Conceptualizing Complexities of Curriculum

Developing a Lexicon for Ecojustice and the Transdisciplinarity of Bodies

DARREN STANLEY
University of Windsor

KELLY YOUNG
Trent University

A Brief Introduction

ECOJUSTICE IS DEFINED as "the condition or principle of being just or equitable with respect to ecological sustainability and protection of the environment, as well as social and economic issues" (Oxford English Dictionary, 2008). The ecojustice education movement began in the mid-twentieth century and has been documented as a framework that can be used in an analysis of the cultural roots of the environmental crisis (Bowers, 2001, 2002, 2007; Kulnieks, Longboat et al., forthcoming; Longboat, Kulnieks et al., 2009; Martusewicz & Edmundson, 2004; Martusewicz, Lupinacci et al., forthcoming; Young, 2005, 2007, 2009). Our interest here is to outline how we frame a discussion of ecojustice education in relation to the embedded complexity and transdisciplinarity of bodies; to begin,we provide an historical overview of ecojustice education later in this paper.

In matters pertaining to ecojustice education, researchers in this area agree that the beginning point involves a recognition of the influence that root metaphors such as individualism, progress, mechanism, patriarchy, etc., have on human to non-human and human to human relationships. In particular, Bowers (2007) articulates the importance of understanding the incredible influence that language has as demonstrated through analyses of the cultural roots of the environmental crisis when he states: "Patterns of thinking are influenced by the root metaphors (interpretative frameworks) that were constituted in the culture's distant past" (p. 12). Beginning with an analysis of language, an ecojustice pedagogy or curriculum involves an etymology of the word "ecology" from the Greek word *oikos* that referred to the "household" which later involved the ways in which "relationships are essential to the well-being of the whole to thinking of the Earth Household of a web of interconnected communities" (Bowers, 2007, p. 3).

To be clear, language becomes central to any discussion of ecojustice. In fact, the ways in which ecojustice teacher educators think about the way we teach language is continually being

questioned. An ecojustice education framework involves reconceptualizing the way we teach about language. Bowers (2007) provides an Ecojustice Education Handbook that articulates how to introduce an ecojustice education framework. In this handbook, he clearly makes connections between the earlier understanding of ecology as "relationships" and continues to elaborate further. For example,, Bowers (2007) writes:

> Ernst Haeckel's (1866) understanding of ecology as the science of relationships between organisms is now being expanded to understanding relationships between humans—and now cultures. The focus on the symbolic characteristics of cultures that influence relationships also takes account of how cultures are nested in a multi-layered and interdependent communities of organisms. (p. 3)

Ecology, then, involves symbolic characteristics—in our case, language (root metaphors) being the most prominent symbolic characteristic used in patterns of human communication. How we make meaning of cultural relationships and communities of organisms involves symbolic characteristics (root metaphors) that carry forward the metaphorical patterns of language that influence how humans experience relationships.

Recognizing and naming root metaphors involves an acknowledgement that words have a history, words illuminate and hide meanings, words influence thinking and cultural practices, and, what is most important, root metaphors are taken-for-granted (Bowers, 2007). By paying attention to root metaphors, we are paying attention to patterns that are part of cultural experience. These patterns can involve a reliance on enlightenment principles that root metaphors rely on, such as highly valuing individualism, consumerism, and progress without considering environmental limits. These metaphors can be compared with root metaphors such as "community" and "tradition" to explore how ideologies rely upon taken-for-granted metaphors. As with an ecojustice education curriculum framework, complexity science recognizes the importance of concepts like relationships, diversity, emergence, self-organization, and a number of other principles that do not typically find their roots in enlightenment principles. Exploring these concepts and the use of root metaphors in an analysis of the embedded complexity and transphenomenality of bodies—physiological, biological, psychological, social, cultural, political and ecological—brings to light the importance and value of considering principles of complexity science as part of an ecojustice educational framework. In so doing, we are drawing upon a set of complexity-related principles and attending to the place and role of root metaphors to conceptualize curriculum dynamically—one that involves peeling back the layers of language that influence social and ecological relationships across many scales (Bowers, 2007).

