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Meaningful Learning: Reconciling the Tensions between Constructivist and Environmentally Sustainable Pedagogy

Nancy Van Kannel-Ray
Western Michigan University

MEANINGFUL LEARNING: RECONCILING THE TENSIONS BETWEEN CONSTRUCTIVIST AND ENVIRONMENTALLY SUSTAINABLE PEDAGOGY

by

Nancy Van Kannel-Ray

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Nancy Van Kannel-Ray, Ph.D.

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Critics of constructivism argue, in many ways correctly, that this approach to education is culturally and environmentally damaging because constructivism may not develop an understanding of the interdependence between the human community and the world in which people live. Advocates for environmentally sustainable pedagogy argue the importance of understanding patterns of thinking that allow communities to live sustainably. The purpose of this study is to resolve the tensions between the two pedagogical frameworks: constructivism and environmental sustainability.

The tensions are resolved in two ways. First, there are forms of constructivism that align in viable ways with the criteria critics argue are necessary for a sustainable environment and which derive from the seminal work of Vygotsky and the sociocultural constructivists. Social constructivism additionally aligns with environmental sustainability since it focuses on the shared experience of a culture and the dialogic nature of inquiry. Second,

emerging from the literature of environmental sustainability are the guiding principles for a new pedagogy of communal constructivism. What separates the emerging process of communal constructivism from sociocultural constructivism and what it gains from environmental sustainability is a moral compass. These guiding principles inform the idea of responsible embeddedness within a system of communities.

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Nancy Van Kannel-Ray

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CHAPTER I

INTRODUCTION

There is a serious concern among educators that the next generation is not going to survive the damage we are doing to the earth, the air, and the water (Bowers, 2003; Hutchinson, 1998; Orr, 1994). Part of that concern involves the ways pedagogical practices have contributed to humanity's involvement in environmental degradation. Since a constructivist framework is one of the most accepted approaches to education (Fensham, 1992), this research will examine constructivist pedagogy and its relationship to environmentally sustainable pedagogy. What is constructivism? What is its intellectual genealogy? What are the patterns of thinking that flow from this theory? Most importantly, does constructivist pedagogy help or hurt environmental sustainability?

According to the literature, constructivism is "the most conspicuous psychological influence on curriculum thinking ...since 1980" (Fensham, 1992, p.801). The National Board for Professional Teaching Standards refers to constructivist tenets in its core propositions. The propositions refer to issues of constructing knowledge, issues of teachers bringing their own knowledge to student learning, and suggestions of utilizing problem-based learning to help students' understanding of content (NBPTS, 2004).

Moreover, there are a growing number of state educational agencies, including New York, California, and Kentucky, that have selected constructivism as the preferred pedagogical method (Brooks and Brooks, 1993). Because of its current popularity, constructivism has "inspired reform at all levels of the educational system" (Simpson, 2002, p. 347).

Although there are various interpretations, constructivism is generally considered a theory of learning which has pedagogical implications in which the student constructs his/her own understanding about life by making meaning of his/her own experiences in relation to his/her current level of learning (Brooks & Brooks, 1993). Moreover, the role of the teacher is to facilitate the process of meaning-making between the student(s) and the curricula and to help correct any misunderstandings (Brundett & Silcox, 2000). At the heart of constructivist theory is the notion of fueling a compassionate connection between the student and the curriculum in order to make learning personally meaningful to the student. "Each individual must construct a personal understanding" of a particular idea by participating in the educational conversation, by direct inquiry, and by making connections between ideas being explored and the individual's personal life experiences (Duckworth, 1996, p. 58).

On the other hand, Bowers (2004) argues that constructivist pedagogy may be culturally and environmentally damaging since it may not help students develop an understanding of the interdependence between the

social world and the environmental world in which people live. In organized and explicit ways, the constructivist perspective may not offer a venue for learning about the complexities of communal relationships and intergenerational social responsibility. In other words, current practices of constructivism may not move the student through larger social layers of relationship between self and family, between self and immediate community, and between self and larger community including the human, ecological, and biological communities of which we are a part (Bowers, 2001). To do that, the personal must be guided toward an understanding of the communal. The idea of the individual responsible only to self and self interest must be transformed to the idea of social responsibility within a context of community. This social responsibility includes an understanding of how we are connected to one another and interconnected to the ecology of the world in which we live, including how what we do and how we live affects that world for the coming generations.

Bess (2003) posits that "we are deeply wired...to form concepts about our surroundings, and then to take action, making tangible adjustments in the reality that confronts us out there, until it conforms more closely with our ideas" (p.282). He argues that this constructivist paradigm, which focuses on the individual rather than community, must be shifted if humanity is going to not only learn about living within the social world interdependently but also sustainably within the environment in order to stem the rising tide of

environmental degradation. This degradation includes eliminating "the production of harmful effluents" such as "greenhouse gases" and "agricultural chemicals" (p. 231). Another way for thinking about environmental issues on the rise include the juxtaposition of such concepts as "refrigerator and ozone hole or automobile and global warming" (p. 233).

In a similar vein, Bowers (2001) argues for an eco-justice pedagogy by discussing the relationship between constructivist patterns of thinking that are implicit in the pedagogy as a link to moral relativism. Such patterns of thinking, Bowers argues, may result in contributing to environmental degradation. For example, Dewey (1959) tends to focus on constructing solutions to problems in the present moment, which is consistent with current constructivist pedagogy. Further, Dewey (1959) has suggested that "true education comes through the stimulation of the child's powers by the demands of the social situations in which he finds himself" (p. 20). Accordingly, "school must represent present life" (Dewey, 1959, p. 2). Therefore, when Dewey (1938) writes about the important questions education should be asking, he considers "How shall the young become acquainted with the past in such a way that the acquaintance is a potent agent in appreciation of the living present? (p. 23). Hence, as Dewey (1938) writes about problem solving, he states "the conditions found in present experience should be used as sources of problems" (p. 79). In contrast, Bowers has suggested considering the consequences of problem solutions four

generations ahead. As one specific example of such an environmental consequence, Bowers (2001) suggested that there is a causal relationship between a global reliance on fossil fuels and--despite the increase in life expectancy-- an increasing number of *premature* deaths in humans due to the diseases exacerbated by environmental degradation. For example, because of "the effects of environmental poisons...cancer in its various forms [including the doubling of testicular cancer] may have increased if researchers who published in the *New England Journal of Medicine* in 1986 have rightly interpreted their data" (Scheffer, 1991, p.89).

Murphy (1994) has argued that constructivism is a pedagogy of personal meaningfulness. As such, a learner's understanding of subject matter is filtered through his/her own personal experiences, cognitive processes, and prior knowledge bases. Using such a personal and cultural base as a filter for making meaning may, in the end, have learners building content scaffolding on interpretations rather than on the existence of facts, in the pragmatist sense (Burningham & Cooper, 1999). In other words, constructivists believe they interact with events occurring in the natural world and, while interacting, develop their own understanding of these events. This understanding is filtered through their personal experience and cultural understandings.

The Importance of Meaningful Learning

Doll (2002) believes that engaging students in meaningful activities is at the heart of many pedagogical theories and supports the idea that students learn best when that learning is personally meaningful to their lives. Cognitive theorists are also clear about the significant role meaning-making plays in the learning process (Caine & Caine, 1990).

Without the creation of an educational environment that addresses learning that is of personal interest to the learner, Sylwester (1995) believes, long term learning is not likely to happen. In this sense learning is defined as "a complex process... consisting of internally constructed understandings of how [one's] world functions" (Brooks & Brooks, 1999, p. viii). In other words, meaningfulness plays a personal and emotional role in the learning process. Emotion is what "drives attention" which is critical for problem solving, thinking, and long-term memory storage (p. 72). Additionally, not only does learning need to be of emotional interest, but it also needs to challenge the student intellectually in a nurturing environment involving a trusting relationship between teacher and student. Following a period of intense learning, the student then needs to have time for reflection in order to give the brain time to integrate the new knowledge into his/her current mental structure (Caine & Caine, 1990; Sylwester, 1997). Personally meaningful learning from a cognitive learning perspective, then, is defined as learning that is of emotional interest to the student, is intellectually

challenging, occurs in a safe educational environment, and allows time for new learning and time for reflection.

"Transformative learning theory" supports the effectiveness of personally meaningful learning (Mezirow, 1998). This theory focuses on the learner being emotionally engaged and intellectually challenged. There is a difference in personally meaningful learning as defined through the perspectives of transformative learning theory and cognitive theory. The way to engage the learner is to facilitate the student making meaning of his/ her experience through a discourse that focuses on critical self reflection. This "involves the critique of a premise upon which the learner has defined a problem" (Mezirow, 1998, p .185). While cognitive theory is concerned with designing environments that primarily trigger emotional responses and tends to be reactive, "transformative theory" is concerned with designing environments that primarily trigger critical self-reflection proactively as part of the transformative process of learning (Caine & Caine, 1990; Mezirow, 1998).

"Gestalt learning" perspective views learning as the ability to have acts of insight. Learning, then, is the opposite of analysis in that it is about creating "meaningful patterns or organized wholes" (Phillips & Soltis, 1998, p. 35). Personally meaningful learning in this sense is defined as the moment of recognition, when the learner has made an intellectual connection among patterns and discerned the whole (Phillips & Soltis, 1998). M.C. Bateson

(1994) describes this type of meaningful learning as a kind of coming home. She states, "each new recognition of pattern, each appropriated skill, could offer a moment of homecoming, building toward an understanding and a capacity to participate in a complex social and biological world" (M.C. Bateson, 1991, p. 24).

Constructivism and Personally Meaningful Learning

Constructivist learning theory includes the idea of personally relevant learning as essential for meaningfulness (Brooks & Brooks, 1999). Each person has a mental construction, a model of how the world operates, and how varying information fits into that model of the world. This construct has been built out of the learner's experiences. It is through this life experience that what-is-being-learned is filtered.

Dewey (1897/1959), one of the foundational theorists from which constructivism evolved, believed that the way education must happen is through finding the interest of the student and then uncovering a strategy or developing an educational environment for capitalizing on that interest. It is important to find what will hook the student into the learning process on a personally meaningful level. As Dewey states, "the child's own instincts and powers furnish the material and give the starting point for all education" (p. 20). Not only did Dewey believe that the child's interests provide the

material for the curriculum, but he also believed that the curriculum should "represent present life" (p. 22).

In order to build a more complete, accurate and complex mental model, according to constructivists, it is important that learning tap into the experiences of the learner in an active, as opposed to passive, learning methodology (Murphy, 1997). To accomplish this, Vygotsky (1935/1978) suggested that students actively engage in their learning. From a constructivist perspective, students' personal experiences become incorporated into their learning experience. Students do not leave their lives outside the classroom door, but rather their life experiences are invited into the classroom (Grumet & Pinar, 1993). Personally meaningful learning is the catalyst for the student to become interested in making connections among the student's life outside of the school, the student's personal interests, and the school curricula. Constructivism utilizes a pattern of thinking whereby the teacher facilitates a connection between the student and content in order to make learning personally meaningful (Brundett & Silcox, 2000). Meaning is then socially constructed. Much of this social interaction, as Vygotsky has suggested, occurs through the use of language, a symbolic and cultural artifact.

Bowers (1993) states that it is language that thinks us, that our thinking is hobbled by the words we use and by the symbolism of language. The symbolic tools of language limit and define how we think. He argues in a

similar way that Kant (1787/1996) argued in *Critique of Reason.* Kant's philosophy noted that the architecture of our brain is a barrier to knowing objective reality and that the way we perceive and interpret information is limited to how our minds work (McInerney, 1992; Kitcher, 1996). Similarly, language is a conduit for exchanging—sometimes in hidden and metaphorical ways-- shared cultural understandings of messages and meanings. Such epistemic patterns of meanings influence thought through, as an example, the use of metaphor. In brief, there is "sensitivity in relationship between language and thought" (Bowers, 1993, p. 122). As an example, implicit in the term *environmental resources* is the metaphor of resources. Resources are things that are there for a person to use. To juxtapose the ecology of the planet with such a term implies that the environment is part of what we can use for whatever purpose we see fit (Bowers, 2003). In such ways, language holds within it the messages about cultural values.

On the other hand, it was Jean Piaget (1967/1971) who stated that "knowledge is essentially construction" (p.362). In *Biology and Knowledge,* he theorized that human intelligence is actually a "bursting" of the kind of instinct that animals demonstrate as they interact with their environments. Piaget believed that learners acquire knowledge by interacting and adapting to the environment.

The following chapter will provide more explanation of Vygotsky, Dewey, and Piaget's theories, all of which are foundational to constructivism, as well as offer an understanding of constructivist pedagogy, how the current discourse has come to be. However, in sum, in the sense of personally meaningful learning, constructivists would use the following descriptors.

