenced by and influence mass

	media messages
Environment	**It is expected that students will:** • use latitude and longitude to locate major political features of Canada, including provinces and territories and their capitals • locate and describe major physical features of Canada using topographic and thematic maps • describe the diverse distribution of natural resources within Canada • demonstrate understanding of sustainability, stewardship, and renewable versus non-renewable natural resources • assess effects of lifestyles and industries on local and global environments

Grade 6 Social Studies

Grades 6	
Applications of Social Studies	**It is expected that students will:** • identify and clarify a problem, issue, or inquiry • research information using print, non-print, and electronic sources • evaluate the credibility and reliability of various sources

	• organize information from a variety of sources into a structured presentation using more than one form of representation • support a position on a national issue by considering competing reasons from various perspectives • design, implement, and assess detailed courses of action to address national problems or issues
Society and Culture	**It is expected that students will:** • describe ways social and economic organizations satisfy needs and wants in a variety of cultures • assess the relationship Between cultures and their environments • describe daily life, work, family structures, and gender roles in Canada and the world • analyse how a society's artistic expression reflects its culture • demonstrate appreciation of contributions of a variety of cultures to Canada and the world
Politics and Law	**It is expected that students will:** • compare individual rights and social responsibilities in

	various cultures • compare systems of government in selected countries • demonstrate understanding of global citizenship • demonstrate awareness of United Nations' human rights initiatives
Economy and Technology	**It is expected that students will:** • describe and compare different economic systems • describe Canada's changing economic relationship with Pacific Rim countries • assess effects of urbanization and technology on lifestyles and environments • evaluate mass media stereotypes of cultural groups or geographic regions
Environment	**It is expected that students will:** • interpret and use graphs, tables, aerial photos, scales, legends, and various types of maps • identify the relationship Between time zones and lines of longitude • locate and describe major geographic features and selected nation states of the world

	• assess settlement patterns and population distribution in selected countries
	• relate population growth and settlement patterns to resource consumption and depletion in selected countries
	• compare use of resources and conservation practices in Canada and other countries

Grade 7 Social Studies

Grades 7	
Applications of Social Studies	**It is expected that students will:**
	• identify and clarify a problem, issue, or inquiry
	• gather and record a body of information from primary archaeological and historical evidence and secondary print, non-print, and electronic sources
	• generate and justify interpretations drawn from primary and secondary sources
	• defend a position on a global issue by considering competing reasons from various perspectives
	• organize information into a formal presentation using several forms of representation
	• design, implement, and assess detailed courses of

	action to address global problems or issues
Society and Culture: **Ancient World Cultures to** **A.D. 500**	**It is expected that students will:** • compare how various cultures meet common needs • demonstrate understanding of events as part of a chronological series • demonstrate understanding of the concept of civilization • describe ways cultures have sought to preserve identity and adapt to change • describe daily life, work, family structures, and gender roles in selected ancient cultures • analyse effects and consequences of contact and conflict Between ancient cultures • identify connections Between current cultures and ancient cultures
Politics and Law: Ancient **World Cultures to A.D. 500**	**It is expected that students will:** • outline the evolution and purpose of rules, laws, and government • compare the concept of the individual in early societies to that of today

	• compare different concepts of membership and citizenship in ancient civilizations
	• compare ways in which ancient governments acquired and used power and authority
	• describe how ancient systems of laws and government have contributed to current Canadian political and legal systems
Economy and Technology: Ancient World Cultures to A.D. 500	**It is expected that students will:**
	• describe various ways ancient peoples exchanged goods and services
	• assess how settlement patterns, economies, and occupations of ancient peoples were influenced by their physical environments
	• assess ways technological innovations enabled ancient peoples to modify their environments, satisfy their needs, and increase exploration and trade
	• demonstrate understanding of the contributions of ancient cultures to science and technology
	• compare ancient and modern communications media

Environment: Ancient World Cultures to A.D. 500	It is expected that students will:
	- construct, interpret, and use graphs, tables, scales, legends, and various types of maps - locate and describe current and historical events - evaluate how ancient cultures were influenced by their environment - analyse ways that people's interactions with their physical environments change over time - evaluate the impact of natural processes and human-induced changes on communities