Such an approach to ecojustice offers a framework that transcends the "narrow scope of disciplinary world views, metaphorically encompassing the several parts of materials handled separately by specialized disciplines" (Klein, 1990, p. 66). To be sure, this is a transdisciplinary approach to ecojustice and would serve to identify any possible "gaps" between the "real" and the "imagined" world in an effort to bring about a greater comprehensive view of and vision for ecojustice. To do so requires the building of a common or shared vocabulary, a transdisciplinary lexicon.

Embeddedness and the Transphenomenality of the Body

To begin, the world appears as a vast collection of diverse living beings—embedded life-forms and phenomena that emerge across various scales of time and space. We argue that such an incalculable collection of "bodies," usually thought of and categorized in terms of particular disciplinary objects, might be usefully conceived of in terms of certain principles that, in spite of a diversity of organizational substances, give rise to a self-similarity in organizational structures. Such a viewpoint, in fact, resonates with physicist Abdus Salam's assertion that "nature is not economical of structure—only of principles" (Kelso & Engstrøm, 2006, p. 15).

Traditional views of life, death, health, and illness suggest that a body is an object that fills a particular, well-defined space not occupied by any other body. Further, a body is thought to be like a container—distinguishable and discernable from all other bodies. As such, in matters of health, the origin and location of some illness, toxin, or cancer within a diseased body, as one might typically experience such things, is rooted in a familiar conceptualization of the body that has long suggested a failure or breakdown of certain "building blocks." Physician Larry Dossey (1982) speaks of this and reminds us that fragmentation and isolation are prominent features of such an historically long, conventional view of health. He continues:

> Bodies, as in the classical view of atoms, stand alone, both in space and in time. Although they form patterns, at heart they are single units in a deep, fundamental sense. Connectedness is seen only in terms of interaction of quintessentially separate bits and pieces. (p. 141)

Our concern here is for the living; moreover, the notion that life is a property of various isolated and isolatable bodies does not fit well with a complexity theory view which stresses the concept of "emergence," a property of all living things across the entire universe, which suggests that all forms of life are, out of necessity, connected with and to one another and arise through a multiplicity of interactions. That is, emergence is "the arising of novel and coherent structures, patterns and properties during the process of self-organization in complex systems" (Goldstein, 1999). As such, we posit that there has been a certain degree of inattentiveness to the notions of collectivity and connectivity, notions that are required to understand the usually invisible relations that bring forth a greater, coherent healthier world.

A Complexity Science Perspective: A View of Dynamical Phenomena

In recent decades, scholars, researchers, and practitioners from a number of different disciplines have come to think about a range of different living phenomena in ways that resonate with conceptual ideas associated with the emerging field of complexity science. As a framework for thinking about a wide variety of disciplinary concerns and matters from the natural sciences to the social sciences, complexity science has come to be recognized for its understanding of dynamical patterns and processes. In fact, the relatively new field has proven helpful for thinking about the world as a vast entanglement of "living bodies"—physiological subsystems, various species and biological beings, social collectives, political and governance structures, cultural bodies of knowledge, and the larger ecosphere.

In the mid-to-late 20th century, a shift in the ways that some researchers and scholars thought about dynamical systems arose from a realization that there are different kinds of dynamical phenomena. Warren Weaver, cyberneticist and information theorist, was one of the first prominent scientists to question and formally address differences in dynamical patterns. In a tremendously influential paper (even to this day), Weaver (1948) outlined three different dynamical phenomena which he termed "simple," "disorganized complexity," and "organized complexity." These three different kinds of dynamic phenomena call for different interpretive and descriptive frames.

A "simple" system, as described by Weaver (1948), was thought of and discussed in terms of small numbers of independent parts or variables that determined the system: examples of simple systems include single-body projectiles, planetary orbits, and generally many mechanical systems where the parts and the interactions of those parts are well-defined, resulting in predictable outcomes.

Certainly, the analytical tools available to early thinkers like Newton and Galileo proved to be sufficient to understand and model simple systems. That said, scientists and mathematicians eventually encountered or created more complicated systems, systems that Weaver (1948) described as "disorganized", where the number of interacting parts or variables used to understand or model the system was increased—sometimes only slightly. As more complicated systems were considered, especially during the 19th century, the need for other tools became necessary and, thus, new analytic tools and statistical instruments were invented and introduced. Whereas earlier tools were appropriate for describing the dynamics of simple systems, statistical tools helped to create pictures of *global* systemic behaviours.