Essential Characteristics of Constructivist Pedagogy:

- Emotional interest
- Personally relevant
- Social Process
- Active Learning
- Experiential Learning

Environmental Sustainability

In order to guide the personal toward the communal, how can educators understand pedagogy in terms of environmental sustainability? This question will be addressed in more depth in chapter three; however, to understand environmentally sustainable pedagogy means to understand certain patterns of thinking, which find their genesis in foundational theorists such as Berman and Bateson. The heart of the argument Bateson (1979) presented in *Mind and Nature* addressed the concept of metacommunication. Bateson argued that in metacommunication, for example, the "ideas about nature...are supported by [one's] social systems; conversely, the social system is supported by [one's] ideas of nature...so that we are living in an enormously complex network of mutually supporting presuppositions" (p. 154).

An ecological viewpoint, according to Bateson (1979), Berman (1984), and Bowers (2001), assumes individuals are not isolated and independent, but rather are interdependent. Pedagogy based on this framework would, therefore, tend toward the holistic and toward community, as opposed to Dewey's (1897/1959) assumption that the individual is the basic social unit. Bowers (2001) argues that Dewey's view that "the individual as the basic social unit and thus the center of subjective decision making about what is of immediate interest" is problematic (p. 7). In Dewey's (1933) words, "the child's own instincts and powers furnish the material and give the starting point for all education" (p.20). If pedagogues begin to look at learners' patterns of thinking, the question then is this: how does a change in assumptions about what is the basic social unit—individual or community—influence the learners' patterns of thinking or habits of mind?

If one looks at the descriptors of environmentally sustainable pedagogy, the descriptors might seem antithetical to constructivism. In the sense of meaningful learning, a more environmentally sustainable perspective would use the following descriptors:

Figure 1: Environmentally sustainable versus constructivist pedagogy.

Environmentally Sustainable Pedagogy	**Constructivist Pedagogy**
Connected to communal environmental interests	Connected to personal emotional interests
Relevant to communal interest	Relevant to personal interest

Bowers (2004) believes the two pedagogies cannot be reconciled because of constructivism's focus on personal meaningfulness. Yet, by making explicit their differing points of view, by uncovering some of their underlying intellectual genealogies and epistemologies, there may be intersecting points at which each perspective might be able to inform a more critical use of the other. M.C. Bateson (1991) stated that it is a "model of learning as coming home [that] can inform schooling" (p.24). In this sense she was discussing the need to "build toward an understanding and a capacity to participate in a complex social and biological world" (p.24). Here, she is offering a new metaphor for learning as coming home. Like a child begins life with a self-centered interest in his/her own needs (food, warmth, love), so can teaching begin with personal meaningfulness. Like a child matures into caring for others beyond its own self-interest, so teaching can connect and extend personal meaningfulness to communal and environmental meaningfulness.

The Problem

Although constructivism does address the issue of personal meaningfulness, some critics, including Bowers (2001) and Bess (2003), argue that this pedagogical perspective, if used uncritically, may inadvertently contribute to environmental problems. Constructivists develop solutions to social problems based on interpretations of social issues. Such interpretations are grounded in personalized meaning. The solutions that

derive from this grounding may not consider the impact on future generations or diverse cultures and communities outside of one's personalized meaning-making (Bowers, 2004). By focusing on teaching from the individual's experiences and personal interests, a student's mental models may not move beyond the personal interests and the interests of their particular social group in order to include an understanding of oneself within a larger view of community and within a global and biologically interdependent context. Constructivism overemphasizes the notion of individualism. The historical context of psychological constructivism has emphasized, through Piaget and Vygotsky, an epistemology regarding how an *individual* constructs knowledge within the architecture of his/her cognitive structures and the mediating influences of social communities. Although constructivist patterns of thinking may be mediated by social and cultural influences, the focus is on individual experiences and solutions to problems that derive from an individual perspective rather than a community-centered focus. A community centered point of view would put the complexities of community relationship into primary focus. Thus, constructivist patterns of thinking tend to ignore "an explicit understanding of relationships and processes, an embodied knowledge of community relationships and the ecology of place, and an awareness of the layered nature of the interdependencies of life-sustaining processes" (Bowers, 2001, p. 152).

Constructivist habits of mind can become problematic when trying to resolve issues that call for solutions involving global, community, and intergenerational awareness when the patterns of thinking being taught are based on assumptions of individuality, and solving the present moment problem (Dewey, 1897/1959) without primary consideration of consequences four generations ahead (Bowers, 2001). An intergenerational connection promotes patterns of thinking that ensure a quality of life for present and future generations, which "preserves the best of the past and contributes to the well being of future generations" (Bowers, 2003, p.164). Such a connection helps students to understand that their "ideas, values, and self-identity" are not derived from only personal choice, but rather are "nested in a complex network of relationships and systems" that include the cultures and traditions of the past (p. 167). Further, that we have a responsibility to the future to balance present needs with long standing traditions; otherwise, we might rely on the short sighted needs of the present moment.

Research Questions

Given the current discourse on environmental sustainability, how can constructivism and environmental sustainability inform each other in order to help humanity survive environmental degradations? What part do these pedagogical epistemologies have to play in the destruction or survival of the environment? As has been noted, constructivism and environmentally

sustainable pedagogy both have differing intellectual genealogies. Both have differing epistemic dimensions. Yet, both share a pedagogy of meaningfulness. Constructivism, however, emphasizes personal, individual meaningfulness, while environmentally sustainable pedagogy values communal, environmental meaningfulness. At what points of meaning and of purpose can the two pedagogies intersect?

Connecting Personal to Communal Learning

Teaching for meaningfulness in terms of a more environmentally sustainable constructivist frame can inform a more critical understanding of how to facilitate learning that is both deeply connected to personal interests and interconnected to communal interests. Further, it can inform educational reform that concerns itself with asking questions, building values, and affecting conscience (Orr, 1994). Understanding constructivism, including its limitations, is a step toward practicing this pedagogy with a more critical awareness, which is an initial step toward overcoming its limitations.

Meaningful learning that moves beyond the personal and individual would involve, as Bowers (2001) has stated, making connections to community, strengthening the quality of life intergenerationally, developing an awareness of the ecology of place and the interdependencies of living within community. For the individual, personally meaningful learning,

particularly from a constructivist perspective, may lack communal awareness because of a pedagogical pattern of thinking that overemphasizes the notion of individualism and a lack of intergenerational relationships. Reconciling constructivism with environmental sustainability, a discussion of which is addressed in chapter five, may ameliorate the "enculturating role played by schools (and other institutions) in reproducing ecologically problematic values, attitudes, and behaviors across generations" (Hutchinson, 1998, p. 2). Instead, a reconciled pedagogy could teach an "explicit understanding of relationships and processes, an embodied knowledge of community relationships and the ecology of place, and an awareness of the layered nature of the interdependencies of life-sustaining processes" (Bowers, 2001, p.152). Constructivism, according to Burningham and Cooper (1999), offers the intellectual flexibility to look at current issues, including environmental problems, and construct the problems in ways that focus on solutions to these issues.

Connecting learning by using personally meaningful/relevant experiences and/or interests is a compelling inroad into the student's mental construct and a way for the teacher to guide student thinking. But this is only the beginning. From a constructivist perspective, one is in "a continuous process of creating and transforming meaning" (Gergen, 1994, p.245). Rather than focusing only on the learner as free from the constraints of the past or future, as constructing one's own reality, as the individual unbounded by ties

to responsibilities other than to self and/or those self imposed, the learner can also become focused on fostering a sense of community and intergenerational responsibility. Once the student has been introduced to the intellectual scaffolding through constructivist pedagogy, the teacher can continue to deepen the student's understanding, his/her knowledge, and can continue to move toward a communitarian ethos. Education then becomes one of the primary venues for society to heal and to provide a future for itself (Hutchison, 1998).

Constructivist pedagogy reconciled with environmentally sustainable pedagogy can connect the personal to the communal, with a start in personally meaningful teaching which then scaffolds learners' thinking into a communitarian ethos. Finally, by reconciling constructivist pedagogy with environmental sustainability, educators can move pedagogy into a direction that is both meaningful and ecologically nurturing and begin to formulate a sustainable educational pedagogy.

CHAPTER II

CONSTRUCTIVISM

Constructivism focuses on how learners learn. Although it has evolved over time, deriving from "cognitive and developmental psychology," it has only been defined as a theory since the 1980's (NCREL, 2004, p.1). The *Thesaurus of Psychological Index* (2001) defines constructivism as a "theoretical perspective that characterizes perceptual experience and reality as constructed by the mind in the observation of the effects of independent actions" (p. 58). *The Thesaurus of Sociological Indexing* Terms (1999) defines constructivism as "associated with structuralist psychologist Jean Piaget. Refers to the process in which cognition evolves through interaction of environment and subject. Distinguished by its focus on psychological and epistemological processes" (p. 51). Additionally, the *Thesaurus of Educational Resources of Information Center Descriptors* (2001) defines constructivism as a "viewpoint in learning theory which holds that individuals acquire knowledge by building it from innate capabilities interacting with the environment" (p. 68).

A Chronological Context

Tracing the roots of constructivism's intellectual family tree, its patterns of thinking began with the philosophy of the German, Immanuel Kant, who lived from 1724-1804 (Phillips, 1995). In a *Critique of Pure Reason,* Kant (1787/1996) stated that "there can be no doubt that all our cognition begins with experience" (p. 43). In his epistemological framework, Kant was laying out the structures of thinking that became the basic foundation for a constructivist theory based on knowledge production deriving, in some part, from the experience of the knowledge producer. Kant argued that "...all *my* presentations in some given intuition must be subject to the condition under which alone I can ascribe them—as *my* presentations—to the identical self, and hence under which alone I can collate them, as combined synthetically in one apperception, through the universal expression *I think*" (p. 181). Kant's philosophy argued that we can only know reality in a way that the structure of our minds can understand it. It is our brain's architecture that is a barrier to knowing objective reality and that the way we perceive and interpret information is confined to the limitations of how our minds work (McInerney,1992; Kitcher, 1996). We can never know the "thing in itself" (Berman, 1984, p. 30). That is, we can never know the "Ding an sich" (Berman, 1984, p. 142). As Kant (1787/1996) states, knowledge results only from the impressions that our cognitive structures afford us. Thus, Kant's

framework rooted the idea that knowledge begins with one's own impressions and experience, an idea that shaped the constructivist landscape.

That ideas are constructs of the individual mind without a basis in reality also flows from the work of both Hans Vaihinger and Alfred Adler. Adler (1929/1956) speaks about heredity as giving each person certain inherited characteristics and capabilities. What was central to his thinking, however, was the "use [a person] makes of them" (p. 207). Adler further offered two factors that influence how a person makes use of his/her inherited capacity in order to be successful in the world. Note that in Adler's terms, success is defined as the personal "meaning we give to our experiences" (p. 208). The two influences are the environment and social relationships. The experiences we have are the filter through which we construct personalized and idiosyncratic meaning regarding any given situation. Adler's theories are referred to as individual psychology. In this systemic approach to psychology, both the "unconscious as well as the conscious are determined by subjective values and interests, all of a social orientation, all without counterpart in physical reality, and in the last analysis a creation of the individual" (Ansbacher & Ansbacher, 1956, p. 9).

Vaihinger's (1925/1956) theory was known as "positivist idealism" or the theory of "as if" (p.78). He posited that "the organic function of thought" occurs through a process that is largely unknown or "carried on in the darkness of the unconscious" (p.78). The product of this unconscious activity,

if this activity "enters into consciousness" and formulates into coherence, becomes a general idea (p. 78). Vaihinger argued further that general ideas were "fictions," i.e. "constructed from the unconscious organic process of thought" (p.78). Although fictional thought constructs are not objectively reflective of the real world in a pragmatist sense, Vaihinger argued that these ideas do bring into the world a "quality far more important for ethics and aesthetics" (p.78). It brought the idea that thoughts are subjective and have a "personal frame of reference" having motivations in the unconscious realm without an external cause. Thus, Vaihinger's "as if" philosophy offers practical purposes regarding knowledge production in the expression of ideas for ethics and aesthetics, given an awareness of the subjective nature of knowledge production.

"Through the link of Vaihinger, we are enabled to appreciate the relationship to Adler...and to John Dewey to whom Adler refers to in his later writings"(Ansbacher & Ansbacher, 1956, p. 87). Dewey's ideas flow from the same philosophical root as Vaihinger and Adler in the sense that "both interpret thought as an activity which fulfills the biological function of assisting the organism to adapt itself to its environment (p.87). Moreover, Dworkin (1959) believed that this instrumentalism of Dewey was a concept that emphasized social purpose and political action. As Dworkin discusses, this view grew out of the historical context of the 1880's and 1890's, a time when the United States saw immigrants flooding into the country, the

industrial revolution in its birth process, and railroads changing the landscape and economy of the country. Out of this base emerged Dewey's philosophy of education.

In Dewey's philosophy of education, thinking is an integral component to learning. Dewey (1933) distinguished "stream of conscious" thought from reflective thought, which he termed "chain" or "stream" of thought in that there were "definite units that are linked together so that there is a sustained movement to a common end" (pp. 4-5). Additionally, reflective thinking is a construct of the mind in that it is a "mental picture of something not actually present, and thinking is the succession of such pictures," but with the purpose of having a reflective conclusion to the chain of thought (p.5).

