

*A Critical Stand of My Own:
Complementarity of Responsible
Environmental Sustainability Education
and Quality Thinking*

CAROL SCARFF SEATTER
University of British Columbia

ABSTRACT: This paper examines the teaching of education for environmental sustainability-related programs in higher education and puts forward an argument for embedded critical thinking within all courses that promote action competence and pro-environmental behaviour. Mogensen's four paradigms of critical thought – epistemological, transformative, dialectical, holistic – provide a template to expand the notion of critical thinking as one that is not limited to a higher order, analytical process suitable for a select few individuals. Drawing on diverse research literature in educational philosophy and psychology, as well as environmental sustainability educational theory and practice, an argument is put forward that without embedded critical thinking pedagogy there can be no action competence and without action competence environmental sustainability programs are deficient and powerless. Therefore it is the case that teaching environmental sustainability education without embedded critical thinking is in danger of indoctrinating students.

RESUME: Cet article analyse dans l'enseignement supérieur, la formation des enseignants sur la viabilité de programmes basés sur l'environnement et allègue un argument qui intègre une étude critique dans les cours encourageant une aptitude à agir et un comportement reflétant un respect de l'environnement. Les quatre paradigmes de l'étude critique de Mogensen qui sont épistémologique; transformateur, dialectique et holistique, fournissent un modèle pour élargir la notion d'étude critique comme n'étant pas limitée à l'enseignement supérieur; procédé analytique approprié à quelques particuliers choisis. A l'appui de la littérature scientifique diversifiée dans les domaines de l'enseignement de la psychologie et de la philosophie, ainsi que de la pratique et de la théorie sur la durabilité d'un enseignement fondé sur l'environnement, on met à l'avant un argument qui, sans intégrer

la pédagogie de l'étude critique, peut ne pas comporter de possibilité à agir et, sans possibilité à agir sur la durabilité des programmes fondés sur l'environnement, ces programmes deviennent insuffisants et caducs. Ainsi, la viabilité de l'enseignement basée sur l'environnement sans intégrer d'étude critique, représente un danger; celui d'endocliner les étudiants.

Introduction

Pro-environmental action – individually or collectively – demands a thoughtful articulation of the reason behind the behaviour that lends credence to the cause. This paper addresses the urgent need for thoughtful and articulate individuals involved in environmental and sustainable endeavours and the education that aspires to facilitate knowledge, skills, and attitudes for environmental issues.

A recent e-mail was sent to the faculty and staff at the University of British Columbia (BC). It was sent from the British Columbia Cancer Association and caught the attention of many. The caption in its entirety follows:

The pro-pesticide industry is trying to convince the BC government that cosmetic chemical pesticides are safe. But *we know that* cosmetic chemical pesticides *can contain* toxic chemicals that cause cancer. (italics added)

The health of our children, communities, and natural environment are more important than a weed-free lawn!

Send an email to your MLA in support of strong cosmetic pesticide legislation that would prevent landscaping companies from using chemical pesticides.

Become a Facebook fan of Pesticide Free BC

Upon receiving the bulletin many of my colleagues immediately e-mailed their Member of Legislative Assembly (MLA). They are to be applauded for their prompt and responsible action. However, this message provides a powerful opportunity for critical reflection and a sorting through of what is really at stake. It consists of an emotive communication comprised of provocative images of deadly chemicals, dying children, and smiling landscapers juxtaposed with velvety green frontyard lawns. "Natural" is contrasted with "toxic" and the pro-pesticide industry contrasted with a healthy and natural environment. In order to thoughtfully assess what would be sensible and reasonable to believe or do in this given situation, it is important to think about the kinds of questions to be raised and considered (Case & Daniels, 2002, n.p.) before taking any action. Can the reader guarantee that saying "No" to the

MLA as soon as possible is being "*appropriately* moved by reasons?" [Italics added] (Siegel, 1988, p. 32). In today's climate, the person who hesitates and suspends judgment is often seen to be behaving environmentally *irresponsibly*. Can it really be the case that in the context of environmental debate, the default position for all good citizens should be anti-chemical, anti-industry, anti-development, and anti-government no matter the way things stand?

This paper aspires to begin an affirming and hopeful conversation around education for environmental sustainability endeavours which either support or repress responsible environmental thinking and behaviour in students. The purpose is to connect with those who teach environmental concerns and think about the practice. There are many instructors who are currently delivering courses in a reasonable and discerning fashion, producing worthwhile results. This inquiry involves taking a closer look at what is working well and what is not in environmental sustainability classes; it is intended to provoke critical thinking about constructive, progressive changes that could be made through the consideration of some insights put forward in this paper. Many students completing courses and/or programs about the environment and the accompanying responsibilities are individually inspired about pro-environmental beliefs and actions. There are those who view all environmental concerns as possessing a "one and the same" solution and think and react uncritically. There are those who, despite their strong belief in the need for positive environmental action, see something in the many anti-government protests in the name of the environment that alerts their concern. When observing those engaged in environmental group endeavours they draw back and are reluctant to join in and be identified as one of the group. What is this about and where can instructors begin to tease out the effective elements of their teaching and eliminate all that does not qualify as such?

Education for Environmental Sustainability

This section briefly addresses education that promotes pro-environmental thinking and action and is underpinned by the view that the purpose of learning and knowing is to cope better with one's environment (Roberts, 1996).

In 2002 the United Nations General Assembly adopted a resolution to designate 2005-2014 as the decade for sustainable development. UNESCO, which is the lead agency, seeks to integrate the values, principles and practices of sustainable development into all aspects of

education and learning, in order to address the social, economic, cultural, and environmental problems we face in the 21st century. Education for Sustainability (EfS), now initiated in many countries, is inspired by aims to help people to “develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others now and in the future, and to act upon these decisions” (UNESCO, 2009). Essentially, today’s children need new knowledge and understanding to cope with a changing world affected by unsustainable practices (UNESCO, 2009).

In many countries such as New Zealand and Canada, Education for Sustainability (EfS) has begun to take the place of what was called Environmental Education (EE). Recently, the emphasis in environmental education has involved clarification of understandings related to the “for” approach. Education *for* Environment “promotes ... critical reflection ... lifestyle changes that are more compatible with sustainability” (Lewis, Mansfield, & Baudains, 2008, para. 140, p. 3). It seeks to build capacity for participation (Tilbury & Cooke, 2005). The “for” also stresses the cultivation of environmental values (Gralton, Sinclair, & Purnell, 2004). It aspires to be education that “empowers people and provides learners with skills to take positive action so that current and future generations have a critical thinking understanding of how complex systems, such as environments and ecosystems, economic and socio-political systems, work” (Tilbury & Cooke, 2005, pp. 14-15). In theory at least, there is little difference between Education *for* the Environment and Education *for* Sustainability (Baudains, 2006; Tilbury & Cooke, 2005).

However, this paper is not concerned with the name of the course, class or program. It draws predominantly on higher education courses and programs that reflect a variation of titles throughout major universities, such as Environmental Education (EE), Education for the Environment (EfE), Education for Sustainability (EfS), Environmental Education for Sustainability (EEfS), and alternate versions. The latter title of Environmental Education for Sustainability (EEfS) will be used throughout this paper to reflect education that has as its goal environmental awareness and sustainable problem solving, that fosters the attitudes, knowledge, and understanding required to make informed decisions about taking actions *for* the environment, that is, schooling that promotes sustainable, pro-environmental thinking and action. However, the ideas expressed here apply equally to secondary science courses of study and other higher education courses or programs that

offer an environmental sustainability focus. In short, the concern there relates to those courses in higher education that connect with the following components: ecological literacy (Orr, 1992), ecological identity (Hayes-Conroy & Vanderbeck, 2005), action competence (Jensen & Schnack, 2006), and transformative learning (Sterling, 2001).

The Nature of Critical Thinking

Critical thinking allows one to see, believe, and act differently than when one's thinking is *uncritical*. Globally, educators of all levels extol this *condition* of thinking as highly profitable and worthwhile. Because it is such a valuable capability, websites, seminars, programs, and courses of all styles and affiliations are on offer to furnish answers to the many questions raised about how to become a critical thinker. Many critically thoughtful educators and philosophers have expressed their descriptions and explanations of critical thinking throughout the past decades. Several key ideas from their writings are included here in order to begin to conceptualize what it is that we can say is critical thinking within today's educational conversations and why it is central to effective and reasonable teaching and learning in the context of environmental sustainability education. Quality thinking can be equated with critical thinking not through the lens of a particular process, schema, or recipe but simply as a distinctive, well crafted judgment. This section includes only those who present elements of this position.

Definitions and descriptions of this quality of thinking are offered that vary mostly in the number, rather than nature, of qualities included in being a critical thinker. Elder (2009), in her work entitled, "I Think Critically, Therefore I am," writes that critical thinking "*forms the heart and soul of every subject* because its concepts and principles are presupposed in, and give rise to, the logic of every subject" (p. 1). Embodied within the essence of in-school or out-of-school studies of all disciplines is required a level or quality of thinking that brings the topic to life and resonates with what really matters. This quality is what we name here *critical* thinking; it is critical because it is *fundamental* to the process of knowing and understanding something. Critical thinking is "reasonable, *reflective*, thinking that is aimed at deciding what to believe or what to do" (Ennis, 1987, p. 9). Expanding on this is the working definition that critical thinking accents the "*quality* of thinking required to competently pose and solve problems, reach sound decisions, analyze issues, plan and conduct thoughtful inquiries" (Case & Daniels, 2002, p. 1). Simply said, a person is attempting to think critically when she or he

“thoughtfully seeks to assess what would be sensible or reasonable to believe or do in a given situation” (p. 1). Thinking critically involves reasons, good reasons that is, for making judgments.