The problem is that there are other kinds of phenomena that stretch across a wide range of organizational structure that are not examples of disorganized complexity, but are what Weaver (1948) originally described as "organized complexity." These include physiological systems, various social collectivities, and cultural and ecological phenomena. Such "complex" systems, like classrooms or the workplace, the nervous system or traffic jams, do not easily "surrender" to the analytic tools that were originally designed to interpret chance events or various statistical distributions. In fact, the notion of complex systems marked an important realization that certain systems are volatile and unpredictable because they have a capacity to change and adapt.

Portraits and Principles of Complex Systems

Whereas traditional reductionism seeks to find some underlying commonality in the diversity of shared substances, a complexity science perspective seeks to find common features and principles in terms of certain shared aspects of organizations (Laszlo, 1972, p. 19–20). Here, we briefly consider the importance of certain principles like diversity, redundancy, local interactions and the "natural geometry" of fractals, and we start with "fractal."

Technically speaking, many complex-related processes and patterns can be described as "fractal," a termed invented by Benoit Mandelbrot (1982) to describe the "natural geometry" of a wide range of living phenomena. The natural world, in fact, is full of these beautiful irregular structures that are temporally and/or spatially fractal and that are known for their "self-similarity." In other words, when viewed across various scales, the different structures resemble one another—like the airways in a lung with its bronchi, various bronchioles, and alveoli—where there are always details at all scales of the organization connected to one another (Stanley,

2006). Furthermore, such bodies emerge through local self-organizing collective action, the manner in which the system is said to "bootstrap" itself into existence (Davis & Sumara, 2006), giving rise to larger coherent patterns.

To be sure, complex systems arise from collective action and, in the words of Davis and Sumara (2006), "develop capacities that exceed the possibilities of the same group of agents if they were to work independently" (p. 81). But, even more, certain principles are required for this kind of coherent action to arise in healthy ways. This is not to suggest that one might know in advance what conditions are necessary for some particular outcome; rather, at best, ensuring the presence of certain principles under particular conditions is the only way of ensuring the "as-yet imagined" as opposed to "perpetuating entrenched habits of interpretation" (Davis & Sumara, p. 135).

In general, no principle can exist in an extreme sense if the system is to remain healthy. That is, we must find "just enough" diversity and "just enough" redundancy, and so on, for the system to maintain its coherence. "Leveraging" just the right amount of each principle cannot be done, but, at best, must be assumed to be present. Diversity, for example, cannot be "assigned or legislated" (Davis & Sumara, 2006, p. 138). And while some systems may appear to be rather homogeneous in nature, there seldom is no diversity present. Rather, there is diversity in the parts and their localized interactions distributed across the system. Where there is sufficient diversity, the contour of what is possible defines, and yet limits, the system.

The principle of diversity has a natural complementary principle: redundancy. Generally speaking, the notion of redundancy is seen as an extraneous aspect of some system that must be limited or even eliminated as they contribute to inefficiencies. Perhaps appropriate for more mechanically-oriented structures, reducing the redundancies too much in complex systems, or even eliminating them, renders the system highly liable to breaking up or falling apart in times of crisis. The difference here between eliminating redundancy and ensuring just enough makes sense in terms of the difference between mechanical systems (that operate in terms of optimum efficiency) and complex organic systems (that obey a logic of adequacy) (Davis & Sumara, 2006). Redundancy, in fact, is what allows a healthy living system to adapt in times of stress or dis-ease.

Finally, in terms of localized interactions, the distributed actions of the system suggest that any notions of leadership and governance in the system cannot be found or attributed to any single entity in the system. To be sure, in many social organizations, there are formal positions of leadership that (supposedly) direct the actions of those "below" them in the interests of the larger system. However, such a notion is problematic because most living systems have no such characteristic—no single leader, authoritarian figure, director or dictator. It is, rather, a shared "vision" or "direction" or "value(s)" that directs the whole, but never with some linear well-defined sensibility or "upward" progression. We respond to a concern about power relations as an imbalance of distributed or shared leadership; where there is a single authoritarian figure there is always an imbalance of power. Hence, where there is shared leadership or distributed leadership a greater balance is achieved in terms of the creative dynamics of organizations.