Reflective thinking leads one, Dewey (1933) argues, to investigate, to think through a problematic idea, to follow through the chain of ideas to the logical conclusion based on evidence and observation. The method of reflective thought is "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p.9). Thinking, then, is defined as "that operation in which present facts suggest other facts (or truths) in such a way as to induce belief in what is suggested on the ground of real relation in the things themselves" (p.12).

Being able to think reflectively, which Dewey (1933) also referred to as "intellectual thinking," gives humanity the power of control over one's self and over others (p.11). It gives control and influence to the outcome of social issues, i.e. how an issue is named, defined, resolved. With control, one can exert meaning and add value to the outcome of chains of thought. Dewey gives numerous examples; however, most examples demonstrate that there is a qualitative difference in the meaning between a person who has expert knowledge and one who has novice knowledge of a particular subject matter.

Further, curiosity motivates reflective thinking. Social interaction can excite motivation and spur learning to more depth by the questions and thoughts of others. Once curiosity has been initially excited, an intellectual pursuit can be more deeply explored through answering questions that are of personal interest to the learner. "The business of education might be defined as an emancipation and enlargement of [this kind of] experience" (Dewey, 1933, p. 202).

Another dimension was added to constructivist thought when the exploration of how knowledge is culturally and socially influenced became a part of the discourse. Dewey "stressed the social nature of knowledge construction" (Phillips, 1995, p.9). His theory gave a strong basis for understanding that learning should occur in a social environment in which students are engaged in meaningful activities, often solving problems (Phillips & Soltis, 1998). Dewey (1959) believed education is most effective

when students are personally engaged. As Dewey states, "the child's own instincts and powers furnish the material and give the starting point for all education" (p. 20). Not only did Dewey believe that the child's interests should provide the material for the curriculum, but also he believed that school should "represent present life" (p. 22).

Dewey (1938) believed direct inquiry was the most effective method for nurturing the child's intelligence, especially experiential and active learning, particularly in the form of a problem solving approach. This is how Dewey believed the child's intelligence would grow more complex, "through the continuous process of reconstruction of experience" (Dewey, 1938, p. 87). This is the primary method for connecting the subject matter to the child's intellectual organizational structure. The function of the teacher was to be of help to the student along his/her educational journey, to have the freedom and responsibility to teach their own curriculum, to choose their own texts and materials, and to develop the primal conditions for nurturing intelligence through the use of the scientific method or direct inquiry, methods which have become embedded in constructivist thought. For many, "Dewey was the most important educational theorist of the twentieth century" (Hall-Quest, 1963, p.7).

Growing from these foundational roots, "the key ideas that set constructivism apart from other theories of cognition was launched about sixty years ago by Jean Piaget" (von Glasersfeld, 1996, p.3). Jean Piaget,

who lived from 1896-1980, was a Swiss psychologist. At the time Piaget was formulating and writing his theories, educational critics in the United States were calling for reform. They called for curriculum that would teach children how to go about the process of thinking (Elkind, 1973, p. xxxiv). The call for educational reform in America was sparked by the advent of Sputnik and the search for new theories of learning. Piaget's concepts are the opposite of empiricism. In a traditional empirical view, the mind and the body are separate. The mind sees reality and, much like a camera, takes a photograph of reality, of what the mind sees. "Piaget argued that the mind never copies reality but instead organizes it and transforms it, reality, in and of itself, being--as Kant made clear--unknowable" (p. xxxv). As Piaget (1967/1971) stated, "knowledge is essentially construction" (p. 362). In *Biology and Knowledge*, he argued that human intelligence is actually a "bursting of the kind of instinct" that animals demonstrate as they interact with their environments (p. 366). Rather, Piaget believed humans organize their cognitive capabilities by acquiring knowledge through interaction with and adaptation to the environment, an ability beyond instinct.

As Piaget investigated the intellectual development of children, he theorized differing and distinct developmental cognitive levels. According to Piaget (1973), the first concrete level is the sensory-motor level. The second or preoperational level is distinguished by the child's command of symbols such as language. During the third or concrete operational level, the child

formulates abilities of reasoning. Then the final or formal operational level is distinguished by the child's ability at metacognition. Thus, through his work, Piaget was studying "how children learn" (Elkind, 1973, p. xxxiv).

It was, however, the research that flowed from the final fifteen years of his life that became foundational to constructivism (Fosnot, 1996). Equilibration is the key idea to emerge from this time. As Fosnot explains, biological equilibration took a different view from both theories current at Piaget's time: those of Lamarck and Darwin. "Behavior drives the evolution of new structures because the development of new behavior...causes an imbalance in the genome, the regulatory system of the genetic structure. The perturbation causes a series of possibilities, or mutations to result in the genome. Eventually a new adaptation to the environment is constructed" (Fosnot, 1996, p.12). Piaget's model of adaptation flowed from Kant's model in that it gave central importance to cognitive structures and individual rational thought as opposed to the social and historical influences embedded in the thought process (O'Laughlin, 1992). According to Fosnot, a "renewed interest [in Piaget's work] has occurred in the work of von Bertalanfly, Potonyi and Prigogine as biologists explore chaos theory and dissipative structures (p.13). Underlying Piaget's theories of developmental levels is his central idea that knowledge does not have an objective, independent reality. Rather, he offered that an individual constructs reality as an adaptive function, i.e. as a function of biological survival.

Another dimension added to the theory of constructivism was the idea of humans as meaning-makers. This idea grew from the work of Jerome Bruner. Although Jerome Bruner has been credited with bringing the ideas of Piaget to the attention of American educators, he also built his own work upon the thinking of Piaget's theories (Elkind, 1973). Bruner (1992) talks about the symbolic structures that individuals utilize in the meaning making process. Bruner is particularly concerned that meaning making does not occur by the individual acting in isolation but rather by an individual acting within a cultural community with "shared symbolic systems" and "traditionalized ways of living and working together" (p. 11). Because an individual constructs meaning within a cultural framework, meaning becomes "public and shared" (p.13). This meaning making, then, becomes a cultural way of knowing. It becomes situated within a communal and cultural context. Bruner contends that the purpose of constructivist learning is "to discover and to describe formally the meanings that human beings create out of their encounters with the worlds, and then to propose hypotheses about what meaning-making processes were implicated. It focuses upon the symbolic activities that human beings employed in constructing and making sense not only of the world, but of themselves" (p. 2).

Von Glasersfeld's variation on cognitive constructivism is referred to as radical constructivism. In this branch of the theory, von Glasersfeld (1996)

posits that there is no reality other than the one each individual constructs within his own mind. He argues that shared meaning making as a result of social interaction is not a true, shared meaning making. Rather, the meanings one person grasps about a word only overlaps the meanings another has of that word at certain crucial points of perception. Meanings, in von Glasersfeld's view, are always personally and experientially constructed.

The sociocultural dimension of psychological constructivist thought "emphasizes the socially and culturally situated nature of activity" (Cobb, 1996, p. 34). The patterns of thinking forming the basis of sociocultural constructivism grow from the theoretical underpinnings of a Russian psychologist and a contemporary of Piaget, Lev Semyonovich Vygotsky. Both Piaget and Vygotsky were concerned with how the individual learner constructs his/her own body of knowledge. Where Piaget was focused on the biological and psychological factors that influenced the individual as she/he learned, Vygotsky was concerned with the social factors that influenced the learner while she/he constructed his/her own body of knowledge (Phillips, 1995). Currently, there is much interest in constructivist circles regarding Vygotsky's theories. "There is particular interest in Vygotskian orientations to education that stress the relationship of teacher to student" (Gergen, 2001, p. 811).

Working after the Russian Revolution, Vygotsky tried to develop a "unified theory of human psychological processes" (Cole & Scribner, 1978, p.

5). Piaget was concerned with "biologically supported universal stages of development," while Vygotsky was concerned with the "interactions between changing social conditions" (John-Steiner and Souberman, 1978, p. 123). In particular, the foundational underpinning Vygotksy's theory gave to constructivism is the notion of how a learner's cognition changes as a result of social interactions during the cultural experiences in which the student is engaged. In fact, Vygotsky was the "first modern psychologist to suggest the mechanism by which culture becomes a part of a person's nature" (Cole & Scribner, 1978, p. 6). Vygotsky was one of the few in the 1950's who pursued "the impact of language on the nature of man as a species" i.e. within a cultural system (Bruner, 1992, p. 11).

In *Mind and Society*, Vygotsky (1930/1978) suggested that the preschool age child is "able to do more than he can understand" (p.100). Through his observations and experimentation, he demonstrated that in the development of the child, experience is what is important to early cognitive growth. Through play, children explore the relationships and practice the skills necessary to participate in the culturally and socially mediated adult world (Vygotsky, 1930/1978). Language is the vehicle through which this development occurs (Vygotsky, 1935/1978).

Vygotsky (1930/1978) further asserted that "prior to mastering his own behavior, the child begins to master his surroundings with the help of speech" (p. 25). Doing and saying are both part of the same function of

problem solving. The more complex the problem, the more necessary using language to solve the problem becomes (Vygotsky, 1930/1978). Children learn to speak to themselves intrapersonnally, as they have learned to speak to adults, interpersonally. Their internal speech, therefore, becomes a "social" speech (p. 27). Furthermore, this internalized speech has a way of organizing the "socializing voice that the child has internalized (Vygotsky, 1930/1978).

These concepts of language and problem solving are part of Vygotsky's (1935/1978) theory of the "zone of proximal development" (p.84). This zone is "the distance between the actual developmental levels as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Within the zone of proximal development, it is of prime importance to set up an open dialogue between teacher and student that facilitates conversations rather than shutting down conversations. In this way, students are encouraged to interact, to have a voice in the educational conversation. It is through this interaction that the conversation sparks an internal cognitive shift in the student, and it is this internal cognitive shift that encourages the construction of knowledge in the individual (Hausfather, 1996; Smagorinsky, 2001).

Vygotksy's writings undergird constructivist pedagogy with several foundational ideas. It is from Vygotsky that constructivism draws the idea

that how one child synthesizes learning may not be the same as how another child does, because each child filters that learning through different experiences (Cole & Scribner, 1978). He explores the idea that learning is socially constructed (Vygotsky, 1935/1978). Moreover, he suggests that children actively engage in their learning (Cole & Scribner, 1978).

Current Discourse

Piaget and Vygotsky's theories form the foundational underpinnings for constructivist learning theory (Fosnot, 1996, p. 23). Growing from these roots, constructivism formed into two distinct branches or schools of thought: cognitive and social constructivism (O'Laughlin, 1992; Fosnot, 1996). Cognitive constructivism is concerned with how a person constructs a body of organized experience and information into knowledge within one's intellectual architecture. Following in the theoretical footprints of the work of thinkers such as Piaget and Vygotsky, cognitive constructivists focus their studies on how an individual goes about learning, i.e. how a person goes about constructing a body of knowledge (Phillips, 1995).

Currently, in cognitive constructivism, there are several key concepts. The concept of adaptation began from the biological context but was extended to an epistemological context by Piaget (O'Laughlin, 1992; von Glasersfeld, 1996). To survive, one adapts biologically to the conditions of the environment which one inhabits. In this extended context of adaptation,

knowledge itself, or how one comes to know the world, is an adaptive function derived from a relationship between the cognitive capability of the person and his/her experiences of the world. Knowledge is, thereby, not a picture of true objective reality, but rather a representation of one's experience of reality. Von Glasersfeld (1996) further defines constructivist meaning of environment as one's experiential representation and abstractions of what surrounds us in the environment, including one's own perceptions of self.

Another concept in constructivist discourse stresses the dimension of social interaction (O'Laughlin, 1992; Cobb, 1996; Fosnot, 1996). Fosnot (1996) adds to the discourse that beyond cognitive constructivism, i.e. how the mind comes to know and understand the world, "humans are social beings" (p. 25). "Cognition and social change are inherently connected" (Fosnot, 1996, p. 25). It is our innate ability as human beings to develop language and live within the experience of community. Participating in "social interactions and culturally organized activities influences development" (Cobb, 1996, p.36).

This dimension has been termed the sociocultural approach. In this approach, "symbols and other cultural tools" act as "preexisting carriers of meanings" (Cobb, Perlwitz, & Underwood-Gregg, 1998, p. 80). Further, with the sociocultural approach, theorists believe cognitive functions are inherently embedded in social and cultural contexts (Wertch & Toma, 1995).

Yet, this approach lies within the field of constructivist psychology, and is at times referred to as sociocognitive, since it is concerned with the central idea of how an individual comes to know and understand the world (Phillips, 1995; Confrey, 1995; Wertsh & Toma, 1995; Bauersfeld, 1995; Larochelle, Bednarz & Garrison, 1998). For example, Cobb (1998) discusses how the microculture of the classroom influences student learning in a sociocultural approach to constructivism. He considers that learning not only involves individual problem solving, but also he proposes that there is an "acculturation into ways of knowing institutionalized by wider society" (p.71). This acculturation process is seen in the "forms of pedagogical practice" within classrooms (p. 71).