Unpacking the big idea – analyze into its components – of critical thinking further, David A. Hunter, at the University of Toronto, in his work, “A Practical Guide to Critical Thinking,” qualifies critical thinking as *reasonable* thinking because of its sensitivity to methods and standards. “Part of what makes critical thinking critical,” he argues, “is that it is governed by rules and methods.” These in turn help one to recognize and identify the good reasons for decision-making and result in reasonable thinking (Hunter, 2009, pp. 1-2). Certain standards or criteria direct the thinker and provide answers about whether or not good reasons inform his or her judgments, beliefs, or actions. That is, critically thoughtful decisions involve using criteria to make reasoned judgments. It is the nature of the relationship between the criteria and the judgment that determines whether or not a conclusion is sound. In the sample sustainability question such as, “Is the spraying of herbicides/pesticides in X-village *justifiable*?” can such a decision be shown to be right or reasonable, that is, is spraying a defensible position? Before reaching a decision about what to believe or what one’s opinion constitutes, it is important to develop criteria and standards for what is a defensible position. For example, one set of standards could be that of safety and effectiveness and in order for such an action to be declared to be just, one needs to draw the connection between the criteria (safe for all and effective) and the action or belief. Once the thinker begins to articulate the criteria that underpins his or her choice, that opinion or belief rests in critical thought.

Siegel (1988) stresses the necessity of utilizing one’s critical thinking skills *on oneself*. The point made here – that critical thinking is most difficult in those situations in which it threatens to challenge one’s self-interest is enormously important and practical. What makes it critical is that bias and assumptions are often missed when they are one’s own and interfere with making sensible and reasonable judgments about what to believe or what to do. Without sorting through one’s tacit beliefs that is, being *uncritical* of one’s ideas, thinking is susceptible to ill-considered and reckless judgments.

The competent critical thinker goes out and “*seeks* reasons on which to base her assessments, judgments and actions” (Siegel, 1988, pp. 32-33). As mentioned above, Paul (1982) points to self improvement as a necessary component of critical thinking and this improvement comes

from "skill in using standards by which one appropriately assesses thinking. It is *self improvement (in thinking)* through *standards* (that assess thinking)" (Paul, as cited in Siegel, 1988, p. 15). Wasserman (2010) supports this view through her description of the *uncritical* thinker who reflects a "lack of confidence in one's own thinking, producing individuals who are uncertain, wary and overly cautious about their ideas" (p. 83). Paul's notion of self-improvement reflects successful outcomes in thought and action and contrasts with Wasserman's juxtaposition of the uncritical mind with its uncertain, careless, and impetuous conclusions. The thinker begins to formulate answers to such questions asked of him as, "What are you thinking?" "On what basis do you hold that opinion or take that course of action?" As a consequence, confidence in one's own judgment begins to form.

Mogensen (1997), one of the Scandinavian educators and philosophers who originated much of environmental education's terms and ideas, writes extensively on the interrelatedness of critical thinking to teaching and learning about environmental sustainability. He too speaks of critical thinking as a way of *qualifying* the ability and will to act individually and collectively. Being critical, he claims, entails reflection and evaluation leading to a reasoned judgment. Critical thought is put forward as an important task of education in general:

An important task of education is to help pupils realize that it is crucial to their lives to be curious, and be able and committed and question things around them, scientific phenomena as well as societal structures and conditions. On a concrete level, this entails asking for reasons why things are the way they are and why others (and oneself) act as they do. In other words, it entails developing the [pupils] as critical thinkers. (Mogenson, 1997, p. 430)

His concept of critical thinking includes four perspectives that sketch a fuller picture of what qualities encompass this kind of thinking. The four include the epistemological, transformative, dialectical and holistic paradigms, each adding a necessary facet of thinking critically and further to educational goals, methods, and strategies. These will be discussed fully in the next section expanding on ways critical thinking can affect student learning about EfES. Without all of these elements, critical thinking as quality thinking fails.

Critical thinking is not a unique type of thinking that is different from other types of thinking. Case and Daniels (2002) describe rational thinking approaches such as problem solving, decision making, and inquiry as "*occasions for critical thinking*" (n.p.). Critical thinking is

simply quality thinking and attempts to associate it with being negative or judgmental prove misleading, since the reference to critical is to distinguish it from *uncritical* (Case & Daniels, 2002); it is not “negative scepticism” (Mogensen, 1997, p. 432) but an affirmative *modus operandi*. In conclusion, critical thinking involves thinking through problematic situations about what to believe or how to act where the thinker uses criteria to make reasoned judgments that embody the qualities of a competent thinker (Case & Daniels, 2002). Critical thinking is attainable for everyone who can think. It is not a quality of thinking that marginalizes most in favour of a select few. Once critical thinking is removed from its hierarchical status and seen as an activity for all students to participate in it is likely that teachers will begin to consciously and purposefully embed critical thinking challenges as part and parcel of their daily curriculum. In summary, to proffer a judgment, envision alternatives, and reach a conclusion in order to take a stand on an issue, the necessary conditions for a quality judgment, conclusion, or position are:

- Be sensible and reasonable within the context of the problem;
- Connect directly to criteria and standards set ahead of time;
- Understand and articulate good reasons for the position; and
- Gain self-improvement in thinking through standards that assess thinking.

Situated critical thinking – within the context of environmental and sustainability learning – entails an understanding of the key dimensions of the curriculum under study. A key to successful environmental sustainability learning is the construct of Action Competence which is discussed below.

Critically Thoughtful Action Competence

A useful way to measure and conceptualize effective pro-environmental beliefs and behaviour is through the construct of *Action Competence*. If an essential result of students taking EfES is taking action, then the kind of action most desirable is Action Competence. Action Competence is simply being able to act in reference to the environment and was conceptualized by the Scandinavians when thinking about the kinds of future citizens who emerge from environmental sustainability education classes. When posed as an educational ideal, the concept becomes something to strive for, that is, being action competent in all areas of one's life. The cultivation of the action competence, however, requires

genuine encounters that provide the necessary insight for students to recognize *what really matters*. In the words of Jensen & Schnack (1994), Action competence encourages learners to engage with the world by:

Asking critical questions such as how, why, where and who, and *engage in "authentic" as opposed to "as if" situations* in which they make decisions about what they want to change and what actions are necessary to bring about change. (1994, n.p.)

This construct involves conscious, committed, and *competent* action and not simply doing *something*.

It is helpful to consider the essentials of such an ideal or standard when evaluating the success of current EfES. Teaching – guiding or coaching – someone to be action competent entails “developing students’ intellectual capacity and motivation to take an active part in finding democratic solutions to environmental problems” (Mogensen & Nielsen, 2001, p. 33). In fact, educators could devise and implement key criteria for action competence in order to assess the success of EfES. A student who exhibits action competence, as evinced in her or his conscious awareness, strong commitment, critical reflection, and democratic responsible actions for the environment, posits the standard. Not only are the actions committed and intentional, “the intentions, motives and reasons all have an intrinsic relation to the actions. So it will be a different action if the intention turns out to be different” (Schnack, as cited in Mogensen & Schnack, 2010, p. 61).

Being appropriately *moved* by good reasons, utilizing critical thinking abilities, is essential for decision-making around environmental issues. While investigating environmental education at all levels of public schools in Denmark for the central elements of action competence in students, Mogensen and Nielsen (2001) speak of “developing and strengthening students’ ability, motivation, and desire to play an active part in *finding* democratic solutions to environmental problems” (p. 33). The key word here is “finding,” a pro-active verb, an indispensable groundwork for making choices and rendering judgments on the best resolution to a conflict of ideas. The concept of action competence is not simply about doing the right thing, or choosing the right course of action, but is connected strongly to the notion of quality thinking resulting in the most defensible critical position on an environmental issue. The critical thinking is part and parcel of flexible and open-minded searching for the best among diverse solutions. Once this is established, the action – being appropriately *moved* by good reasons – becomes, if not easy, straightforward.

One test for action competence is evidence of critical thinking as part of the actions. In order to identify critical thinking in their research study, Mogensen and Nielsen (2001) posed a focus question of particular interest to this study. The first example entailed looking for evidence of students identifying and prioritizing environmental problems (p. 34). The criteria developed for what counts as a crucial environmental issue is utilized as the standard for making judgments among diverse environmental problems. Critical thinking entails student choices supported by good reasons, that is, by the standards/criteria they developed. After such deliberations, the students in this study most frequently chose the problem of pollution as their top concern (p. 34).

Critical thinking challenges depicted by Case and Daniels (2002), described as thinking through problematic situations about what to believe or how to act when the thinker uses criteria to make reasoned judgments, comprise the second focus question put forward by Mogensen and Nielsen (2001). Recognition of the distinction between myth and fact provides the second example considered by the researchers as evidence of critical decision making in environmental debate (p. 34). Flexibility is required here in order to examine assumptions with open-mindedness and consider the possibility that one's belief could be myth. When this comes to environmental concepts such as global warming, deciding what to believe is not as straightforward as one would think, due to conflicting claims of fact and myth. Inherent within quality thinking are the *standards* (Hunter, 2009), *substantiates* (Mogensen, 1997), or *criteria* (Case & Daniels, 2002) developed to underpin and direct a reasonable judgment. Two positions of global warming are presented below as they were retrieved from their websites in May, 2010

Global Warming

Position #1: Environmental Defense Fund (EDF) Website

MYTH: The science of global warming is too uncertain to act on.