Healthy Organizations: An Ecojustice Orientation

In organizations that are not "complex," the sum of all of the parts produces a complete "thing" that can be taken apart and put back together to its original form where the various parts

are connected and interact with one another in precise ways. Although the parts may be connected in precise ways, there need not be any "relationships" among the various parts. Relationships, however, as in human relationships, suggest something more than the mere interactions of agents or parts in a system. Relationships are the organizing principle for the world (Lewin & Regine, 2001, p. 7): a world of respectful, healthy relationships, something strongly aligned with an ecojustice view of the world.

The relatively recent development of the field of ecojustice education is deeply informed by the work of Gregory Bateson (1972), as well as scholars who were subsequently influenced by his work. For example, Bowers and Martusewicz (2004) drew upon Bateson's understanding and recognition of the importance of mutual interactions between cultural and natural systems in conceptualizing a framework for a cultural analysis of the roots of the environmental and social crisis (Bowers, 1993; Leopold, 1948; Polyani, 2001; Sale, 1995; Snyder, 1990).

According to the Oxford English Dictionary, the term "ecojustice" appears in print as early as 1973. *Eco*, the root of the word *ecology*, derives from the Greek *oikos*, meaning "household" and involves the study of relationships. Resonant with ecology, justice, health, and pedagogy, ecojustice aims to understand how cultural degradation and the ecological crisis might be informed through some measure of interdisciplinarity. For instance, social linguistics, sociology of knowledge, deep ecology, ecofeminism, and Indigenous studies offer an examination of the ways in which deeply embedded cultural roots of the environmental crisis inform ecojustice. These disciplines offer a framework to: (a) explore the ways in which language informs ways of knowing and being in terms of how metaphor plays a major role in human relationships with natural and reconstructed environments (Abram, 1996; Bateson, 1972; Bowers, 2006; Bringhurst, 2006; Lakoff & Johnson, 1980); (b) provide a critique of scientism and technology in terms of their powerful hegemonic role in the way knowledge is conceived and reproduced in Western culture (Berry, 2002; Illich, 1970; Mander, 1991; Merchant, 1980; Sachs, 2001); (c) consider the importance of oral traditions, often ignored in social justice frameworks, within diverse cultural commons (Apffel-Marglin & PRATEC, 1998; Basso, 1996; Cajete, 1994); (d) explore issues of environmental racism and provide a feminist perspective about the future of the Earth (Griffin, 1995; Plumwood, 1994; Taylor, 1997; Warren, 1997); and (e) provide a commentary on Western notions such as "progress" in relation to local and global communities to reflect the historical, cultural, philosophical, linguistic, political, economic and educational roots of the ecological crisis (Bowers, 2001, 2005, 2006; Bowers & Apffel-Marglin, 2004).

The development of the field continues to grow through annual conference and retreat opportunities.The *ecojusticeeducation.org* website is dedicated to hosting the *EcoJustice Review: Educating for the Commons* journal, and, in 2007, a section of Division B, Curriculum Studies, titled "Ecological and Community Perspectives" was introduced. Ecojustice educators can be found across North America in colleges, universities, in foundational areas, as well as in science and English/Language Arts curriculum methods courses.

In addition to understanding the cultural roots of the environmental crisis, we note that an enlarged transdisciplinary perspective opens up a greater view of ecojustice, one informed, for instance, by complexity science and health. To this end, we examine the confluence of some shared ideas and concepts that span the seemingly isolatable and isolating stance of any one discipline. Put differently, we seek to identify and use a shared vocabulary and other grounded root metaphors and images that might prompt a more holistic, organic, healthy, sustainable view of the world.