On the other hand, social constructivism emerges from the field of sociology and is concerned with knowledge as a "social construction, a cultural product...that gives rise to socially agreed theories of the world and social patterns and rules of language use" (Ernest, 2004, pp.1-2). Steffe (1995) argues that educators have an important interest in social constructivism because of its emphasis on "communicative interaction" and the idea of "knowing as an adaptive activity" that emerges from von Glasersfeld's work (p. 490). Social constructivism does not focus on the individual or the individual mind. Rather, the focus is on "persons in conversation" (Ernest, 1995, p. 480). The world is given meaning only as a shared meaning which has been socially created by the shared experience of

a culture. This shared reality is in continual construction as a living, shared, communal conversation.

Social constructivist viewpoints stress the personal, social, and subjective meaning of language. Historically this viewpoint is in tension with the traditional viewpoint of language as the "bearer of truth" (Gergen, 2001, p. 805). This view flows from the ideas of John Locke (1690/1959) who stated that words "stand as marks or the ideas within [one's] own mind whereby they might be made known to others, and the thoughts of men's minds be conveyed from one to another" (p.3). Language, then, becomes the vehicle we use to convey the reality we observe of the world. Language becomes the manner in which we inform each other about our "thoughts and observations" (Gergen, 2001, p. 805).

Social constructivism concerns itself with, among other factors, the problems of the social influences on language use. If language is the vehicle for informing one another about our thoughts and observations about the world, one must consider the social influences on language. It is a "system that both precedes and outlives the individual...it is already constituted; it is borrowed from existing genres or to appropriate forms of talk ...already in place" (p. 805). To participate in language is to participate in community. Language is one factor considered in this branch of constructivism. Social constructivism, then, is a dialogic inquiry that focuses on "how one is constructed in various relationships...and how one performs appropriately in

a culturally constituted scenario... and how one takes part in a process of communal negotiation and sanction" (Gergen, 2001, p.812). Social constructivism emphasizes "subjectivity, the sociocultural situatedness, and the intrinsically dialectical nature of the process of coming to know" (O'Laughlin, 1992, p. 810). Thus, as O'Laughlin states, social constructivism has the "power to transform" (p. 810).

The power to transform lies in the ability to make a claim for and then frame a problem (Spector and Kitsuse, 1977). "People do not define as problems those conditions that they feel are immutable, inherent in nature or the will of God" (p. 84). Spector and Kitsuse state that there need to be certain conditions that must exist before people define conditions that exist as a problem. Usually the conditions are related to a value or an interest of the person or group who is making a "claim" for a solution (p.82). "The belief that something can be done about a condition is a prerequisite to its becoming a social problem (p. 84). Then, by defining the problem, giving it a name, and constructing a theoretical frame of understanding for it, others can become aware of the problem and begin to focus on the conditions of the problem also.

Schutz (1970) argues that social construction derives from shared meanings developed by a cultural group regarding how to go about living daily life. He supposed that "domains of relevance" in a culture group determined the taken for granted assumptions about how one goes about

living life and what one believes is valued in the culture (p.114). He offered that transforming society begins with transforming the "domains of relevance" by means of questioning a culture group's "unquestioned way of life" (p. 115).

Capek (1993) develops the issue of environmental justice using a constructivist framework. In this framework, he discusses a grassroots effort by groups who were upset by the chemical contamination in their soil. By their communicative efforts, they began to formulate a shared understanding that this was a condition that was not valued by their group, and that something could be done about the condition. They began to frame the issue as an unjust social issue. They used the dimensions of environmental justice which included having rights and claims to " accurate information...prompt, respectful and unbiased hearings about their claims...democratic participation in deciding the future [of their claims]...and compensation" (p.8). Thus, how a group defines, names, and frames social issues can "act as a powerful motivator for social change" both within the social and within the educational arena (p.9).

Summarily, constructivism is a theory of learning having three dimensions. The first dimension is that reality is a constructed perception. Two schools of thought dominate this perception within cognitive psychology. The cognitive theorists such as von Glasersfeld (1998) and the radical constructivists argue that reality is a personally, highly idiosyncratic mental

construct. Sociocultural constructivists, who base their theories on Vygotsky, believe that individual cognitive development cannot be separated from the society and culture in which one is embedded. A second dimension is that perception of reality is influenced by experience. Experience is, to some extent on a continuum, that is personally, socially, and/or culturally embedded. The third dimension is that experience filters social interaction which is embedded in cultural experience, operating much like a system in which one piece acts upon another in a cascade.

Pedagogical Practices

Although most theorists agree that constructivism is a theory of *learning* as opposed to a theory of *teaching*, this framework does have pedagogical implications. One implication is a student-centered learning environment, which encourages inquiry, and the organization of one's experiences into some personally meaningful idea of the world (Fosnot, 1996; Becker and Varelas, 1995). Another implication is that the act of learning is not a passive activity but an active one in which the student engages in some form of interaction with the curricula. As a result of this activity, new internal constructs are developed within the learner's mind (Ernest, 1995; Fosnot, 1996). An example of such practice is the discovery approach to mathematics learning during which students are given small wooden blocks and sets of problems to solve using the blocks. Through interactive classroom

communication and problem solving, the student formulates mathematical theories based on their active constructs (Wood, Cobb, and Yackel, 1995). The process of learning is, therefore, a "process of making personal meaning" (Brooks and Brooks, 1993, p. viii).

Another implication for pedagogical practice is that the voice of the student is valued (Brooks and Brooks, 1993; Desautels, Garrison, and Fleury, 1998). The interactive classroom communication gives depth, diversity, and varied perspectives to an individual's act of meaning making during the process of knowledge construction. "Dialogue within a community engenders further thinking" (Fosnot, 1996).

Yet another implication is the role of the teacher, which is to facilitate the learner to construct his/her own knowledge (Becker and Varelas, 1995; Lewin, 1995). This point of view is in opposition to such pedagogical approaches as direct instruction. Further, Lewin (1995) argues that this cognitive structure relies on prior mental structures of the individual, some of which are culturally embedded. Because teachers have the power to "legitimate" their classroom practices and thus certain sources of knowledge, this form of legitimating "authority is given over to allowing [students] to develop self-confidence in their own epistemic processes" (p.432).

Thus, from a pedagogical viewpoint, constructivism emphasizes learning that is centered on the student and that is focused on creating personal meaning for the learner. If constructivist pedagogy focuses on personal

meaningfulness, how then does it facilitate the teaching of deeper levels of social responsibility and communal meaningfulness? What might inform a more critical awareness of constructivism in this sense?

CHAPTER III

ENVIRONMENTALLY SUSTAINABLE PEDAGOGY

Historical Context

To understand environmental sustainability is to understand this theory in reaction to the ideas of the scientific revolution. "The foundational narrative itself: the making of modern science...is one of the formative moments of environmentalism (Jamison, 2003, p. 47). The pedagogy of environmental sustainability is the consideration of this theory within the educational context.

The epistemology of environmental sustainability, which involves understanding patterns of thinking that allow communities to live sustainably, is in opposition to the epistemology of the scientific revolution. With the scientific revolution, culminating in the seventeenth century, there was a paradigmatic split between the integrated world of human-as-part of nature and human-versus-nature. This shift saw the rise of the scientific method as a way not only to approach science, but also as a framework for how people think about their relations to the world and their experiences of the world. With the scientific revolution, the accepted form of generating knowledge was "mediated through technology" including such methods as

scientific inquiry and experimentation as well as the use of the tools of technology (Jamison, 2003, p. 51).

This relationship, undergirded by the scientific method, is an I-it, subject-object, observer-observed relationship in which an organism or phenomenon is outside of or external to the field in which is it located. This allows for a pattern of thinking about the environment as an object, as not an integral part of us. In order to understand a phenomenon, this method included breaking down an event or object into its smallest possible unit of study and studying its aspects objectively (Berman, 1984). Thus, as Berman argues, the perspective that is on the opposite end of a continuum from environmental sustainability is the Cartesian view, which flows from the ideas of Descartes, who was writing during the early seventeenth century. He was not the only intellect theorizing these ideas, but "modern definitions of reality can be identified with specific planks in his scientific program" (p.11). Descartes, then, is linked to the ideas inherent in the notion of objectivity, that the relationship of the observer to the observed is one of subject to object.

As Berman has identified, the origin of Descartes' ideas derived from Plato's concept of rationalism, which was that knowledge comes from reason unimpeded by the senses. Aristotle's empiricism also fit into the Cartesian view in the sense that "knowledge consisted of generalizations" (p.13).

By the seventeenth century, the scientific revolution was part of the epistemological landscape in the western world (Berman, 1984). Newton had put forth his perspective of the universe as a giant machine. Empiricism, including the idea of "always check[ing] your thoughts against the data so that you know what thoughts to think" became fundamental to scientific thought (p.14). To this perspective, Bacon added the idea that a person "had to question nature directly by putting it in a position in which it was forced to yield up its answers" (p.14). The Cartesian viewpoint has the following tenets.

- Nature is known from the outside and phenomena are examined in abstraction from their context.
- The goal is conscious, empirical control over nature.
- Descriptions are abstract; only that which can be measured is real.
- Mind is separate from the body, subject is separate from object.
- Logic is either/or; emotions are epiphenomenal.
- Only matter and motion are real.
- The whole is nothing more than the sum of its parts.
- Living systems are in principle reducible to inorganic matter; nature is ultimately dead. (Berman, 1984, p 237).

On the other hand, the tenets of environmentally sustainable epistemology are in tension with the Cartesian viewpoint. The tenets environmental sustainability derive from a Batesonian perspective, which is a very different view than the Cartesian.

Bateson believed there was a "consciousness to and order in living systems" (p.4). Harries-Jones (1995) has referred to Batesonian thinking as a

"formal epistemology of pattern" (pp. 62-63). This means that Bateson's (1991) epistemology is a systems' theory of thinking which Bateson referred to as "cybernetics" and "ecology of the mind" (p.187).

Bateson viewed the ecological and biological world as a unified whole. Each object, each molecule, each plant, each life form, each person contributed to the living consciousness of the planet as a whole system. Humans are not apart from the ecosystem but are "embedded" in the system (Flinders, 2002, p. 197). In such a Batesonian epistemology, it is not the individual that is of prime importance, but rather "the living system" and each of its parts' relationship to it that matters (Berman, 1984, p. 237). In other words, humans "are not separate from the things around us" (p. 236).

Another tenet is the rejection of linear, cause and effect thought as it is used in the scientific method (Bateson, 1991). It is better to have an openness to perceive the patterns that are embedded in nature since an if-then logic is an incomplete model of causality. "The effect is not the cause" (Bateson, 1979, p. 117). Rather, "patterns of relationships exist between all living forms and their environments constitute a single field of reciprocal interaction" (Harries-Jones, 1995, p. 33.) It is the organism within the context of environment that transforms the other. The relationship to other is key. Each part is in a kind of informational communication with the other to form a living system in a recursive relationship in which each part affects the other parts (Harries-Jones, 1995).

The heart of the argument Bateson presented in *Mind and Nature* (1979) addressed the concept of metacommunication. Bateson argued that communication occurred through action or language within a context. In order for a person to understand a whole message, one must have both the words or actions and the context. For example, the context of a message can have varied meanings if the communicator is being playful or angry or aggressive. On a larger scale, if a culture has a context, messages can be understood in different ways. "The ideas about nature, however fantastic, are supported by [a cultural] social system; conversely, the social system is supported by their ideas" (p. 154). Because people can learn about context and can be influenced by context, humans can generate communicative contexts that may have "complex networks of mutually supporting presuppositions" and which may not have any relationship to or understanding of the reality of the living world (p.154).

Consider that there are three aspects in holistic descriptions when trying to understand the living world (Bateson, 1991). There is the "real world," the "representation of it," and "the abstraction" (p.157). The difference between the real world and the representation of it would be like the difference between an airline ticket and the actual plane ride. The ticket represents the ride but is not the actual experience of the ride. Further, how one person contextualizes "plane ride" affects the representation of and then the abstraction of the idea of plane ride. This idea of plane ride may or may

not be the real experience of all actual plane rides under similar conditions. Because of differences in context, then, there may be different ways to represent the idea of reality.

In summary, in a Batesonian perspective, the following can be said:

Figure 2: Batesonian perspective.

Influences on the learner:	Environmental and cultural contexts
Purpose of intelligence:	To understand one's relationship within the ecological/biological system and to live harmoniously within that system
How knowledge comes to be:	Perceiving the patterns in nature
Question asked of learning theory:	What are our relationships within the ecology of the system and how do they affect the larger system of which we are a part?

Berman was another theorist foundational to environmentally sustainable pedagogy. Like Bateson, he argues for a worldview on the opposite end of a continuum from the Cartesian view. "The history of the West, according to both the sociologist and the poet, is the progressive removal of mind, or spirit from the phenomenal appearances" (Berman, 1984, p.57). He further argues that it is through "Hermetic wisdom"' or the concept that knowledge connected both through an emotional and an intellectual journey that learning occurs (Berman, 1984, p. 61). Moreover, the

epistemology of post Cartesian thinking would posit that there is no unconscious thinking, that the unconscious is merely body knowledge, that "the body and the unconscious are one and the same thing" (p. 167). "Knowledge is acquired [not] by recognizing the distance between ourselves and nature," but rather through a "merger with nature" (p. 59).