FACT: There is no debate among scientists about the basic facts of global warming.

The most respected scientific bodies have stated unequivocally that global warming is occurring, and people are causing it by burning fossil fuels (like coal, oil, and natural gas) and cutting down forests. The United States National Academy of Sciences, which in 2005 the White House called "the gold standard of

objective scientific assessment" issued a joint statement with 10 other National Academies of Science saying "the scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action. It is vital that all nations identify cost-effective steps that they can take now, to contribute to substantial and long-term reduction in net global greenhouse gas emissions" (Joint Statement of Science Academies: Global Response to Climate Change [PDF], 2005)

The only debate in the science community about global warming is about how much and how fast warming will continue as a result of heat-trapping emissions. Scientists have given a clear warning about global warming, and we have more than enough facts to implement solutions right now.

(Retrieved from www.edf.org on May 09, 2010)

Position #2: Earth Day 005 Fact Sheet

MYTH: The science behind the theory that human beings are causing dramatic global warming is sound. CNN, for example, reported that a 2001 National Academy of Sciences report represented "a unanimous decision that global warming is real, is getting worse and is due to man. There is no wiggle room."

FACT: Richard Lindzen, Ph.D., a professor at the Massachusetts Institute of Technology and one of the 11 scientists who prepared the NAS report (and who also contributed to the UN's International Panel on Climate Change), has said so – repeatedly. He has said there were a wide variety of scientific views presented in the report and "that the full report did, [express a wide variety of views] making clear that there is no consensus, unanimous or otherwise, about long-term climate trends and what causes them." The same is true of all of the UN's IPCC studies to which many reporters refer.

(Retrieved from www.nationalcenter.org on May 09, 2010)

Before any lifestyle changes are initiated and a degree of Action Competence achieved, a critical examination of the above positions is the important first step. In order to make a judgment about which of the two positions is closer to a fact it is essential to brainstorm and develop criteria with which to evaluate the two claims. Also, it is important to question what alternate positions are possible as well as the two offered here. What is it that constitutes a defensible claim? Once criteria for a defensible position about global warming are delineated, the thinking task becomes less difficult. In the above example, the development of criteria of what constitutes a "respected scientific body" underpins a critical judgment. One thing for certain is that labels such as scientific and scientist are insufficient to convince or persuade. Furthermore, both positions claim to have enough facts to be very clear about what is true and what is not, adding to the confusion. The credibility of such expert voices as The White House, CNN, National Academies of Science, and the UN's International Panel on Climate Change comes into question. The critical thinker recognizes that judging what is the most defensible scenario demands a thorough sorting. Only once this has been completed and a decision reached can meaningful action follow.

Augmented Concept of Critical Thinking

Educators in higher education are puzzled about how to respond to the emergence of multiple courses and programs in Education for Sustainability and Education for the Environment and the like. There exist multiple perspectives on sustainability, education for sustainable development, and education for sustainability, adding that there are also "multiple perspectives on the way educators *should* interpret these ideas" (Wals & Jickling, 2002). The literature points to three key approaches to make sustainability work. The first focus is one of definitions of sustainability – where they have emerged from and what they can achieve. The second key approach is managerial and based on the premise that once we have enough of the *right kind of knowledge* the planet (and the people who inhabit it) can be managed sustainably. The final approach focuses on sustainability and environmental issues as a discourse with "*on the ground effects* of discourses about sustainability" rather than establishing what it could or should mean in practice (Alvarez & Rogers, 2006, p. 177). A confusion regarding the concept of sustainability education and its interpretations and implications continues. An interpretation of the propositional use of "for" in "Education for Sustainability" or "Education for the Environment,"

prescribes that education must be in favor of some "specific and undisputed product" (Wals & Jickling, 2002, p. 222). As a result, one of the pedagogical challenges is to develop a radical philosophy of education which is critical and takes a controversial point of departure rather than the one of accommodation" (Mogensen, 1997, p. 429). Environmental education deals with the inter-relatedness of issues of social justice and ecological sustainability (Mogensen & Vognsen, 1993, p. 10.1), and action competence is the ultimate associated goal (e.g., Mogensen, 1997; Jensen & Schnack, 1994, 2006). Wals and Jickling delineate "sustainability talk" as having the potential to bring together "different groups in society searching for a common language to discuss environmental issues" (p. 222) prior to taking action. The pedagogical point here is one of creating dissonance where those with different worldviews meet, clash, and begin to construct new ideas. It is the recognition that current beliefs and understandings no longer suffice that provides the stimulus for learning to occur. Sterling affirms that "sustainability issues are deeply challenging problems and only by engaging with complexity can systemic problems be understood" (2001, p. 48). Engagement in "sustainability talk," inside or outside higher education classes and among those with contradictory worldviews, *should* provoke a clash of beliefs and ideas and provoke further discussion. However, sustainability talk "often masks central issues under the false pretense of a shared understanding, set of values and common vision (Wals & Jickling, p. 223), the process labeled a "shallow consensus" (p. 224). Hayes-Conroy and Vanderbeck (2005) and others speak of shaping and steering students through an "understanding" of what is really the case, thus reinforcing the notion of a "shallow consensus." On the other hand, "a possessor of a critical attitude is inclined to seek reasons and evidence; to demand justification; to query and investigate unsubstantiated claims" (Siegel, 1988, p. 39) and instigate a "passionate drive for clarity, accuracy, and fair-mindedness, a fervor for getting to the bottom of things" (Paul, 1982, p. 23). In the words of Wals and Jickling (2002), "critical thought depends on transcendent elements in ordinary language, the words and ideas that reveal assumptions and worldviews, and the tools to mediate differences between contesting value systems" (p. 223). That is, one's identity comes to light through critically thoughtful environmental sustainability thinking. No matter one's beliefs around EfES, whether or not the issues raised, taught, and learned are sustainable or not in the context of higher education – whether or not sustainability is simply a fancy word for environmental improvement and more a luxury than a

need (Nyakuma, 2009) – one cannot ignore that there are diverse viable viewpoints and positions to be considered. Such education is not a template for a prescriptive, narrow, and repressive sustainability code. Students' action competence depends on an openness of spirit, a recognition of close-mindedness. It is not sufficient to take a stand of one's own without understanding and articulating why and on what basis one's position is founded. It is essential that some aspects or views of the content of thought be indicated.

A pedagogy of embedded critical thinking, that is, reflective and evaluative thinking involving a *thinking through* of problematic situations leading to reasoned judgment (Case & Daniels, 2002) is encapsulated in Mogensen's (1997) four-pronged view of critical thinking. Critical thinking can be seen from four perspectives and it is a concept that in its totality encompasses an epistemological, a transformative, a dialectical, and a holistic perspective (p. 432). The section below looks at the four paradigms, each supported through examples of research findings from the literature. The purpose here is to support the notion that critical thought as described and presented in this paper is not limited to a higher order, analytical process, suitable for a select few intellectuals out of touch with the familiar. The concept as situated and portrayed in this paper is particularly suited to teaching and learning environmental and sustainability concepts, values, and action about Nature and the real world.

Epistemological Perspective of Critical Thinking

Mogensen's epistemological element of critical thinking pertains to human understanding through "actively examining and questioning the world" and a subsequent metacognitive reflection (1997, p. 433). Engaged inquiry is juxtaposed with a didactic teaching style – "the transfer of knowledge in an end form" – that seldom leads to understanding (p. 433). Critical thinking is described as an all-encompassing learning experience where critical thinking concerns: "identifying factual as well as normative aspects of a problem; explaining and understanding these aspects in a historical and structural context, and analyzing and assessing them with the aim of *developing visions of possible action strategies*, as appropriate" (p. 433) [*italics added*].

From this perspective, students are engaged in all aspects of their learning from seeking out the pertinent background knowledge to making judgments among viable responsible action alternatives and

even to the extent of envisioning options of one's own. The encouragement to "seek out and talk to those involved ... and listen to their arguments" (Mogenson, 1997 p. 433) resonates with Paul's conviction that "the possessor of a critical attitude ... is inclined to seek reasons and evidence; to demand justification and to query and investigate unsubstantiated claims" (Paul, as cited in Siegel, 1988, p. 40).

A recent research study involves an epistemological shift in teaching for understanding about environmental and sustainability issues and actions and reinforces the epistemological characteristics of critical thinking under discussion. The authors support the importance of teaching methodology in relation to critical and reflective thinking. The research uncovers two shifts: a shift in participating teachers' understanding of sustainability and a subsequent shift in teaching practice. Alvarez and Rogers' (2006) study underpins Mogensen's concerns for enhancing understandings. Barr and Tagg (1995) argue that the shifts involved in this study can be "characterised their most fundamental level as a shift from a teacher-centered approach to a learner-centered one" (Alvarez & Rogers, 2006, p. 177). Fundamental to a learner-centered approach within this study is the element of critical and reflective thought for both the teachers and learners. A more sophisticated discussion around teaching for understanding speaks to the necessity of both strategic and intellectual teaching acts, especially when it comes to learning complex and abstract issues (Scarff Seatter, 2003).