Identifying Some Aspects of a Shared View and Language: Returning to the "Body"

Through an ecojustice framework, the ways in which "the body" has been conceptualized through a Western lens as autonomous and isolated is explored, deconstructed, and reconceived. For example, Shepard (1982) suggests that:

> We are reminded with painful regularity of our continuing sense of dislocation, the neuroses of personal identity problems, the terror of loneliness in the crowd, of isolation both from society and from the rest of nature. These anxieties are linked to doubts about the purpose of life, even of order in the creation. (p. 26)

Our bodies are, as Shepard notes, "dislocated" and "isolated" not only from other human bodies but also from the natural world. Everyday examples announce such notions and can be seen in a usually taken for granted notion of independence rather than interdependence, expressions such as "self-sufficiency is vitally important," "do not borrow from anyone as it reveals a weakness," "strong people do not rely on anyone," and "family is best experienced 5000 miles away." There is a theme here that is reproduced that somehow suggests that "the body" does not need human or non-human interaction to survive and even strive to be healthy. Other examples include asking children where food comes from. A typical response is that, "food comes from the grocery store." Children, particularly those who are educated in urban settings, are unaware of the body's connection to food that traditionally (prior to globalization) has been through locally grown foods.

From an ecojustice perspective, a local model of food is holistic in nature and includes the importance of considering how earlier assumptions and worldviews are carried forward as part of today's naturalized patterns of thinking and being. A body is part of a social body—a social landscape where cultural assumptions are invisible. In response to an alienated approach to the body, ecojustice education and complexity science posits the body as part of nature. For example, questioning assumptions about the body during the sexual revolution of the sixties involved new understandings about the body enmeshed with old ones. And, because bodies are gendered, have complex histories, and are embedded and experienced in daily life through language and cultural ritual, Griffin (1995) suggests that "like the physical acts which bring sustenance, the needs of the body have become mechanical too, they are no longer numinous sources of knowledge" (p. 57).

Similarly, for Bowers (2003), a Western conceptualization of "the body" can be traced to Johannes Kepler who, involving a mechanistic metaphor, likened the body to a clock. Bowers writes that a "mechanism is a root metaphor that had its roots in the transition from a Medieval to the modern worldview" (p. 2). Further, Bowers (2003) notes that Kepler "used the root metaphor of mechanism to explain the universe as a celestial machine" (p. 2). Ecojustice educators believe that language is central to the cultural ecological analysis of healthy environments since language has a history and reproduces deep cultural assumptions that shape a worldview. With English, a dominant language that reproduces Enlightenment principles that shape certain Western ideologies, elements of language such as mechanistic metaphors need to be explored. It is vital to recognize and name the root metaphor of mechanism to understand the ways in which

the body is not a clock and to develop an ecological consciousness that interprets the body as holistic and embedded in an ecosystem to demystify the self-nature dichotomy.

By making visible the usually invisible assumptions that have previously led to a certain ecological blindness, ecojustice educators develop an attention to ecological concepts by considering where patterns of thought come from. As Bowers (2003) suggests, words suggest certain misconceptions and are carried forward in Western culture. It is inconceivable that an ecological relation to the body can exist without reframing the body through an ecological root metaphor, showing a high regard for transdisciplinary complexities and meaning something broader than merely imagining it as organs, flesh and bones; we take up the notion of the body in a deeper philosophical, cultural and ecological sense.

Since, as we have mentioned, ecojustice seeks to denaturalize root metaphors, the theory of metaphor is useful in an analysis as it includes an exposing of the ways in which language encloses the body mechanistically—that was once conceived of holistically (versus linearly) as embedded in an ecosystem and a social community. The *Oxford English Dictionary* (2008) defines the body as "the material frame of man (and animals)" (p. 241). From the German *Körper*, the body is often associated with a vessel or a trunk of a tree (OED, p. 241). A vessel implies a mechanistic root metaphor, while a trunk of a tree indicates an ecological one. The material frame of a body is organic in nature. This gives rise to the problematic presumption of a Cartesian dualistic notion of a body/mind (and spiritual) split whereby the value of rational beings over experiential knowing became common-place and taken-for-granted in Western educational settings. For Abram (1996),

> The sensuous, breathing body is, as we have seen, a dynamic, ever-unfolding form, more a process than a fixed or unchanging object…Yet the living body can easily assimilate other dynamic or eventful processes, like the unfolding of a story, appropriating each episode or even as a variation of its own unfolding. (p. 120)

Perhaps the most serious obstacle impeding an ecological conceptualization of the body is the notion that the educational system is headed away from, rather than toward, certain ecological fundamentals that enable the development of ecological consciousness of the body as relationally embedded in an ecosystem and mediated through and by language. Examples include ways in which the body is mechanistically conceived in curricula through "product" and "outcomes based" language that positions students as "producers" of manufactured goods rather than focusing on "processes" that foster healthy learning ecologies. A complexity science approach then, as conceived through an ecojustice frame, involves, among other things, a critical repositioning of language to reveal what interferes with and erodes a participatory approach to understanding and cultivating healthy learning organizations.