This merger occurs when a learner experiences a learning state beyond reason alone. In this learning state, cognitive knowing, intuitive knowing, sensuous knowing, i.e. through the senses, all merge synergistically into a creative consciousness state of awareness. During such a learning experience, an example of which a person can achieve during deep meditative states, the learner may experience that the ego is an "arbitrary construct" (p.291). Thus, the learner can become more aware of a merger between the learner and the biotic environment, both as participants in a "vast ecology" of consciousness, "totally alive and sensuous" (p. 290). This would be the difference between, as Bateson describes, mind and "Mind," i.e. between a Cartesian view of intellect and a Batesonian view of intellect (Berman, 1984, p. 245). An example of such a learning state would be the moment of "flow" as described by Csikszentmihalyi (1993) when a person is so engaged in a challenging physical and/or cognitive activity at the boundaries of one's capabilities that the person loses track of time and even a sense of ego self. In much the same way, an individual can be subsumed within the larger framework of the group when a community has a similar flow experience, for

example at a football game or at a religious event or a political event, when the group is in a shared affect or responsiveness to the moment. This resonance is the effect the event has for the larger cultural community.

Teaching based on this frame would, therefore, tend toward the holistic and further, toward helping learners apply their individual experiences of learning to be more conscious of Mind than mind, and thereby, to the needs of the community. Community in this sense includes the entire biology of the environment, not only the human community. Teachers would begin to look at students' patterns of thinking and become facilitators of elder knowledge as one of the methods for educators to facilitate a deeper level of social responsibility and human interconnectedness between the individual, the community, and the human embeddedness in the natural world.

A post-Cartesian epistemology recognizes "participating consciousness," which is intellect with grounding in the affective (p.149). This perspective is a very sensuous understanding of the world that considers that the boundaries between each of us and the rest of the biological/ecological community are a somewhat artificial boundary. Like a large tapestry, each living thing is but a thread within that tapestry. We are all not only in relation to each other, but also a part of each other.

Furthermore, Berman (1984) argues that of key importance for a culture is the search for "meaning" (p. 2). He argues that before the sixteenth and seventeenth centuries, western civilization held a more "enchanted" view of

the world (p. 2). By this he believes that people belonged more in the world as participants in the environment, an environment that was more alive for human beings. With the scientific revolution, the sense of connection to a living, conscious environment was replaced with a different view. This view was nature as apart from, as something to be conquered. It is the subject-object, observer-observed viewpoint of the scientific model. An environmentally sustainable epistemology has a holistic view of the world and "the awareness of humanity's organic embeddedness in a complex and natural system" (p.189).

Epistemology, from Berman's perspective, is also less about the boundaries between self and other and more about finding meaning in one's relationship with self, with others, including the biotic, and with finding a sense of meaning and belonging within the ecology of Mind. See figure below.

Figure 3: Environmentally sustainable viewpoint.

Influence on the learner:	Interconnections with nature (biological/ecological community), our own intellect grounded in affect.
Purpose of intelligence:	To find meaningfulness and live in harmony as part of the context of a sustainable, living world
How knowledge comes to be:	Through experiencing nature intellectually, emotionally, and relationally.
Questions asked of learning theory:	How do I belong meaningfully in the ecology of the conscious world?

Current Discourse

Currently, the discourse on environmental sustainability emerges because of the intertwining of industrial/technological awareness and an ecological awareness of the effects of modernization on the environment (Bowers, 2001; Bess, 2003). Importantly, other concurrent key influences make the effects of environmentally sustainable or green knowledge possible. Bess (2003) argues these include the following: 1) a scientific community that understands the effects of technology and industry on the world's ecology, a dialogic political process, 2) an open information dissemination system, 3) "a dissident counterculture sufficiently potent and widespread to challenge the social and economic status quo," and 4) a core of people who are educated and who have the economic security and ecological literacy to integrate green knowledge into their community life (p. 239).

Environmentally sustainable pedagogy crosses academic disciplines from the sciences to the humanities in an effort to develop a theory which tries to understand humanity and our impact on the ecology. Like constructivism, environmental sustainability is an epistemology which has pedagogical implications. Generally theorists agree that it is not, as yet, a theory of teaching. Moreover, it can be problematic to locate epistemologically because of the holistic nature of the various frameworks from which its knowledge is derived; however, generally the making of "green knowledge" has derived from the cultural, social, and political environmental movements

which began in the early 1960's (Jamison, 2003, p. 9). Although it is not a theory of teaching, this epistemology seems to be moving in the direction of providing models of teaching and guiding principles for pedagogical practice.

There is, however, tension within the epistemology. "A basic division that has affected environmental knowledge [production] is between what might be termed cultural and economic approaches to the understanding of human activity" (Jamison, 2003, p.32). As a result, at one end of a continuum are those theorists who believe that technology can be included in the solution to alleviating environmental problems. At the other end of the continuum are the theorists, like Bowers for example, who believe a technological mindset is part of the root cause of environmental problems. They base their epistemic reality on the belief that solutions can be found by "understanding the connections between environmental problems and traditional ideas, belief systems, local knowledges and ways of life" (p.29). By the 1970's, environmental sustainability or the "process of nature-society interaction were studied in a more explicit interdisciplinary way" (Jamison, 2003, p. 34). In the 1980's, environmental studies had split into such sub-fields as "environmental history, environmental sociology, and ecological economics," to name a few (p. 34).

When considered as a teaching philosophy, environmental sustainability is referenced in the literature under various terms. Bowers (2001) refers to environmentally sustainable pedagogy as "eco-justice" (p. viii). Within an

eco-justice framework, Bowers recognizes the interdependence of humanity on the robustness of the environment. He further connects ecological concerns with the viability of bioregional knowledge and local cultural ways of knowing. In eco-justice pedagogy, this epistemological approach would be different from a "Cartesian form of consciousness and self-identity" (p.181). Rather, Bowers argues that educators should teach critical reflection that centers on the renewal of community and culture in ways that consider the sustainability of the environment in a manner that is meaningful for the community. Bowers favors the end of the environmental studies continuum that strives for a solution based in an understanding of the connections between environmental problems and traditional belief systems.

Hutchison (1998) names the framework "education for ecological renewal" or the "pedagogy of possibility" (p. 24). The pedagogy of possibility focuses on meaningful learning and finding a sense of purpose within the natural world, while paying critical attention to the cultural context in which one is embedded. Meaningful learning in the holistic sense is directed by the learner's own motivations as well as by the teacher and the curriculum (Hutchison, 1998). A lifetime search for meaning and purpose is further informed by ways of knowing and understanding that go beyond the logical and analytical. Knowing and understanding involve the intuitive and the spiritual and are additionally informed by cultural, racial, religious, familial, and community identities (Hutchison, 1998).

Smith calls this perspective "place-based education, its aim is to ground learning in local phenomena and students' lived experience" (2002, p. 584). Place-based education focuses on the use of the local environment as the place to investigate nature, and on the use of the local economic life of the community to draw students into the process of decision-making and to make them a part of the intellectual and real-world life of the community.

Smith-Sebasto (1997) defines environmentally sustainable pedagogy as "education for ecological literacy" (p. 279). She states that K-12 education has ignored environmental education as an academic discipline. As a result, the perception of students regarding nature seems to be alienated from a first hand knowledge of the systems that sustain life on this planet and from a sense of how the biology of earth nurtures our lives. Ecological literacy further teaches about humanity's responsibility for the earth's stewardship for future generations.

Orr (1994) names this perspective "ecological design intelligence" and "environmental education" (p. 2). In ecological design intelligence, Orr defines the "goal of education" as the ability to understand systems thinking as long range and holistic planning for the future of the environment and those living within the environment (p. 11). He states the purpose of environmentally sustainable pedagogy is to "educate people to think broadly, to perceive systems and patterns, and to live as whole persons" (p.2). Orr's

epistemic base would be the end of the environmental studies continuum that believes that technology *can* be incorporated into the environmental solution.

Regardless of the theorists' relative position on the continuum however, environmental sustainability as a theory has a definitive characteristic. Environmentally sustainable pedagogues do not rely on the notion of a reality based solely on scientific fact. In the traditional view of science, "nature is known from the outside, and phenomena are examined in abstraction from their context" (Berman, 1984, p.237). Similarly, constructivists do not rely on the notion of a reality based in scientific fact, but rather allow that there are alternative forms of constructing the world (Simpson, 2002). However, unlike constructivism, environmentally sustainable epistemology is "nature ... revealed in our relations with it, and phenomena ... known only in context" (p.237). This characteristic is an "epistemology of pattern" in which events and/or living organisms are "located not outside of but rather in relation to... the field of which [each] is a part" (Harries-Jones, 1995, pp. 62-63). Therefore, as an epistemology, this framework is concerned with "how we are going to think about ecological issues" within a communitarian ethos (Harries-Jones, 1995, p. 30). It is further concerned with how humanity will live meaningfully and harmoniously as part of the ecological context (Berman, 1984; Orr, 1994; Bowers, 2001; Bess, 2003). As pedagogy, environmental sustainability is

concerned with transforming students' patterns of thinking so that humanity can live meaningfully and harmoniously in the natural world.

The larger problem with living in harmony with the world seems to be the paradox of westernized definitions of living in harmony. It is the great 21st century paradox that is "rooted in two factors; rapid technological change and economic modernization and the growing environmentalist response that this modernization provoked" (Bess, 2003, p. 238). As Bess argues, those who want technological change and those concerned with the environment have acknowledged a reliance on the other: both want to continue to consume and yet both want to replace what has been removed from the environment as a result of consumption. Consider these paradoxical impressions:

> The emergence of a consumer economy, hell-bent on building homes and offices and filling them with appliances, gadgets and accouterments; the decline of agriculture as a major sector of the national economy; the importance (real and perceived) of technology as a economic growth factor, an increasingly tight web of connections to global economy, through imports, exports and multinationals corporations; the link between technological prowess and military rank; the proliferation of transportation and communication technologies; the steep rise in energy consumption; the institutionalization of the welfare state; the alternation of moderate left and moderate right in political power; an independent judicial system, a competitive array of uncensored mass media; fairly stable population. (Bess, 2003, pp. 238-239).

Therefore, important factors have emerged to make communities focus on the degradation in the environment (Bess, 2003).

Given the current discourse on environmental sustainability, how can constructivism and environmental sustainability inform each other in order to help humanity survive the environmental degradations? What part do

these pedagogical epistemologies have to play? As has been noted, constructivism and environmentally sustainable pedagogy both have differing intellectual genealogies. Both have differing epistemic dimensions. Yet, both share a pedagogy of meaningfulness. Constructivism, however, emphasizes personal, individual meaningfulness, while environmentally sustainable pedagogy values communal, environmental meaningfulness. Are there points of intersection between these two pedagogies that ease these tensions? Do these intersections help each pedagogy inform a more critical use of the other in ways that shape an environmentally sustainable education that is both personally and communally meaningful? The answers to these questions will be explored in the next chapter.

CHAPTER IV

UNLOCKING THE TENSIONS BETWEEN CONSTRUCTIVISM AND ENVIRONMENTALLY SUSTAINABLE PEDAGOGY

From where does the knowledge of extending personal to communal and environmental meaningfulness derive? Can it derive from alternative epistemic bases? According to foundational constructivist theorists, individuals learn by interacting with the environment and making cognitive sense of phenomena when their current mental models are in dissonance with new information. According to Piaget (1971), this is influenced by one's developmental levels. Symbolic cultural tools, such as language, can also influence what people learn (Vygotsky, 1930/1978). Or, learning occurs when individuals actively construct meaning by developing a solution to a problem arising from the learner's personal interests (Dewey, 1959/1897). What each of these have in common is that learning, from a constructivist perspective, occurs through an interaction. Learning does not occur in isolation, but rather within a context and as part of a process.

From an environmental viewpoint, learning similarly involves an interaction, the interaction of the biologic (human, animal, other life forms) embedded within the natural world (Berman, 1984). Learning occurs as communities develop relationships as part of a living system (Bateson, 1984).

Learning similarly occurs as communities engage in intergenerational conversations involving traditions of the past that have helped the present generation and may help future generations to survive (Bowers, 2003). Both theoretical frameworks--constructivism and environmental sustainability--share an active process as part of knowledge production: interaction as part of the process. But, interaction to what end, with what goal in mind?

The goal of constructivist learning focuses on how the individual produces personal knowledge within his/her own intellectual architecture including the social and cultural influences acting upon the individual. Yet, the goal of environmentally sustainable learning focuses on how communities produce shared understandings of social knowledge in order to help humanity survive environmental damage.

Bowers (1997) argues that the core idea of constructivism, the individual constructing his/her own knowledge based on his/her own experiences, ignores "the influence of culture" (p. 107). The radical constructivist believe that there is no reality other than the one each individual constructs within his/her own mind. (von Glasersfeld, 1996). Radical constructivists posit that shared meaning making as a result of social interaction is not a true, shared meaning making. Rather, the meanings one person grasps about a word only overlap the meanings of that word at certain crucial points of perception. Meanings are always personally and experientially constructed.