In contrast to teaching environmental sustainability in the classroom setting, the teachers and authors of this inquiry tell a story about how, in teaching about sustainability in rural Victoria, Australia, "they shifted from teaching about sustainability as though it was fixed and definable" – in an end form – to a way that accepted from the outset that it was a contested concept (Alvarez & Rogers, 2006, p. 176). In a sustainability course taught at RMIT University, "Farming the future," teachers took a chance. Rather than holding to the current "sustainability education prescriptive environmental targets," audits, energy, and water efficiency, sustainable design mapped on to the curriculum of various disciplines and fields – they took the students out into regional and rural Victoria to hear from land managers and community members about how they understand sustainability. Teacher/researchers began to see themselves as facilitating a process where learners (both teachers and students in this case) are exposed to

different understandings of sustainability and were able to appreciate the messy and complex reality of sustainability-on-the-ground. They were able to compare the current prescriptive practice challenging assumptions and exposing students to conversations with ordinary people making sense of and attempting to negotiate change in their lives (p. 176).

There was more involved in this experience than hearing the grassroots views of the people. The field-trips were well chosen as students experienced first hand the conflicts that are often part of sustainability environmental projects. The first of many trips to the field was to the Fenton's farm that was extolled as one of Australia's best known examples of conservation farming. The experience of visiting Lanark was a "romantic and visionary one" for the students but they also had to confront the fact that the Fenton's sustainability practices meant that they also lost something: the short term economic viability of their operation. The Fenton's told of a social cost as well, describing disapproval from the local community for their crazy land practices. In another trip, the group visited the Campaspe River and Goulburn Valley region of the State of Victoria (Alvarez & Rogers, 2006, p. 180). Here an eight-year drought and the problem of water rights had decimated the dairy industry in the region and led to a decline in the number of tomato farmers whose industry was struggling to build markets and maintain viability. The dialogue with students included discussions about how to make Australian tomatoes more marketable internationally in the face of aggressive competition from imported products – in short, how to sustain the tomato industry and slow the movement of people out of small communities. As teachers observed their students' response to multiple stories and perspectives, they saw clearly that their original approach – the one-size-fits-all approach to teaching sustainability issues was inadequate and misleading. It is the exposure to alternative perspectives, thinking about making judgments between real life viable alternatives that the teachers, students, and community members experience within these trips that activates the critical thinking element of environmental sustainability education. Student respondents made such comments as, field trips "open up our minds ... [to] look at issues in a different way and not just be 1 in 300 students taking down the same notes in a robotic form" (p. 185) and "I have always known the cut and dry definition of sustainability, but never had the chance to dissect it and understand what it really means" (p. 186). Teachers described their epistemological shift in teaching practice from one of the

investigative to the interpretative approach and write of seeing the value of such engaged experiences with all aspects of actual sustainability problems as opposed to a packaged delivery in the classroom (p. 183).

The second key component of Mogensen's epistemological perspective is the "action dimension" (1997, p. 433). The action is seen as a putting into practice and reinforcing what is learned as well as experiencing first hand the complex multi-layers of environmental issues. Gaining a glimpse of the big picture, "there is a meta-knowledge which is acquired through being personally involved in solving a real-world problem" (p. 433). Three examples from research serve to underpin the connection between engaged practice and quality thinking about real-world sustainability. First is the Lyons Higgs & McMillan (2006) study of four schools' experiences in sustainability education. The impetus for the research is the aim of "sustainability education to teach students to understand and respond to complex environmental, social and economic issues in a way that promotes sustainable living" (Green Schools Initiative, 2006, n.p.). Interestingly, the title of the study is about "teaching through modeling" but this is misleading. What the four schools have put in place is a dynamic learning environment where everyone is modeling participatory action for each other. Sustainability practices are incorporated and shape the entire school community that "models sustainability through its systems and action." Role models are duo-directional with students modeling for teachers as well as teachers modeling for students; students and faculty are the school care-takers, and school governance models social equity with inclusive decision-making which "increases student ownership of their education" (Lyons Higgs & McMillan, 2006, p. 44).

A second study that supports Mogensen's first critical thinking perspective is the work of Louise Chawla (1999). Chawla took up the "significant life experience" theme (Tanner, 1980) and studied environmentalists' sources of commitment to environmental action by asking them to recall significant formative experiences that have led to their involvement (Chawla, 1999). The interviewed voices of young environmentalists and their conceptions of the essential difference in selecting a life path that led to a successful and productive pro-environmental lifestyle, connects with the pedagogy and epistemology of environmental sustainability studies. Her findings alert educators to possibilities for improving practice and the role of critical thinking is implicated as well.

Most frequent among interview responses – when asked for recommendations for effectiveness – were to “know your facts” in one form or another. “Have accurate facts that warrant your concern and that can *stand up against opposition* attempts to discredit you (Chawla, 1999, p. 22) [italics added]. Effective action requires not only identification and documentation of problems but also finding solutions that “depend on knowing the roles and the rules of the game and the influential players ... they need to understand how problems appear from different sides, and weigh the situation, as a foundation for dialogue” (p. 22). That is, you have to be able to look at both sides and weigh the situation or *else people will not take you seriously* (p. 22). Looking closely at the responses of these young effective environmentalists, it appears that it is important for educators to keep in mind that practicing action, which Mogensen proposes, needs to be accompanied with a thorough understanding of what you are doing and why. A good starting point is to encourage students to answer the question, “What makes your position more defensible than the other(s)?”

Third, Arnold, Cohen, and Warner (2009) recently completed a study of youth and environmental action on the East coast of Canada. Drawing on the work of Emmons (1997), positive environmental action is defined as “a deliberate strategy that involves decisions, planning, implementation, and reflection ... to achieve a specific positive environmental outcome (p. 35). It is important to make a critical thinking connection here, however, as they go on to say that educators need be concerned with “motivating individuals to move beyond behavior, which may be the result of habit or avoiding reprimand, to *initiate* action” (Arnold et al., 2009, p. 28). The key point being that critically thoughtful science and environmental teaching encourages students to develop an understanding of why something needs to be done and take action on that basis. Building on Emmons’ stipulated definitions of behavior and action, one can argue that educators are more likely to promote change, rather than perpetuate accepted norms, when youth are involved in choosing and initiating their own actions instead of responding with behavior change to the persuasions of others (Jensen & Schnack, 2006). This study builds on Chawla’s research and involves recruiting youths from multiple organizations, who have initiated environmental action, implementing an in-depth interview approach to deepen understanding of the nature and combination of their influences. The influence of schooling was noted by many of the participants, but not

always in a positive sense. Below, is a quote from “Chrissy” describing her decision to leave school:

The whole environment around me wasn't really my kind of place, and I really feel I learn a lot more from the world than I do from four white walls and a monotone teacher. I wasn't learning the things that I felt I should be learning and that I felt were necessary ... and important ... I knew that there was more for me ... I wanted to get out and *connect with people*. (Arnold, et al., 2009, p. 33)

Chrissy wasn't initiating action of any sort – let alone action competence – although she was aware that something significant was missing in the classes. The transformative perspective of critical thinking, discussed below, sheds further light on this discussion.

The Transformative Perspective

“Teaching must emphasize the interventionist and action perspective by increasing the pupils’ abilities and will to influence and take part in solving future environmental problems. Although what the ‘good’ action is can be an ongoing educational discussion” (Mogensen, 1997, p. 430) and cannot be taken for granted. The transformative component of critical thinking points to changes in the “inner dimensions” – affecting the “will” of the learner – such as attitudes, values, and, therefore, identity. It is the individual who is the target of transformation – the transformation of personal life styles (p. 433). This section addresses the big picture of transformative learning and the key ideas involved in the concept as it is currently understood and relates to critical thinking. The practice of transformative learning will be supported by several key authors and research examples from the field.

David Orr (1992) speaks of a paradigm change that involves one looking at the Earth differently and seeing it in a new way. Paradigmatic shift involves seeing the unfamiliar in the familiar; transformative learning extends to major changes in “thinking, feeling, relating and being” (Bennetts, 2003). The inception of such changes implies a critical awareness of personal assumptions and reworking the basis of personal belief systems (Boehnert, 2010). It follows that transformative learning has to do with gaining a thorough knowledge and understanding about something and believing in it. The transformative part is the believing, taking on something anew. As discussed above, change in thought or action is not induced through transmissive, didactic teaching. Transmitting information about environmental issues does not lead to behaviour change; not only does

it not work, too much environmental information, particularly relating to various environmental global crises, can be disempowering without a “deeper and broader learning process taking place” (Boehnert, 2010). Sustainability educator, Stephen Sterling (2001) addresses this deepening in a four stage learning process in an engagement with sustainability education where stage four relates to a transformative experience as follows:

- No change: (no learning: ignorance, denial, tokenism);
- Accommodation: (1st order learning – adaptation and maintenance);
- Reformation: (2nd order learning – critically reflective adaptation); and,
- Transformation: (3rd order learning – creative re-visioning). (Boehnert, as cited in Sterling, 2001, pp. 19-20)

Mogensen (1997) speaks of going beyond accommodation whereas Sterling supports and extends this view by placing transformation as a “creative re-visioning” so that “transformative learning changes who we are by changing our ability to participate, to belong, and to negotiate meaning” (2001, p. 19). Boehnert (as cited in Sterling) writes that transformative learning “happens when learners participate in a social learning process and values and assumptions are evaluated for their effectiveness towards shared goals” (pp. 19-20). Transformational learning occurs when something happens that makes a difference and one feels oneself as part of the difference. It becomes tricky to tease out the transformative learning from the environmental action as one unfolds from the other. Numerous models have been constructed to facilitate transformative learning such as Christine Bennetts’ (2003) semblance of a problem-solving learning cycle that includes the phases of evaluation of circumstance, assessment of learning need, and adaptation of the present pattern of life required to achieve the new goal. The New Zealand EnviroSchools’ four step Action Learning Cycle immerses students in a local environmental question that stimulates reflection, action and new ideas – the phases of the cycle include: a) identify the current situation, b) explore alternatives, c) take action, and d) reflect on change.