Developing a Transdisciplinary Vocabulary

By "transdisciplinary," we call attention to *trans,* meaning across or beyond disciplines. For example, a cultural analysis of the roots of the environmental and social crisis includes an approach that moves *across* and *beyond* educational boundaries of institutions into communities in the human, and, as Abram (1996) suggests, the more-than-human world.

Certainly, other root metaphors are at play that give rise to views of healthy or unhealthy organizations. Once again drawing upon the body as our example, root metaphors that frame the body as mechanistic can also be traced to Genesis, in the Bible, whereby, it is taken-for-granted that man (humans) dominates over nature. This assumption, coupled with notions of Enlightenment principles, encourages the idea that humans are objective free thinkers through a privileging of logical abstract thinking over bodily-sensory experience, fueling a hyper-separation between humans/nature and a deeply entrenched discrimination of the natural environment. All of which encouraged an embrace of another root metaphor—*progress*, at the center of a story of Western civilization as "ever-evolving and moving forward," which in turn provided an illusion of growth, development (another taken-for-granted root metaphor), improvement, advancement, etc. Such a framing is anthropocentric (another root metaphor) in nature and creates false hierarchies. These hierarchical root metaphors structure and reinforce linear understandings of the body's mechanistic relationship to the natural world. Above all, these assumptions continue to contribute to anti-ecological habits of mind or what Louv (2008) terms, "nature-deficit disorder" (p. 36).

Principles of complexity science and aspects of ecojustice education have a hermeneutic quality, that is, recognition of the body as interdependent. For example, Heidegger (2004) suggests that "the way in which you and I am, the manner in which we humans *are* on earth, is *buan*, dwelling" (p. 101). The old word *bauen* "also means at the same time to cherish and protect, to preserve and care for…" (Heidegger, 2004, p. 101). Both complexity science and ecojustice education view the body as part of a whole—completely integrated, interdependent and as "dwelling" in a place.

We end here with some consideration of certain complexity-related principles that find some resonance, in particular ways, with the images and metaphors laid out in an ecological reconceptualization of the body—of healthy, dynamically-balanced, sustainable organizations. Specifically, we recognize the importance of certain principles like diversity, redundancy, local interactions and features like self-organization and emergence. Herein, we come to see other ecological views of certain usually-taken-for-granted mechanistic metaphors and views of world. These seemingly dissimilar discourses resonate with one another as they both value diversity of all living things; espouse the importance of conceptualizing the body, social institutions and the non-human world in a non-linear manner through a holistic approach. Both seek to denaturalize root metaphors and recognize emergence, self-organization, coherence and relationships as part of a healthy approach to all living things. For example, Berry (1995) who believes that one's work should be rooted in and responsive to one's place, and environmental activist, Snyder (1990) understand that nature is self-organizing and flourishes from bioregion to bioregion through an appreciation of the importance of a returning to the local. For both disciplines, there exists a deep understanding of the interdependence of a lattice of relationships, connectedness and interdependence of all things.

About the Authors

Darren Stanley is Associate Professor and Associate Dean, Graduate Studies, Research and Continuing Education in the Faculty of Education, University of Windsor. His areas of scholarship address various qualities and characteristics of complex dynamical systems, including

notions like leadership, governance, the importance of diversity, collective learning, and healthy organizations.

Kelly Young is an Associate Professor at Trent University's School of Education where she teaches English Curriculum methods and foundational courses. Her areas of research include literacy, curriculum theorizing and leadership in ecojustice environmental education. She is co-editor of *Approaches to Educational Leadership and Practice* (Smale & Young, Detselig, 2007).

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