If there is no true shared meaning making, the teacher's individual choices about framework, curriculum and language usage decide what is valued and emphasized in the classroom and what is assigned lesser value and/or ignored. Within the educational setting, if what is emphasized is personal experience, is there a corresponding lack of emphasis on the idea of relationship to communal experience? If pedagogy connected to students' lives through the process of activities engages personal experience, then how does pedagogy engage the student in activities of communal experience? Such a "process-oriented" pedagogy as constructivism reinforces "feelings connected with the immediate moment [as the] primary concern" (Bowers, 2001, p. 107). Without an emphasis on the communal, how does education teach patterns of thinking that go beyond the immediate moment and that are concerned with how a culture survives the decisions of the current generation? How do educators pedagogically reinforce patterns of thinking that aid culture groups to make decisions that help humanity to survive the consequences of our everyday actions four generations ahead?

To do this, we must understand our embeddedness in nature, as opposed to our sense of having an entitlement to try to control nature. Humanity must learn to conserve. Bowers (2003) argues that nature itself tends to be conservative. In this sense, conservative is not defined in political terms having ambiguous meanings. Rather, conservative means that nature tends to conserve itself over generations, changing slowly relative to the external

world and internal exigencies. This pattern of natural conservation is unlike the traditions passed on from generation to generation in North America which contain, as Bowers argues, distinct underlying assumptions antithetical to conservation, such as the belief that "the environment is an exploitable resource" (p. 7). Rather, Bowers asserts that the environment is not an exploitable resource, the concept of exploitation metaphorically implied in the term *natural resources*. The word *resource* infers that it is something to be used for one's own purposes. He posits, as does Bateson (1979) and Berman (1984), that humanity is embedded within nature, dependent upon a symbiotic relationship with it for our own survival.

Bowers (2003) further asserts that in order to survive embedded within nature, we must understand which traditions help us to survive and which traditions hurt our survival. We owe our survival to the knowledge of the past and as a contract with the future. In order to live within an intergenerationally knowledgeable system, it is vital to have "continual reflection of members of a community" regarding what changes within an environment will "contribute to the well-being of the community" across generations (pp. 9-10). The continual reflections are the on-going conversations various communities have regarding how to survive environmental damage. The conversations are on-going with the past through a dialogue regarding what traditions have helped or hurt the communities survival and with the present regarding what can be

maintained or changed to help the communities to survive environmental degradations now and in the future.

One of the basic assumptions underlying constructivist pedagogy is the idea "that society is an organic union of individuals" (Dewey, 1959, p.22). As Bowers (2003) interprets this, he posits "that the individual (not groups) is the source of ideas and values" (p.7). Two outgrowths of that assumption of the focus on the individual in constructivism include the following: 1) Knowledge is defined as "the meaning [one gives] only within the reality of our experiential world...It is made of the network of things and relationships...It is a compendium of concepts and actions that one has found to be successful, given the purposes one has in mind" (von Glasersfeld, 1995, p.7). As Bowers (2003) interprets this, "ideas and values are matters of individual judgment" (p. 45). 2) The second outgrowth is that the purpose of education is "freeing the life-process for its own most adequate fulfillment" (Dewey, 1959, p.101). As Bowers (2003) interprets this assumption, he asserts that "individual freedom and the pursuit of self-interest [are] the highest value" (p. 45).

Bowers is critical of these ideas because they do not contribute to the communal well-being or intergenerational knowledge. In pedagogical terms, many of these assumptions, as Bowers asserts, are reflected in the work of John Dewey. The pedagogical implication of Dewey's philosophy fosters learning that is of personal interest to the learner, often through inquiry

where the learner explores answers to his/her own questions. In Dewey's (1933) words, "the child's own instincts and powers furnish the material and give the starting point for all education" (p.20).

Moreover, for Dewey (1933), intellectual thinking is about problem solving. It is about the "demanding for a solution of a perplexity" (p. 14). This problem solving has its intrinsic motivation in the ability to have control over the problem. As Bowers would suggest, however, problem solving in this sense, is about solving present moment problems without regard for the past or the future or how solutions are "viewed as part of a contract that the current generation has with past and future generations" (Bowers, 2003, p. 10).

Moreover, Bowers (1997) critically asserts, within a pedagogy of personal meaningfulness, there is an overemphasis on the notion of individualism raising consequences of a way of life based on this assumption. To hold the individual as a domain of relevance within a social group means ignoring the "participatory and embodied patterns of community" (Bowers, 2001, p. 145). Bowers explains community in this sense as "an explicit understanding of relationships and processes, and an embodied knowledge of community relationships and ecology of place" (p. 152).

He further argues that another assumption underlying Western culture is the idea "that change is linear and inherently progressive in nature" (Bowers, 2003, p. 7). An outgrowth of this belief is the continual "quest for

new ideas, insights, and interpretations" (p.39). To change to communal relationship, Western society, which seems to be a "society of individuals emancipated from the authority of communal traditions and views change as the expression of progress," would transform to a society interconnected by a focus on relationships of communal concerns (pp. 15-16). For Bowers (2004), change as an expression of progress is one of the underlying assumptions that threatens a sustainable approach to everyday living. As Bowers interprets Dewey's thinking, problem solving focuses on solving present moment problems as they relate to everyday life. They do not focus on considerations of preserving the commons, preserving cultural traditions, and preserving resources for future generations. Bowers uses computers as an example of the technologically advanced tools for education that supports constructivist ideas. He states, that "computers amplify a cultural view of learning that represents data as the basis of thought, and puts out of focus how the metaphorical language that appears on the monitor encodes and reproduces a culturally specific form of intelligence" (Bowers, 1997, p. 110). It holds in high value scientific, theoretical and "technologically based knowledge" which focus on solving present moment problems, i.e. within this generation, and equates change with progress (p. 113).

An uncritical use of constructivism ignores "the importance of cultural traditions in shaping the attitudes of the individual" (Bowers, 1997, p.120). Cultural traditions aid in the understanding of humanity's "participating in

a community of memory that frames a common vision of the future dependent upon a process of transgenerational communication where both elders and the new generation understand the importance of their respective responsibilities in terms of the community—rather than from the perspective of the autonomous individual..." (p. 123).

This disconnection from community, the knowledge of past generations and a concern for future generations, as Bowers (1997, 2001, 2003) has argued, is endemic in the hidden assumptions of a specific form of constructivism. More to the point, Bowers' point of criticism of constructivist assumptions include the following: that "the individual is the source of ideas and values" (Bowers, 2003, p. 7); "ideas and values are matters of individual judgment" (2003, p.45); "individual freedom and the pursuit of self interest is the highest value" in our culture (2003, p. 45).

Bowers, however, fails to understand two important points. 1) He has set up the concept of the individual as a focus for society or community as a focus for society as a false dichotomy. Dewey (1933) believed that the individual "child" was the "starting point" for all education (p. 20). Dewey did not state that this was the ending point. It is not an either/or proposition, that one can have either the individual as an important part of the experience of learning or the community.

Constructivism as defined by Vygotsky, for example, expands the experience of learning for all individuals within the context of community.

The idea is to learn from each other. Bowers seems to misread that the focus on the individual as a basis of the social unit precludes a focus on community. A focus on the individual and the development of a communal identity does not have to be an either/or situation, i.e. either individual or community. To Bowers, it is individual or community. Dewey suggests an either/and idea, that has the individual in community. Dewey, as one of the foundational thinkers of constructivism as well as Vygotsky who is representative of the sociocultural constructivists, hold the idea of the individual and community learning together, one increasing the learning of the other. By focusing so myopically on the idea of the individual as the underlying assumption, Bowers misses that constructivism holds some of the key processes that can unlock an environmentally sustainable educational focus.

Bowers' argument hinges not on constructivism as a whole theory but rather on the specific subset of radical constructivism. Von Glasersfeld (1996) as a leading and current example of radical constructivism, posits that reality is a personally, highly idiosyncratic mental construct. Pedagogy based on radical constructivism enhances the taken-for-granted assumptions regarding the individual's importance relative to personal meaning and values. Bowers' critiques, thereby, land squarely on the philosophy of the radical constructivists.

Despite Bowers' critiques of radical constructivism and his misinterpretation of Dewey's thinking, he does offer part of the key for setting an agenda for a new type of constructivism, which is a melding of both environmental sustainability and sociocultural constructivism, and which will be referred to as communal constructivism. What Bowers suggests is that not "participating in a community of memory that frames a common vision of the future dependent upon a process of transgenerational communication" is problematic for a sustainable future (1997, p. 123). This argument highlights the specific tension between constructivist pedagogy and environmental sustainability: Constructivist pedagogy, because it focuses on personal meaning making, lacks a set of guiding principles that set a moral compass as part of the inter-generational decision-making process of education.

The Moral Compass: A Set of Guiding Principles

Emerging from the literature of environmental sustainability are the guiding principles for the pedagogy of communal constructivism, which would have an overarching purpose to "ensure the quality of life for future generations" (Bowers, 2003, p.122). What separates the emerging process of communal constructivism from sociocultural constructivism and what it gains from environmental sustainability, to some extent, is, as part of the process, a moral compass from which the process must flow. These guiding

principles inform the idea of responsible embeddedness within a system of community(ies). Although current examples lack the guiding principles, one can extrapolate from the literature what these would include.

Bowers (2003) offers one guiding principle. He posits that the "well being of the community and the present generation has a responsibility to past and future generations [which] cannot be reduced to a set of policies determined by outsiders or by elite groups within the community" (p.10). Rather, Bowers considers it vital to understand patterns of thinking that can be destructive to environmental systems that derive from an understanding that, "the traditions of different culture communities have developed in response to living in different physical environments. Therefore, their traditions of technology, patterns of mutual support, ceremonies, knowledge of local ecosystems, and so forth should not be subverted by abstractly formulated ideas about the need for a universal language, a world monoculture, and an autonomous form of individualism" (p.10). This is about the contract the current generation has with the past. In other words, this contract is reconciling the tensions between the needs of the individual's interests and the needs of the community. It is about reconciling the tensions between the need to change and adapt to current conditions and the honoring of "intergenerational experience (traditions) that have been tested" over time (p. 11). It is about reconciling the "tensions between knowledge derived from theory and critical reflection, and knowledge based on direct experience of a

place-centered life" (p.11). It is about balancing an understanding of the past, present, and future. "Too much emphasis on conformity to the norms of the community may limit the development of the individual's special talents and interests, while a singular focus on the right of the individual to become autonomous in all aspects of life overlooks the many ways they are dependent on the community's network of supports" (p.11). One of the guiding principles becomes: How does this (practice, process, pattern of thinking, decision) help to sustain the quality of life for each individual and for the community(ies) for generations to come? Such consideration of intergenerational relationships requires not only discussions that are passed along horizontally through present time dialogic engagement of various communities, but also vertically through time by the communities' discussion of the relationship of traditions and culture to the health of the community, the "intergenerational experience" (p. 11).

Bateson (1991) offers another guiding principle when he writes about one's "organic perception" of the world (p. 26). With this phrase, he was indicating that how one perceived one's place within the natural world, which is somewhere on a continuum from separate from the rest of the world to embedded in it, affected how one understood and acted in the world. For example, the more separate one perceives one's self to be from nature, the more comfortable one can become with using nature as a resource for one's own end. Guiding principles for communal constructivism are the questions:

How are we embedded within this system? How does what we (collectively and/or individually) do affect this system?

Orr (1994) offers another guiding principle when relates that the "goal of education is not the mastery of subject matter. Subject matter is simply the tool" (p.13). He was expressing that knowledge learned in any subject matter must be learned for a purpose and that purpose must be about asking the question: How does this knowledge affect humanity and the world in which people live?

Importantly, since communal constructivism is about building intergenerational community and is rooted in social constructivism, the process of developing a set of guiding principles would be part of an on-going community dialogic inquiry. Such a process allows the guiding compass to adapt to the changing environments and needs of community(ies) as they meet the basic tenets of the principles. It would be a living set of principles as opposed to procrustean rules.

Constructivism Supportive of Environmental Sustainability

The forms of constructivism, however, that align in viable ways with the criteria Bowers argues is necessary for a sustainable environment derive from the seminal work of Vygotsky and the sociocultural constructivists who are aware of the embeddedness of meaning in a social and cultural context and their mediating influences. A point of intersection between sociocultural

constructivist and environmentally sustainable epistemology is the awareness of how language transmits and influences shared cultural meanings. Bruner (1992), for example, explores how cultures work together using "shared symbolic systems "and traditionalized ways of living" (p. 11). Further, social constructivism is concerned with "the social patterns and rules of language use" (Ernest, 2004, p. 2). Social constructivism does not focus on the individual but rather on the shared experience of a culture. This epistemology concerns itself with "a system that both precedes and outlives the individual...it is already constituted; it is borrowed from existing genres...already in place" (Gergen, 2001, p. 805). It already has as an assumption of a connection, philosophically, from past generations to present generations. Through the dialectical nature of social constructivism, it connects present to future generations. Thus, social constructivism has another point of intersection with environmental sustainability.