A study on values in education for sustainability, with a focus on a “whole systems thinking” approach has been applied to three mini-projects (Lewis et al., 2008). Researchers investigated six schools that worked together to explore an explicit values education agenda from an environmental education for sustainability perspective. The values

embedded were social, civic, and environmental responsibility. The notion of making values explicit through field work – planting native reeds in a nearby lake, creating a community permaculture garden, and conducting a trial for a turtle nesting site – *made explicit the values they were learning*. For example, the students were able to discuss relevant values, actively engage in water quality assessments and take action to care for reeds they planted (pp. 145-146). Of course, no matter what the students take on from such experiences as their values, long term transformation is yet to be determined. Authors write that the challenge to participating schools now is to consider ways to deeply embed values and sustainable practices.

Epistemological and transformative discourses merge in apprehending instructive strategy *for* transformative teaching and learning. Dominant forms of environmental sustainability education “aim mainly to transmit information” (Huckle, 2006, n.p.) and operate with the understanding that what students require for competent activism is knowledge of the environment. Nonetheless, if the aim is to achieve transformative sustainability, fundamental changes and “a broadening of democratic structures that *engage* people in formulating goals needs to be put in place, not just in realising them” (Rathzell & Uzzell, 2009, p. 271). If environmental education aims to support such changes, it needs to be transformative itself, that is, it needs to transform the relationship between learner and teacher. Rather than reproducing the existing dimensions of power, that is, “constituting learners as consumers,” such teaching involves recognizing learners as thinkers and decision-makers, *actors in a transformative process*” (p. 271) [italics added]. Transformational learning should also be emancipatory, freeing the minds of students from a false consciousness about their race, class, gender, or ethnic status and other forms of social repression.¹

Rathzel & Uzzell (2009) address EfES in higher education and advocate a form of “self-reflective transformation” (p. 263). Categories of transformation in terms of strong and weak sustainability beliefs and practice, bring to light the age-old challenge of power dimensions and change. One feature of a genuine encounter of action competence could be that engaging with real problems in a participatory way can be ineffective if the “right and power to decide is still in the hands of others” who may think and act under a different worldview (p. 272). Closed doors – and minds – are integral to environmental sustainability talk and call out for critical thinkers and critical thought.

A Transformative Shift: Anthropocentrism to Eco-centrism

The mandate of EfES includes the promotion of changing values and the transformation to personal environmental identities. The apparent contradiction between opposing worldviews such as anthropocentrism and eco-centrism provides a template for change, that is, students differentiate and select among different views of the environment and its purpose in regards to sustainability beliefs, intentions, and action. The shift in personal worldview exemplifies transformative learning (see, for example, Brackney & McAndrew, 2001) as a goal of environmentally focused education and several research studies call for a *directional* shift away from one paradigm and towards the other (Palmer, 1998). LaTrobe & Acott, 2000; Kowalewski, 2002). Viewing environmental education classrooms through the lens of "ecological identity work" (Thomashow, 1995) that develops students' personal worldviews in relation to nature, one research project investigates the shaping of worldview (Hayes-Conroy & Vanderbeck, 2005). This study of a group of students at a North American university, highlights the tensions observed between students' conformance to a group opinion and their simultaneous desire to stake out a critical, and individual, position (p. 310). Hayes-Conroy & Vanderbeck raise the questions, "But what does it mean to be a knowledgeable, aware and motivated environmentalist?" "What must one do in order to become one?" "How do we teach others to do the same?" (p. 311). Transformation occurs, according to much of the literature, when the student shifts away from anthropocentrism (human-centeredness) towards more eco-centric (earth-centeredness) worldviews. The key point to make here is that studies in environmental sustainability often attempt to measure whether students hold eco-centric or anthropocentric worldviews. This can be justified from a constructivist learning perspective, finding out prior knowledge, beliefs, and attitudes, however, the intent here is often to encourage and shape students to shift from one world view to the other. A desirable transformation presupposes a shift away from the anthropocentric view in favour of eco-centric beliefs and values. Many scales used in various studies are available but only one is included here. The New Environmental paradigm (NEP) scale asks students to rate statements on a scale of 1 (strongly disagree) to 5 (strongly agree), including such statements as:

- We are approaching the limit of the number of people the earth can support;

- The balance of nature is strong enough to cope with the impacts of modern industrial nations; and,
 - Humans are meant to rule over the rest of nature.
- (Stets & Biga, 2003, p. 411)

The students with an eco-centric view, by this method, would agree with the first statement and disagree with the next two. Many researchers have a problem with such assessments because "as students become more sophisticated critical thinkers in regard to environmental issues they may be less likely to provide answers that show a simple acceptance of preconceived notions of what constitutes a pro-environmental attitude" (Hayes-Conroy & Vanderbeck, 2005, p. 312). For some educators the goal of environmental sustainability education seems to be to "steer students to locate themselves within the boundaries of a more or less preformed environmental identity" (p. 313). For example, Morris (2002) sees her work in the higher education classroom as work that is directed towards a particular end, ecocentrism (Hayes-Conroy & Vanderbeck, 2005, p. 313). Many other researchers and educators articulate a similar position, in fact Kowalewski for example, saw his classroom as a "space for students to both critique (and reject) mainstream anthropocentrism and to work towards an acceptance of a deep ecological world view" (Kowalewski, as cited in Hayes-Conroy & Vanderbeck, 2005, p. 313). Many scholars who apply scales such as the NEP, "decided where students should be locating themselves in relation to environmental debates and what sorts of actions should be considered consistent with a pro-environmental position" (p. 314). This kind of transformation may involve a change in worldview, values, and beliefs but lacks the critical element necessary to make it truly transformative learning.

Rather than embracing the two worldviews presented here as an opportunity for a shift in students' thinking and believing about the nature and purpose of the environment, this framework could be utilized in the fostering and shaping of discussion and debate on the assumptions about the nature and purpose of the environment and how these assumptions might influence environmentally sustainable practice (Carew & Mitchell, 2008, p. 111). Also, the literature reveals a lively debate on this particular distinction of world views – anthropocentric and eco-centric – both in regards to a particular preference of environmentalists of one over the other and also whether such subdivisions are the *only means of interpreting* the themes underpinning assumptions (p. 111). However, reflection on such a subdivision would

offer an opportunity for academics and their students to consider what assumptions about the nature and purpose of environment inherent within each worldview that might be embodied or enacted by different actions directed at environmental sustainability (p. 111). As mentioned above, it is well *worth reconsidering* this shift from one subdivision to another as critical transformative learning.

For many students, choosing to study the environment is a step towards identifying themselves as part of a community of like-minded, ecologically concerned individuals, where there was a general understanding of what constitutes a pro-environmental perspective (Hayes-Conroy & Vanderbeck, 2005). Melanie was among many of the respondents in this study who was aware of a "collective understanding of what pro-environmental behaviour looked like." The authors of the study write that it often seemed that critique of these collective understandings was accomplished outside the classroom, rather than within it.

Melanie: Say [the professor] brought up those two terminologies [ecocentric and anthropocentric], you know, and she [says], "what do you guys think?" like not putting a ... value judgment on it or anything. I still know her well enough to know what her opinion is on the issue [and] everyone's going to [respond] "well, eco-centric is much better." Who is going to be that person who raises their hand and says, "oh no, we should be anthropocentric?" [Group laughter] So, a lot of it is also peer pressure. You know, can you imagine [if you said that], everyone would like boo and hiss at you and throw things at you, you know? So, um, well, not really, but you know what I mean. So, um, but I feel like that is some of it too, like, the pressure of it all – being the environmentalist and saying what you are supposed to.

Erica: I think that all my classes have tried to teach, or at least to put out there that both [the terms eco-centric and anthropocentric are] used ... but I think that no matter how much people avoid saying that one is better, *you still get the implied notion of which one is better* according to the class or the professor. There is a general feeling of the class that eco-centric is better. (pp 320-321) [italics added]

More of the interviewees directly and implicitly expressed that an environmental identity is not just about "saying what you are supposed to"; being an environmentalist also entails that you do, and even wear, what you are supposed to. The final interviewee selected here is Gary

who identified what he felt was understood to be pro-environmental and yet was skeptical of such boundaries.