Social constructivism provides for communal dialogue, particularly surrounding issues of concern. Spector and Kitsuse (1977) assert that "social problems are constructed by members of society who attempt to call attention to situations they find repugnant and who try to mobilize the institutions to do something about them" (p. 78). They list a number of steps in a process that groups use to develop a shared meaning of a social issue and that then aid the group in mobilizing to action. These steps include "defining the issue, giving it a name, developing a theory to account for this trouble" (p. 85). By

going through this process, members of society can make the issue clear for others and show it is an experience that affects others as well as, and importantly, an unsatisfactory lived experience that has a possibility of being transformed into a more satisfactory lived experience for everyone (Spector and Kitsuse, 1977). The literature of environmental sustainability seems to be going through this process of socially constructing an issue in order to mobilize society to action. However real the issue may be, especially concerning environmental concerns, the larger society becomes mobilized effectively when the problem has been defined, named, unsatisfactory lived experiences have been clarified, and solutions have been offered. The literature of environmental sustainability has been doing just that with the added recognition that regarding any solutions, "the current generation has a moral responsibility to leave future generations an environment that is not degraded" (Bowers, 2003, p.163).

Conservation was the term used pre World War II to address the idea of developing a communal awareness and process for taking care of natural resources (Scheffer, 1991). Concerned groups of people began to become disturbed by the Western world of "burgeoning human population, urban blight, the pollution of air and water, the hazard of anthropogenic chemicals, and the disappearance of old wilderness" (p.3). Thus, as Scheffer has stated, the idea of conservation gave way to the current concept of environmental sustainability. This current concept deals with not only "what and how" to

sustain natural resources but also "why" we need to deal with it, i.e. survival of life on this planet (p.3). The activism of the 1960s and 1970s, which was given a cultural voice by such writers as Rachel Carson (1962), defined the term conservation in much broader terms and named environmental degradation as an issue of repugnance to growing social groups. Further, the growing epistemology of environmentalism began to center on the notion that sustainability was a matter of "attitude" (p.33). In order to transform a change in attitude, information had to be related that demonstrated the effect environmental issues were having as part of a communal problem. The community needed a shift in perception regarding how to go about everyday life in order to change.

In this defining and naming a social problem to make it relevant to everyday life, it is key to demonstrate that the problem is solvable. Scheffer (1991) offers eight components to a solution:

- Placing more emphasis on reducing human overpopulation.
- Measuring the carrying capacity of local ecosystems and managing them accordingly.
- Restoring (insofar as possible) and protecting the agricultural base: the ancient and forever nursery of humankind.
- Carefully rationing the use of irreplaceable minerals and fuels.
- Stop disposing of wastes by dumping them somewhere else.
- Measuring the health effects of the myriad anthropogenic poisons which, unrecognized, enter our bodies every day.
- Placing more emphasis on protecting the purity of the shared world environments such as tropical forests, the ocean, the atmosphere, and the stratosphere.
- Preserving the biological diversity, the earth's greatest treasure (pp.167-168).

Several of these solutions call for a change in the basic assumptions of how we go about everyday life in Western society. One is sharing the commons, including land, ocean, air, and forests (Scheffer, 1991: Bowers, 2001).

To the current formulation of the issues in environmentalism, two key factors have been added (Scheffer, 1994). One is the idea that issues that occur locally affect the biosphere as a whole (Scheffer, 1991; Bowers, 2001; Orr, 1994). The second are the problems of overpopulation and the problems inherent in too many people's footprint on the ecology of the earth (Scheffer, 1991; Bess, 2003).

Shabecoff (2003) calls environmentalism "a major social movement, a movement that is becoming one of the most powerful political and cultural forces of our time" (p. xiv). During the 1970s and 1980s, people in countries all over the world were giving an environmental voice to the problems of rampant industrialism that consumes ever more natural resources, invents synthetic substances and "spews the wastes and effluents...many deadly to human health and the natural environment—into the air, dumped into the waters, and buried in the earth. The residues of industrial activity began to turn up in the shells of bird's eggs, in the flesh of animals, in mother's milk, in the blood of children and in the body fat of almost all humans" (p. 73).

The defining of environmental sustainability and its implications for humanity are very much a part of the current socially constructed dialogue. This means as a shared cultural meaning, groups are engaged in defining the

problem and making clear the unsatisfactory lived experiences. Once a group has made the case for a social issue, constructivist approaches can be used to transform the solution from an issue that calls for action to becoming a way of everyday life for society. Schutz (1970) explores the idea of social construction by analyzing what is important to everyday life. He posits that social relationships are shared meanings of events, although there are overlapping meanings, not quite captured in the shared meanings, which are unique to each person. He argued that a key factor for understanding social systems is the notion of relevance. What is relevant to a cultural group is the "hierarchy of values any social and cultural group establishes as its domain of relevance" (Wagner, 1970, p. 24). These "domains of relevance" are established through culturally shared meanings and criteria of what are valued in each cultural group, values which are passed on to succeeding generations (p.24). In Bowers' (2003) language, these are "intergenerational experiences" of a culture group or the traditions that are passed down from one generation to the next and which are the contract of the past generation with the future (p.11). Some of these values are passed down through assumptions, some hidden and some explicit, about what is of importance in everyday life. Wagner (1970) offers the example of a society which holds two different domains of relevance. One society might hold "technical achievement" as dominant in which case skills of math, science and analytical thinking would be valued (24). The other group might hold

"religious achievement" as the highest value in which case a different set of skills would be valued (p.24).

Thereby, social communities have hierarchical sets of shared values which are passed on from generation to generation. To change a hierarchical value, the first step is to define it as a domain of relevance within the shared meaning of a social system. "The order of domains of relevances prevailing in a particular social group is itself an element of the relative natural conception of the world taken for granted by the in-group as an unquestioned way of life" (Schutz, 1970, pp.114-115).

This may be the case for environmentally sustainable epistemology. Regardless of the realities of environmental degradations—depletion of the ozone layer, melt down of glaciers worldwide, increasing greenhouse gases—the first step in making environmental sustainability a domain of relevance is to question the unquestioned way of life. The focus of the literature of environmental sustainability seems to do that: raise the question about a social system's current way of life and the consequences of such a path.

Orr (1994) questions the purposes of learning and the consequences those purposes have for future generations. He believes that "all education is environmental education" (p.12). No matter what subject area is being taught, each discipline is a part of the other, influences the other, and they all influence what occurs in the natural world. He uses as an example the teaching of economics, arguing that economics has "important ecological

lessons" contained within it, as do all of the disciplines (p.12). He further argues that it is important to understand that "knowledge carries with it the responsibility to see that it is used well in the world" (p.13).

Educators as change agents can aid in this process by understanding constructivism as tool of social change and by using the process approach of constructivist pedagogy as a means to connect to the personal interests of the student. Constructivism is an epistemology and a pedagogy of personal meaningfulness. It is also an "intellectual tool" to connect specific and content rich knowledge to "having ideas of what to do, at raising questions, and at answering [one's] own questions" (Duckworth, 1996, p.10). It is a way to connect a social issue to individuals in a pedagogy of personal interest.

Using a constructivist approach to pedagogy, educators can build on personal connection, to help students form cognitive scaffolding between prior and new knowledge and the larger picture of the connectivity of knowledge that has meaning. To accomplish this, providing for meaningful experience for students is essential. As many expert teachers intuitively understand, "knowing and learning take on importance only when we are convinced it matters, it makes a difference" (Meier, 2002, p.41). For students to become fully engaged in the learning process, according to Gadamer, "something awakens our interest—this is really what comes first!" (Cited in Jardine, Clifford, & Friesen, 2003, p. vx). To facilitate this we must invite students into the educational conversation. By using an approach that is

personally meaningful, through inquiry, teachers can connect students in intellectual and emotional spaces where "an unexpected question triggers an exciting and provocative tangent; the changing moods and emotions of individuals create a unique and often perplexing life/world in classrooms..." (Slattery & Rapp, 2003, p. 96).

But as Bowers (2001) has stated, connecting to personally meaning learning in a constructivist sense with its overemphasis on individualism may not explicitly or implicitly teach the concepts of community, traditions, and intergenerational relationships and may implicitly teach ways of thinking that reinforce individualism to the detriment of community, traditions, and intergenerational responsibility. As an example of explicitly taught concepts, "few in the constructivist classroom would be able to recognize the difference between an older person and an elder, or understand the importance of elder knowledge to the moral ecology of the community" (p. 70). Elder knowledge is defined as "esteemed elders...those individuals who have experienced a profound and compassionate reconciliation of outer and inner directed knowledge, rather than virtually anyone who has made material achievement or simply survived to chronological old age" (Suzuki & Knudtson, 1992, p.18). Elder knowledge can "penetrate to the deepest and most heartfelt realms of human understanding" (p.230).

Perhaps environmentally sustainable pedagogy as a theory of teaching can inform constructivist learning theory by holding the individual and the

community in relationship. It can demonstrate how the individual is embedded in nature, is part of the process of a system's approach to life, is part of the cause and effect of what happens to the environment. We are already in community. Communal constructivism can offer the guiding principles of intergenerational pedagogy. It can further offer specific instructional strategies, processes, and models of teaching as well as different assumptions about the act and experience of teaching, including its form and content. Moving the learner beyond the notion of the individual as the basis of society-- i.e. society defined as a group of individuals-- might be accomplished by using environmental sustainability as the content of pedagogy, with a constructivist approach. In this way the personal can be connected to the communal through the content of environmental sustainability, yet offered through experiential and inquiry based processes.

A critical use of communal constructivism can "build toward an understanding and a capacity to participate in a complex social and biological world" (Bateson, 1994, p. 24). Like a child begins life with a self-centered interest in his/her own needs (food, warmth, love), so can teaching begin with personal meaningfulness. Like a child matures into caring for others beyond its own self-interest, so teaching can connect and extend personal meaningfulness to communal and environmental meaningfulness by using the processes of constructivist learning theory and the content of environmental sustainability.

CHAPTER V

PEDAGOGICAL IMPLICATIONS

Communal constructivism begins with guiding principles and includes processes that merge both sociocultural constructivism and the pedagogy of environmental sustainability. In practice, current emerging practices exist to begin to demonstrate how communal constructivism can look. It is important to note, however, that these are initial forays into communal constructivist processes. As such, these practices become overly focused on curricula and content, especially science content, and less focused on the pedagogical processes as they relate to learning. There is a reason for this.

Part of the problem stems from the literature's naming of the framework as environmentally sustainable pedagogy. Spector and Kitsuse (1977) state that how one names an issue structures how one will frame and orient to the issue. By naming this body of literature under the rubric of environmental sustainability, the pedagogy which flows from it is hobbled by that name. As Orr (1994) argues, "all education is environmental education" (p 12). It is a process that has implications in all the disciplines including social, economic, international, humanities, arts, and sciences, to name a few, well beyond only environmental concerns. Communal constructivism is a pedagogical process that helps to understand how systems work. It is a process guided by

a set of principles and by a purpose of learning that is focused on how community and the individuals within various communities are part of the process.

Because environmental sustainability tends to focus on the environment, what is translated into pedagogical practice--just as is often translated into legislative practice—is the obvious link to the science of sustainability, rather than the larger context of the transdisciplinary processes of communal constructivism suggested by the guiding principles and the processes of sociocultural constructivism and environmental sustainable pedagogy. The process of communal constructivism begins with and is informed by the guiding principles. Communal constructivism is also informed by the pedagogical implications of sociocultural constructivism, for example, inquiry as process. It is also informed by the systems thinking of environmental sustainable pedagogy which, as part of its process, often begins investigation in local knowledge and then moves to larger contexts. It is also informed by environmentally sustainable pedagogy's idea of our embeddedness in a natural system as opposed to the Cartesian's view that we are separate from the system.

Hutchison (1998) asserts that "learning is not simply an intellectual exercise, well-removed from the world outside the classroom, but rather as a cultural endeavor on the part of the child, who is building the foundations of an emerging cosmology of the world" (p. 127). The purpose of education, then,

is to "nurture in children an ecologically sensitive view of the world," a view that is "biocentric rather than an anthropocentric" (p.153). Thus, communal constructivism would transform the underlying assumptions of sociocultural constructivism. Constructivism has as an assumption the idea that the individual is the basic unit of society, although influenced by society. An outgrowth of this assumption is that the individual is free from the constraints of past or future and unbounded by ties to responsibilities other than to self and those self-imposed to the idea of an individual embedded within a community responsible to and for that community. Communal constructivism has the underlying assumption that community is the basic form of society with an understanding of the importance of the individual. This means "shaping a culture that is more responsive to the needs of human beings and the requirements of natural systems. When we refer to 'culture' in this way, we are not suggesting a single set of responses that must be identically adopted by all people; such a culture may well be multifaceted in its manifestations" (Smith & Williams, 1999, p.1). An outgrowth of this is a "moral reciprocity within communities that ensures a balance between" the individual and the community needs (Bowers, 2003, p. 88). As an example, this can mean "individuals must be granted the opportunity to criticize oppressive relations and the freedom to leave community, but also...to seek security and satisfaction through collective effort instead of individual striving" (Smith & Williams, 1999, p. 2). It is the underlying process of

education that becomes different. The lens through which education is viewed shifts from analysis and problem solving, i.e. relating to issues as though they were problems to be solved. Rather, the process becomes understanding that "human cultures have arisen in response to the demands and opportunities of particular ecosystems" (Smith & Williams, 1999, p.3). Humans, then view the process as embeddedness in a system, the flow and ebb of that system and one's (individually and collectively) effect on interacting within that system.