Gary: It's like, the environmental activist – it's a package deal, it's a trendy thing. I have talked to these groups, I am a member of the outing club, I do yoga, but I reject the fact that as soon as you are an environmentalist, everyone you hang out with has a certain set of views, and everyone is like eye to eye on every sort of issue ... I think these *days if you identify with a group it is impossible to be an individual*. (Hayes-Conroy & Vanderbeck, 2005, p. 321) [italics added]

Here are examples of the perceived beliefs and intentions of many instructors of higher education environmental sustainability courses. Gary and many others seemed to have undertaken a transformative learning experience as they comfortably call themselves “environmentalists” but do not like the identity that is attached by many. It is interesting to point out here that even though critical thinking is seen as a necessary component of environmental education, it is named as the *cause of the confusion* of these young university students. It is *because they are critical thinkers* that they are reluctant to join in with many environmental groups and/or endeavours. It is clear from the class descriptions provided that these students are not receiving a curriculum with an embedded critical thinking element – the source of their critical thinking comes from outside, or prior to, such courses.

On the other hand, when critical thinking is embedded with the curriculum the interviewees have quite a distinct response. At the same time as Erika, Melanie, and Gary spoke of their experiences with the tacit understanding of the boundaries of an environmental identity, others spoke of being quite comfortable in their class.

Ellen: Well, I guess that's where I am comfortable [in environmentally oriented classes]. [There are] ideas and thoughts that I have myself, and it's nice to feel like people share those thoughts as well. It is very personal ... you bring to the class your own ideas and, you know, you probably come away with some new formed ideas from other people's opinions, and it's more of expressing yourself and your ideas where economics or math is just set, it's just, there is no room for discussion really. (Hayes-Conroy & Vanderbeck, 2005, p. 319)

Many also simultaneously stated that disagreements in the group were as important as agreements and that “*having an openness to other views was crucial to the success of the class*” (p. 319, italics added). Many

students felt drawn to such courses for the very reason that they were seen as “spaces to debate and negotiate their ecological identities, identities that are as personal as they are intellectual.” Throughout the many interviewees in this study, from numerous university classes, the difference in comfort level seemed to be with the instruction – students were aware when they were given a genuine learning community to explore viable alternative viewpoints and lifestyles. However, they recognized and were alarmed by instruction that spoke about choices and possible worldviews but controlled through tacit intentions and expectations that were understood as a “one-size-fits-all” mold. Without an embedded critical spirit when exploring a contested concept as environmental sustainability both instructors and students are limited to the kind of accommodation learning described above by Sterling and denied transformational learning – a creative-revisioning that offers the opportunity to participate, belong, and negotiate meaning anew. For those academics charged with teaching environmental sustainability this requires “being conscious of and explicit with students about the assumptions that informed the positions on sustainability which the academics have chosen to include in the syllabus” and encouraging students to explore alternative founding assumptions (Carew & Mitchell, 2008, p. 114). In this way *critical thinking is transformative* and without it transformational learning can be *manipulation*.

The Dialectical Perspective

The dialectical perspective is crucial for the condition of critical thinking to occur. Mogensen (1997, p. 434) speaks of two aspects of the dialectical perspective of critical thinking. The first pertains to what Giroux calls the “contextualization of information” (1978), meaning that critical thinking obliges the individual to look at a case from several points of view, to listen to other people’s understanding and treat them responsibly and fairly. As the understanding that knowledge is dependent on latent interests and values of oneself and others is covered elsewhere in this paper, the focus here is on the second meaning of dialectical that Mogensen refers to as:

The dynamic view that progress and development take place by constantly challenging, querying, criticizing and breaking down parts of existing practice with the aim of reconstructing a new and alternative practice which is believed not to contain the deficiencies and errors that can be identified with existing ones. (1997, p. 434)

This dialectic aspect can only be sustained responsibly if the critical thinker has certain predispositions or virtues. Mogensen lists six qualities that critical thinking can develop (p. 434). This section will focus on the virtue of open-mindedness that connects powerfully with other virtues such as courage, humility, and impartiality and together encompass the six qualities.

"If we are to steer a course between being obstinately defensive and wantonly credulous it is important to understand what open-mindedness requires (Hare, 2009). The popular over-simplification that open-mindedness is nothing more than a ready acceptance of new ideas fails to emphasize the careful, critical examination of ideas that serves to keep open mindedness on the strait and narrow. Open-mindedness requires an attempt to reconcile the tension between the conflicting demands of receptiveness toward new ideas and a critical assessment of those ideas. Open-mindedness requires critical thinking, to some measure, otherwise it will collapse into gullibility and credulity" (Hare, 2009, p. 38). This virtue requires the absence of a dogmatic and rigid stance that dismisses reflection and inquiry as pointless on the grounds that absolute certainty is already at hand; it embraces instead the ideal of an unbiased and impartial examination of arguments and evidence regardless of the direction in which such inquiry leads (p. 38). The second point is that the critical thinker clearly ought to be open-minded otherwise evidence that ought to be taken into account will be neglected, or concealed. Moreover, if the critical thinker is someone with the critical spirit – as Siegel (1988) maintains – then open-mindedness is simply required. We would not allow that someone had the critical spirit, a genuinely trying to get at the truth, if they were not open to all the relevant evidence. The virtue of open-mindedness includes two qualities on Mogensen's list: the will to apply consistent criteria of assessment to oneself and others and an awareness of the limits of one's own knowledge (1997, p. 434). Open-mindedness provides no guarantee that inquiry will be successful, since even genuine open-minded reflection can result in error, but the practices associated with open-mindedness (addressing objections, considering new results, trying to falsify our strongest theories, and so on) greatly enhance our prospects of making progress in the direction of truth.

The dialectical element of critical thinking is facilitated by the virtue of courage. Mogensen portrays this quality as having the fortitude to stand up and enter into discussions and debates, that is, a willingness to put oneself and one's ideas on the line (1997, p. 434). When looking

through the lens of open-mindedness, the virtue of another layer of courage emerges, that of intellectual courage to look into matters that might reveal disturbing truths, or evidence that counts against one's own position. The two aspects of courage – one in body and one in mind – require an open-minded critical thinker to be sustainable. It is one thing to take part in a protest march, such as the one in Auckland, New Zealand this year against the government's decision to remove some pristine unspoiled lands from conservation protection; it is another to enter fully into a genuine dialogue with others of similar and opposing views on the topic. Herein is the courage or will to persist despite "great barriers and frustrations" (p. 434). This notion of courage on one level moves beyond the boundaries of open-mindedness in that it can refer to being open to alternative ideas and evidence in its fullness sense, that is, when the learner goes beyond being open to actively seeking out and/or envisioning other possibilities.

The virtues of humility and impartiality encompass the remaining qualities described by Mogensen as: "the ability to empathize, to appreciate other people's ways of thinking as well as an ability to decentre one's own views and see beyond one's own narrow sphere of interest" (1997, p. 434). Truths derived from our best scientific theories, from value judgments we make in controversial cases, and conclusions drawn in complex matters are seen as *provisional*. This maintains an open-mindedness that is closely associated with intellectual humility and epistemic modesty.

The very nature of environmental sustainability as a contested and variable concept (Carew & Mitchell, 2008) connects in a powerful way with the dialectical element of critical thinking put forward by Mogensen and presented above in light of various dispositions and virtues required for its success. Including both factual and value-based components, environmental sustainability presents a challenge for higher education instructors as it "should and does manifest [its various components] in variable ways" (p. 114). Topics of environmental sustainability support a teaching and learning pedagogy aimed at "engaging students' awareness of how and why a diversity of values, viewpoints, and actions might assist them in developing as flexible and creative practitioners" (p. 114). Open-mindedness, humility, and courage are an inherent part of the process.

The Holistic Perspective

The holistic perspective of critical thinking unites feelings and reason, fashioned to reinforce and complement each other. Here Mogensen (1997, p. 434) draws on the work of Scheffler (1977) whose position presents "two human constituents of consciousness develop and support each other reciprocally" (p. 23). Action Competence, as the desired end result of EfES, requires a holistic perspective, "in order to translate intention to act into actual action" (Mogensen, 1997, p. 435). The responsible activist is a holistic critical thinker for "emotion without cognition is blind – cognition without emotions is vacuous" (Scheffler, 1977, p. 172). Persons who do not acknowledge their emotions risk becoming "insipid, purely registering external stimuli, bored and incapable of distinguishing between the significant and the insignificant" (Mogensen, 1997, p. 435). A person incapable of determining what is of consequence and what is not, what counts as evidence and what does not, is seldom moved to action. Emotions are inherently part of oppositional activism, just as they are involved with almost every social action (Jasper, 1998). On the other hand, when emotions are in a state of what psychologists call "high arousal," they have taken over and rational thought has been overcome or suppressed (Scheffler, 1978, p. 2). When emotions take over without reason, action is generally indiscriminate and arbitrary.

In their work entitled, "Emotion and Rationality: The Characterization and Evaluation of Opposition to Renewable Energy Projects," Cass & Walker (2009) examine the factors that lie behind oppositional activism and the role of emotion within. They argue that while emotion has an evident role and a place in activism, "industry actors use this as a characterization to strategically dismiss public concerns as being irrelevant to the sought after 'rationality' of planning processes" (p. 63). That is, actions played out through emotions can be used to identify and define activists as those who *act without reason*. Because feelings or emotions are a central piece in critical thinking and environmental action, it is interesting to look at some of the most probable reasons underpinning emotional oppositional response. Cass and Walker highlight two important aspects from research literature, place attachment and fairness. This is helpful as persons on either side of an issue can be *emotionally opposed* or *emotionally in support* of that issue. The context put forward by Cass and Walker is the United Kingdom government's proposal of wind farm development and at present in New Zealand, it is the government's proposal to mine

conservation lands that is at issue. In both cases the oppositional activism is by the people against a government's project and in both incidents the people's oppositional role has been dismissed on the grounds of an emotional and irrational impetus of action.