Within schools, communal constructivism as pedagogical practice involves a transdisciplinary, holistic approach to education (Keifer & Kemple, 1999). Educational practice, for example, can be grounded in the study of bioregional knowledge through investigation into local communities and resources (Orr, 1994; Kiefer & Kemple, 1999; Bowers, 2001). Specifically, curriculum becomes based on several basic understandings: intergenerational thinking, systems thinking, dialogic and inquiry based processes, embeddedness in a natural world including community, holistic, transdiciplinary education. As Smith (2002) states, "the aim is to ground learning into local phenomena and students' lived experience" (p. 584). In this way students can use the process of connecting from personal experience by studying local systems and then move to connecting that learning to investigating ever larger communal systems and how these systems interconnect and affect humanity economically, socially, politically,

environmentally, etc. In this way, students can also become invited to participate in community, either locally or on a larger scale, as part of the knowledge base, decision-base, or active process of community issues.

Smith (2002) asserts that bioregional knowledge as fundamental beginning point for sustainable education provides a way for students "to connect themselves more deeply to their own traditions" (p.586). It also provides a venue for the study of ecology and how each person lives and by extension what each person values, and how that value affects the ecology of the earth. It allows for an "induction into community processes" and a sense of agency regarding communal life (p. 590). Additionally, it allows for transdisciplinary curriculum.

Keep in mind that existing exemplars tend to focus on the content of this pedagogy (bioregional knowledge, environment as content) more than the processes (inquiry learning, transgenerational learning, and our embeddedness within systems), and lack the explicit guiding principles.

Emerging Pedagogical Practice

Practitioners are, however, moving in the direction of demonstrating how communal constructivism, as a budding process, can look. The Environmental Middle School in Portland, Oregon currently hosts a student population of 218 students in grades 6-8. EMS is a mixed grade school in which students are learning to become "engaged and ecologically literate

citizens" (Smith, 2004, p.73). The school's curricular content is fundamentally based on bioregional knowledge as the students develop a "deep regard for the land, the air, water, and each other" (p.84). The curriculum, then "addresses the health of social and natural systems" (p. 77). The process that is used as students engage in the study of the bioregion is often inquiry based-- a constructivist process. In fact, one of the major questions that the students answer throughout their time at EMS is this: "What kind of places do we want to keep and what will we have to do to do that?" (p. 84). As Kiefer and Kemple (1999) assert "by linking education and ecology at the very heart of the school development process, we are both providing schools with real-world context for learning to take place and building a foundation for holistic education that honors the natural connectedness of all things" (p.43). This includes addressing more than just ecological issues but encompassing a network of embedded, connected systems including, for example, social, political, and economic, to name a few.

Located in Bar Harbor, Maine, the College of the Atlantic is similarly a transdisciplinary curriculum, at the college level. Local bioregional knowledge is the fundamental curricular content here, also. "The College of the Atlantic enriches the liberal arts tradition through a distinctive educational philosophy—human ecology. A human ecological perspective integrates knowledge from *all academic disciplines* and from personal experience to investigate –and ultimately improve—the relationships

between human beings and our *social and natural* communities" (College of Atlantic, 2004, p.1). Although the college offers one undergraduate degree in human ecology, it offers several in graduate studies including educational studies as well as teacher certification in environmental science, museum education, and social studies. Their transdisciplinary, holistic program offers a way to investigate, study, and understand the "interaction of people and natural systems" (College of Atlantic, 2004, p.1). Similar to EMS in Portland, the programs in this liberal arts college explore the idea of the interconnection and embeddedness of the human community within the natural world, starting at the local bioregional level then moving beyond the local community level to an international level.

Faculty from the Moray House School of Education at the University of Edinburgh in the United Kingdom and the Institute of Education at Manchester Metropolitan University collaborated on an education module that developed a study guide for primary and secondary teachers. This guide is based on the SEEPS (Sustainable Education in European Primary Schools) project and is the UK's contribution to the work of the UNESCO teacher advisory group for educating for sustainability. The modules advocate a holistic approach to education. The content of the curriculum investigates local bioregional knowledge and uses constructivist approaches, particularly those which "recognize that learning requires the building of meaning by learners through social networks" (Educating for a Sustainable Future, 2004,

p.1). Again, the focus of the modules is to help students become environmentally educated and ecologically literate and to understand humanity's embeddedness in the natural world and the interconnectedness of all life.

That a community engaged in reflective dialogue is an important aspect to the education of a community is reflected in the Sustainable Development Initiative of Canada. The Council of Ministers of Education, Manitoba Education and Training (Sustainable Development Initiative) acknowledged the need for "a general public involvement in the process that provides the community with a forum for discussing local sustainability and a platform to identify priorities and actions to be taken (CMEC, 1999, p.100). As Spector and Kitsuse (1977) argue, it is through an engagement in socially constructed argument over socially constructed issues that action will occur. Sustainable education fosters such a situation. In fact, one of the emerging core principles of environmental education is the "preparation for work as activists able to negotiate local, regional, and national governmental structures in an effort to adopt policies that support social justice and ecological sustainability (Smith, 1999, p.7). Constructivism is tied to personal exploration of meaningfulness. With investigations into bioregional and local issues, the personal, individual focus of pedagogy can be transformed to a communal focus regarding the needs of society and each person's embeddedness in nature.

At the core of constructivism is the perception that the individual is disconnected from, rather than embedded within, the natural environment (Bowers, 2001). It is this perception which has the feeling of being "detached from our relatedness to one another" (Smith, 1992, p.40). Educators are key in their mediating position for preparing students for a shifting from the everyday lived experience of the underlying assumption that the individual is the basis of society. Instead, "an educational model capable of transmitting and confirming [a different] worldview...would draw children into the lived experience of interrelatedness and away from the detached independence currently cultivated in contemporary classrooms" (Smith,1992, p.93). The underlying assumption of the everyday lived experience could become the belief that community is the basis of society.

Understandably, educational transformation as a socially constructed issue aids in giving a venue for cultural groups to develop shared meanings regarding issues which are of importance to a group and that can become a frame of reference in a changing paradigm. As an initial step in the process, through the use of constructivist pedagogical process using environmentally sustainable pedagogical content and guiding principles, a transformative educational agenda within schools systems can be fostered.

Although there are a number of people writing about how to educate for environmental sustainability—Bowers (2003), Orr (1994), Hutchison (1998), Smith (2002), for example—there is no theory of teaching that comes from

this literature base. It seems, however, that this is one of the directions it is heading in reference to educational implications. There is an overarching educational framework and guiding principles emerging from these sources that have roots in environmentally sustainable and constructivist pedagogy.

For example, one direction is the emphasis on local knowledge as a means for ecological sustainability; another is an emphasis on "holistic education that honors the natural interconnectedness of all things (Kiefer & Kemple, 1999, p. 43). Education based on the dialogic reflection of the "experiences of community" is another (Bowers, 2003, p.9). This means that being part of a community requires "continual reflection by members of a community" (p. 10). Change is not a linear progression. Rather, change is "viewed as part of a contract the current generation has with the past and future generations" (p.10). As such, the important question of what places we want to conserve and what we should do about it that are asked at the Environmental Middle School in Portland, Oregon and by extension at the College of the Atlantic and the study guides of the United Kingdom's joint education program needs to be asked in light of these issues: "What traditions of different cultures have developed in response to living in different physical environments?" (Bowers, 2003, p. 10) How do "traditions of technologies, patterns of mutual support...knowledge of local ecosystems" help humanity and the ecology of the world to survive? (Bowers, 2003, p. 10)

Bess (2003) writes about the tensions humanity holds in paradox as we try to problem solve the damage we currently do to the environment. He posits that

> We are deeply wired, most of us, to form concepts about our surroundings, and then to take action, making tangible adjustments in the reality that confronts us, until it conforms more closely with our ideas. We are inveterate interferers. And yet, it seems, this is precisely the habit we would have to unlearn, if we wanted to have a chance of stemming the rising tide of artificialization. We would have to learn how to be comfortable with holding back, standing clear, refraining. The opposite of intervention. The opposite of control. (Bess, 2003, p. 282).

He explores the idea of characteristics of the wilderness areas of the world. He defines wilderness not just as the areas one would naturally think about like a Himalayan mountain peak or a wild river gorge, but rather to accept the idea of wildness, i.e. "allowing life enough breathing-room to develop according to its own powers, without interference, right alongside our human species (Bess, 2003, p. 282). That means that there would be wildness to protected areas of the world that might have some wilderness aspects to them already, aspects that have not been encroached upon by human endeavors or interventions or management. That also means allowing an amount of wildness to our own backyards where we "allow" life to go on without human intervention, where we give up our own control.

He describes these two possibilities as "Eco-Management and Eco-Restraint" (Bess, 2003, p. 279). In Eco-Management, the framework of knowledge production would be holistic and systemic in which the

environment would be managed under varying sorts of control. The other would be Eco-Restraint in which some of the environment would be managed and some would be outside of human control, without human access, "delimited areas" (p. 282).

For sustainable education, educators will also need to hold a similar wildness: letting go of the current paradigm and giving over to holistic, transdisciplinary education. "The goal of education can become to connect intelligence with an emphasis on whole systems," not to confuse information with knowledge, and to understand knowledge and its "effects on real people and their communities" (Orr, 1994, pp.11- 13). Thus, the importance of local bioregional knowledge is to connect the content of learning in local communal knowledge that can extend into the larger knowledge of interconnectedness beyond the local. It is also important to acknowledge that "process is important for learning" (p. 14). This extends into constructivist ways of learning that marry sociocultural and social constructivism and the dialogical nature of community building with the processes of environmental sustainability. In this way students can understand a connection between knowledge and community, which extends personal meaningfulness to communal and environmental meaningfulness.

Communal constructivism, therefore, offers new assumptions. Humanity is embedded in nature, not separate from it. Transgenerational knowledge is important to our survival; the cultures and traditions of the

past can inform the present. The present generation pays attention to these cultures and traditions as we hold reflective communal dialogues in order to decide how to pass on to the next four generations an environment that has not been damaged. An outgrowth of this assumption is the need to live on the earth with a smaller footprint.

And finally, there is the assumption that the community, rather than the individual, is the basic social unit. This is different than social constructivism which is based on the assumption of the individual, i.e. the individual in conversation. In social constructivism, how individuals construct a shared meaning and a shared understanding of culture is the focus. Communal constructivism is also different than social cultural constructivism, which also has the assumption of the individual as of prime importance: this approach to learning involves how the individual constructs learning within the architecture of one's mind influenced by social and cultural interaction. Communal constructivism offers a focus on community as of prime importance. It is the relationship of communities with the living system of a conscious planet and the relationship of each individual within that system that is of primary focus, not the individual. Community can be comprised of differing social units such as the community of family, of culture group, of local community, etc. With the processes of traditional constructivism informing the processes of environmental sustainability, communal constructivism can begin to develop into a teaching theory that

can be a source of connection, not compartmentalization into disparate disciplines, and a source of communal cooperation and identity, not individual competition and isolation. The process of cooperative learning, inquiry, experiential learning, as examples of constructivist pedagogical processes, can be sources of connection to what is meaningful to each person's heart and sense of who she/he is in the world. Schooling however, is a concept and not a place. By moving school beyond the school house walls and into the community by beginning with the study of local bioregional knowledge offers learning on so many levels. It offers a connection to elder knowledge as students explore the knowledge base of those adults who know what there is to know deeply and well about the local regional systems. It offers a venue for exploring connections to the community and how each person affects community, can become involved in community, and is a part of community. It offers a venue for exploring systemic effects of one's local community to the larger systems beyond the local--from the singular, local to the communal whole. The pedagogical implications of communal constructivism can also offer evaluative criteria for dialogic community decision making regarding the systemic effects of what one (singular or communal usage) does by answering questions of : How does this affect the future for our children generations from now? How does this preserve the traditions and cultures of different communities? How are those traditions and cultures helping or harming the preservation of the ecosystem for the

present and future generations? These are part of on-going vibrant communal conversations. Piaget has said that the "property of knowledge is the attainment of truth; whereas the property of life is simply the quest for survival" (Piaget, 1967/1971, p. 361). Ultimately, in communal constructivism, the quest for truth and knowledge and the quest for survival can be woven into a single tapestry by being aware of how our patterns of thinking, educational processes, and actions help us all to lead meaningful lives that contribute to growth personally and communally and, in the process, result in a healthy ecosystem for our children's children.

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