Disruption to place-based attachments, identities, meanings, and values are at the crux of emotional responses (Cass & Walker, 2009, p. 63). The events that provoke emotions, such as the announcements of development proposals, have been described as "moral shocks" (Jasper, 1998, p. 409). Reverence for the beauty of the countryside where one lives, a strong bond, and a sense of identity with a place that has been home for many years, or suspicion of technology or corporations in general will increase a person's shock level from such proposals as large wind farm development and mining of conservation lands. Town meetings and protest marches are places where emotion and reason often play out and the balance between the two can determine both the integrity and reception of the position.

Critical thinking is in evidence only when both emotions and reason complement each other. One impetus for strong emotional response is "place identities" and "place attachments" as discussed above. A second common cause of emotional oppositional response to environmental development proposals, for example, is feeling powerless in the face of unfairness and injustice. Feeling unfairly or unjustly treated can precipitate a strong emotional response and this can be in terms of both procedural and distributional injustice (Cass & Walker, 2009, p. 64). The emotional reaction centres on the principle that those affected by a decision have a normative right to be involved in some way in associated decision processes and when citizens feel excluded or neglected as the result of a close-minded, decision-making process the perception of unfairness often leads to emotional responses. Research literature indicates that responses to renewable energy projects, for example, are "situated and multidimensional and also to some degree based on concerns that have a potentially strong emotional basis" (p. 64). Therefore, one should therefore expect emotion to be part of the oppositional actism if not at its very foundation, as it "constitutes a fundamentally legitimate part of what it means to respond, resist and oppose" (p. 64).

It is interesting to note that although evidence of emotional responses are used to strategically discredit and exclude those who are seen to be making them, both opposing and supporting persons being interviewed tended to "contrast their own 'facts' with their antagonists'

'myth'" (Devine-Wright & Devine-Wright, 2006). The defense of both positions include an element of emotion; however, it is often the sense of powerlessness and lack of voice that situates more visual passion on the side of those responding to a proposal, rather than the proposers. Critical thinking aids activists on both sides of environmental sustainability debate through the identifying and documenting of problems, finding solutions that depend on knowing the role and rules of the game and influential players. Critical thinking activists understand how problems appear from different sides as a foundation for dialogue (Chawla, 1999, p. 22). Cass and Walker (2009) speak of a process of "engagement" that brings together interested persons from both sides of the table, prior to any announcement of a development project, that features the "enabling of multi-directional and open dialogue between all parties in which the emotions of public responses are acknowledged and respected as a necessary part of debating what is at stake" (p. 68). Constructive dialogical engagement between conflicting parties recognizes that knowledge is not necessarily all about facts and/or myths but dependent on latent interests and values (Mogensen, 1997, p. 434). Critical thinking that integrates reason and emotion is the only way to navigate through the layers of complexity.

Conclusion

This paper clarifies that the aim of EfES is action competence – purposive, committed, and responsible environmental action. Even to begin to approach this ideal of oppositional activism, critical thinking plays an essential role in the development of students' understanding and ability to act in this way. As action competence is central to effective EfES and critical thinking is at the heart of effective and thoughtful action competence then it is necessary, even crucial in current times, for students to learn to think for themselves. EfES requires embedded critical thinking throughout the curriculum and is "acknowledged, but not always practiced, as one of the key skills within Education for Sustainable Development in Higher Education Institutions" (Dawe, Jucker, & Martin, 2005). Cautious educators encourage "individual academics attempting to infuse concepts of sustainability into ... coursework ... to acknowledge that sustainability is a concept with both factual and value-based components and ... should and does manifest in variable ways" (Carew & Mitchell, 2008, p. 114). Tilley, Marsh, Middlemiss, and Parish (2008) present "critical reflective thinking as a *method for learning about sustainability* as well as being a necessary

skill for practicing professionals" (p. 2) and powerful examples of strategies for the critical engagement are included (pp. 2-4). The TC2 consortium developed by Roland Case and Leroi Daniels (2002), present a compelling pedagogical model of critical thinking that adapts nicely to the higher education classroom, a pedagogical model that embeds critically thoughtful sustainability thinking no matter the challenge.²

All-important is the place of critical thinking in our conceptualizations and in our pedagogy. As articulated throughout this paper, critical thought is NOT limited to a higher order, analytical process suitable for a select few intellectuals at the top of each class. It is this mind-set that in part is responsible for lip service only paid to critical thinking in environmental classes. The lens of Mogensen's four perspectives begins to unpack some of the roles, characteristics, and qualities of the critical thinker and the real world work of environmental activists reveals further what is at stake when it is omitted from teaching, learning, and taking action. Without the epistemological, transformative, dialectical, and holistic components there is no critical thinking. In summary, the dangers of effective environmental sustainability education could be subject to the following without a curriculum infused with critical thinking:

1. Without the epistemological perspective, teaching is uni-directional and transmissive;
2. Without the transformative element, change in values and attitudes is insubstantial and unexamined;
3. Without the dialectical element of critical thinking any progress and development is irresponsible and blind; and,
4. Without the holistic perspective of critical thinking dialogic engagement ceases to exist.

Teaching for thinking involves setting the stage for students to take a critical stance. It embodies a focus and concern for students to seek out reasons, uncover, infuse, and consider carefully the ideas of others. Close-minded individuals – students or teachers – are unable or unwilling to give due regard to reasons that are available for revising their current beliefs. What also seems necessary is a special emotional investment in the truth of some belief that an open mind regarding that belief would threaten; "the belief has become integral to the individual's understanding of who she is and why her life matters so that seriously considering evidence contrary to the belief is threatening to her very identity" (Callan & Arena, 2009, p. 11). So, having an open mind, that is,

being open-minded, involves courage and it is that kind of courage that is vital for future citizens – we need to keep thinking for ourselves, making judgments, and sharing our ideas. If instructors in higher education feel their mandate is exceptional to the point that a default position of a tacit understanding of what is really the right belief or lifestyle is taken, students can be prevented from thinking for themselves.

To teach to accept a set of beliefs uncritically is indoctrination and indoctrination is the opposite of teaching someone to think for oneself. If environmental sustainability studies are taught in a manner where certain ideas are advised and extolled over others, where students are not really part of the decision-making process, it is in danger of becoming a form of indoctrination. A thread that runs through this paper is that of being genuine: through the medium of genuine dialogue, a genuine sense of commitment, genuine encounters of action competence, and a critical spirit – genuinely attempting to get at the truth – instructors are making a difference for their students and their world. Critical thinking can be seen as a key lever in the fight against indoctrination.

NOTES

1. Using realistic case studies, Gary Fenstermacher and Jonas Soltis (1986) explore the strengths and weaknesses of three approaches to teaching, the executive, facilitator, and liberationist. It is the liberationist approach that views the teacher as liberator of the mind.
2. TC2 at <http://www.tc2.com> is a non-profit organization that works with teachers and university professors internationally on a pedagogical model that is comprised of four prongs: a learning community; Critical Challenges that are lesson plans “tweaked” to ensure students think critically in order to complete the challenge, the tools (background knowledge, criteria for judgment, critical thinking vocabulary, thinking strategies, and habits of mind) and the assessment of the tools. Here is a model that shows great promise for Higher Education classes on all topics.

REFERENCES

- Alvarez, A. & Rogers, J. (2006). Going ‘out there’: Learning about sustainability in place. *International Journal of Sustainability in Higher Education*, 7(2), 176-188.
- Arnold, H, Cohen, F., & Warner, A. (2009). Youth and environmental action: Perspectives of young environmental leaders on their formative influences. *The Journal of Environmental Education*, 40(1), 27-36.

- Balcaen, P. & Scarff Seatter, C. (2009). *Teaching critically thoughtful science*. Paper presented at the Canadian Social Sciences in Education (CSSE) conference at Ottawa, Ontario, Canada.
- Baudains, C. (2006). *What is environmental education?* Paper presented at the EDUC250/450 Environmental Education Seminar, Murdoch University, Perth, Australia.
- Barr, B. & Tagg, J. (1995, Nov./Dec.). A new paradigm for undergraduate education. *Change Magazine*, pp. 13-25.
- Bennetts, C. (2003). The impact of transformational learning on individuals, families and communities. *International Journal of Lifelong Education*, 22(5), 457-480.
- Boehnert, J. (2010). The teach-in: Designing a process for transformative learning. Retrieved April 23, 2010 from <http://www.eco-labs.org>
- Brackney, M. & McAndrew, F. (2001). Ecological worldviews and receptivity to different types of arguments for preserving endangered species. *The Journal of Environmental Education*, 33(1), 17-20.
- Council of Ministers of Education Canada (CMEC). Pan-Canadian Education for Sustainable Environment (ESD) framework for collaboration and action. Retrieved June 16, 2010 from <http://www.cmec.ca/Publications/Lists/Publications/Attachments/222/ESD-collaboration-action.pdf>
- Callan, E. & Arena, D. (2009). Indoctrination. In *The Oxford handbook of Philosophy of Education*. Oxford, UK: Oxford University Press.
- Carew, A. & Mitchell, C. (2008). Teaching sustainability as a contested concept: Capitalizing on variation in engineering educators' conceptions of environmental, social and economic sustainability. *Journal of Cleaner Production*, 16, 105-115.
- Case, R. & Daniels, R. (2002). Introduction to critical thinking. The Critical Thinking Consortium, Richmond. Retrieved February 19, 2010 from [http://www.sd38.bc.ca:8004/~\(TC\)2/](http://www.sd38.bc.ca:8004/~(TC)2/)
- Cass, N. & Walker, G. (2009). Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects. *Emotion, Space and Society*, 2, 62-69.
- Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education*, 31(1), 15-26.
- Dawe, G., Jucker, R., & Martin, S. (2005). *Sustainable development in higher education: Current practice and future developments*. A report for the Higher Education Academy. Retrieved May 14, 2010 from www.heacademy.ac.uk/assets/York/documents/outwork/tla/sustainability
- Devine-Wright, P. & Devine-Wright, H. (2006). Social representations of intermittency and the shaping of public support for wind energy in the UK. *International Journal of Global Energy Issues: Special Issue on Intermittency*, 25(3/4), 243-256.

- Elder, L. (2009). I think critically therefore I am. *The Times Higher Education*. Retrieved February 14, 2010 from <http://www.timeshighereducation.co.uk/story.asp?storyCode=410393§ioncode=26>
- Emmons, K. (1997). Perspectives on environmental action: Reflection and revision through practical experience. *The Journal of Environmental Education*, 29(1), 34-44.
- Ennis, R. (1987). A taxonomy of critical thinking dispositions and abilities. In J. Baron & R. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9-16). New York: Freeman.
- Enviroschools. (2008). *Enviroschools handbook*. The Enviroschools Foundation. Retrieved February 12, 2010 from <http://www.enviroschools.org.nz>
- Fenstermacher, G. & Soltis, J.F. (1986). *Approaches to teaching (Thinking about education series, 4th ed.)*. New York: Teachers College Press.
- Giroux, H. (1978). Writing and critical thinking in the social studies. *Curriculum Inquiry*, 8.
- Gralton, A., Sinclair, M., & Purnell, K. (2004). Changes in attitudes, beliefs and behaviour: A critical review of research into the impacts of environmental education initiatives. *Australian Journal of Environmental Education*, 20(2), 41-52.
- Green Schools Initiative. (2006). *The little green schoolhouse: Thinking big about ecological sustainability, children's environmental health, and K-12 education in the USA*. Retrieved June 1, 2006 from <http://www.greenschools.net/greenschools>
- Hare, W. (1979). *Open-mindedness and education*. Montreal, QC: McGill-Queens University Press.
- Hare, W. (2009). What open-mindedness requires. *Skeptical Inquirer*, 33(1), 36-39.
- Hayes-Conroy, J. & Vanderbeck, R. (2005). Ecological identity work in higher education: Theoretical perspectives and a case study. *Ethics, Place and Environment*, 8(3), 309-329.
- Huckle, J. (2006). *Education for sustainability: Some guidelines for curriculum reform*. Retrieved June 14, 2010 from http://john.huckle.org.uk/publications_downloads.jsp
- Huckle, J. & Stirling, S. (1999). Education for sustainability: An invitation to join a debate. Retrieved April 23, 2010 from http://john.huckle.org.uk/publications_downloads.jsp
- Hunter, D.A. (2009). *A practical guide to critical thinking: Deciding what to do and believe*. New York: John Wiley & Sons.
- Jasper, J. (1998). The emotions of protest: Affective and reactive emotions in and around social movements. *Sociological Forum*, 13(3), 397-424.

- Jensen, B. & Schnack, K. (Eds.). (1994). Action competence as an educational challenge. In B.B. Jensen & K. Schnack, *Action and action competence as key concepts in critical pedagogy* (pp. 87-98). Copenhagen: The Royal Danish School of Educational Studies.
- Jensen, B. & Schnack, K. (2006). The action competence approach in environmental education. *Environmental Education Research*, 12(3-4), 471-486.
- Kowalewski, D. (2002). Teaching deep ecology: A student assessment. *The Journal of Environmental Education*, 33(4), 20-27.
- LaTrobe, H. & Acott, T. (2000). A modified NEP/DSP environmental attitudes scale. *The Journal of Environmental Education*, 32(1), 12-20.
- Lewis, E., Mansfield, C., & Baudains, C. (2008). Getting down and dirty: values in education for sustainability. *Issues in Educational Research*, 18(2), 138-155.
- Lyons Higgs, A. & McMillan, V. (2006). Teaching through modeling: Four schools' experiences in sustainability education. *The Journal of Environmental Education*, 38(1), 39-53.
- Ministry of Education New Zealand. Education for sustainability matrix. Retrieved February 14, 2010 from http://www.minedu.govt.nz/the_Ministry/EducationInNewZealand/DirectoryofEducationalinstitutions.aspx
- Mogensen, F. (1997). Critical thinking: A central element in developing action competence in health and environmental education. *Health Education Research*, 12(4), 429-436.
- Mogensen, F. & Nielsen, K. (2001). Students' knowledge about environmental matters and their belief in their own action possibilities – A Danish study. *The Journal of Environmental Education*, 33(1), 33-35.
- Mogensen, F. & Schnack, K. (2010). The action competence approach and the "new" discourses of education for sustainable development, competence and quality criteria. *Environmental Education Research*, 16(1), 59-74.
- Mogensen, F. & Vognsen, C. (1993). Development of action competence and a case study: The Quark programme. In R. Williams (Ed.), *Diversity within unity – An approach to education for the environment of Europe*. Sussex, UK: University of Sussex.
- Morris, M. (2002). Ecological consciousness and curriculum. *Journal of Curriculum Studies*, 34(5), 571-578.
- Nyakuma, B. (2009). Sustainability: Critically rethinking the status quo. Retrieved February 12, 2010 from <http://www.delta.tu.delft.nl/en/archive/article/sustainability-critically-rethinking-the-status-quo>.
- O'Riordan, T. (1981). Environmentalism and education. *Journal of Geography in Higher Education*, 5(1), 3-17.

- Orr, D. (1992). *Ecological literacy: Education and the transition to a postmodern world*. Albany, NY: SUNY.
- Palmer, J. (1998). *Environmental education in the 21st century: Theory, practice, progress and promise*. London, UK: Routledge.
- Paul, R. (1982). Teaching critical thinking in the "strong" sense: A focus on self-deception, world views, and a dialectical mode of analysis. *Informal Logic Newsletter*, 4(2), 2-7.
- Rathzell, N. & Uzzell, D. (2009). Transformative environmental education: A collective rehearsal for reality. *Environmental Education Research*, 15(3), 263-277.
- Roberts, D.A. (1996). Epistemic authority for teacher knowledge: The potential role of teacher communities – A response to Robert Orton. *Curriculum Inquiry*, 26, 4.
- Scarff Seatter, C. (2003). Constructivist science teaching: Intellectual and strategic teaching acts. *Interchange*, 34(1), 63-87.
- Scheffler, I. (1977). In praise of the cognitive emotions. *Teachers College Record*, 79(2), 171-186.
- Siegel, H. (1988). *Educating reason: Rationality, critical thinking, and education*. London: Routledge.
- Siegel, H. (2009). Open-mindedness, critical thinking and indoctrination, homage to William Hare. *Paideusis*, 18(1), 26-34.
- Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Totnes, UK: Green Books for the Schumacher Society.
- Stets, J. & Biga, C. (2003). Bring identity theory into environmental sociology. *Sociological Theory*, 21(4), 398-423.
- Tanner, T. (1980). Significant life experiences. *The Journal of Environmental Education*, 11(4), 20-24.
- Thomashow, M. (1995). *Ecological identity: Becoming a reflective environmentalist*. Cambridge, MA: MIT Press.
- Tilbury, D. & Cooke, K. (2005). A national review of environmental education and its contribution to sustainability in Australia: Frameworks for sustainability – Key findings. [CD]. Canberra: Australian Government Department of Environment and Heritage and Australian Research Institute in Education for Sustainability.
- Tilley, F., Marsh, C., Middlemiss, L., & Parrish, B. (2008). Critical and reflective thinking: The ability to reflect critically on sustainability challenges. Leeds, UK: University of Leeds.
- UNESCO. (2009). UNESCO world conference on education for sustainable development. Retrieved June 16, 2010 from www.esd-world-conference-2009.org/
- Wals, A. & Jickling, B. (2002). "Sustainability" in higher education: From doublethink and newspeak to critical thinking and meaningful learning. *International Journal of Sustainability in Higher Education*, 3(3), 221-232.

Wassermann, S. (2010). Teaching for thinking redux: A curriculum model for classroom practice. *Phi Delta Kappan*, 91(5), 81-84.

Carol Scarff Seatter is Associate Professor, Faculty of Education, University of British Columbia, Kelowna, BC, Canada. She obtained her PhD at Simon Fraser University, Burnaby, British Columbia in curriculum theory and implementation. Teaching areas include elementary and secondary science, theory, and practice; knowledge and curriculum; principles and practice of curriculum; and research methodologies, all at the graduate level. She also acts as Graduate Coordinator for her faculty. Research interests include higher education, sustainability education, and critical thinking, science and mathematics, and school-mediated education for sustainability and pro-environmental behaviour.

Author's Address:

Faculty of Education
3rd Floor, EME Building
University of British Columbia
3333 University Way
Kelowna, BC
CANADA V1V 1V7
EMAIL: carol.scarff@ubc.ca