An Ecogenesis for Education:
A Context for Learning

Perceiving Systemic Patterns in the
Design and Creation of Learning Communities

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CHAPTER ONE:
INTRODUCTION AND INDEX

The three principal endeavors of a Bard:
One is to learn and collect sciences;
The second is to teach;
The third is to make peace
And to put an end to all injury;
For to do contrary to these things
Is not usual or becoming to a Bard.
The Triads of Britain

I seek with respect and humility to follow the integrity of the bard as I report my learning adventure. The bard was a Celtic poet or minstrel. I extend the definition to my mode of sharing while attempting to honor the spirit of the original intention.

Some say that the Sixth Extinction is inevitable. There are facts that support this view that I cannot challenge. Nevertheless, I go with hope and the conviction stated by Krishnamurti in his conversation with David Bohm. The Ending of Time was their topic and these were the words: "Even if there is not time to change it is still the right thing to do." (Krishnamurti and Bohm, The Ending of Time, audio tape)

Living in a new way involves creating a worldview that sees humanity as a participant in the natural cycles of the Earth and subject to the laws of the Cosmos. This worldview implies deep regard for all of creation. It involves looking at how we are with one another. It involves how we learn together of this new way of being. It becomes a choice-less choice.

I will put forward several assumptions that lay background for asking questions that I will follow in this inquiry. There are challenges of immense proportions facing humanity.

Three prominent ones are:

- Global ecological deterioration
- Social unrest including a loss of identity and meaning
- Perceptions that current educational approaches are failing

I give credence to the idea that these three salient aspects of the crisis are related. None can be approached with disregard of the other. My fourth assumption is also my strongest conviction:

- Education is the leverage point at which to address these challenges.

I began to clarify my own assumptions by questioning: "Might we form a more beneficial world view that encourages an educational approach that bases itself on sustainable natural systems? If so, in what ways might educational communities based on such context bring about healthy and appropriate atmospheres and environments? In this time of shifting perceptions, how might humanity discover meaning and identity imbedded in ecological consciousness and strong community commitment? In what ways might that sensitivity influence our relationship to the natural environment?

The driving question that emerges from the three challenges mentioned and the questions that emerge from them leads me to the overall-driving question of my inquiry.

What does it mean to create an integrative, ecological educational community?

I sought to investigate and understand the atmospheres and environments that would prepare, nurture and sustain both the environment and the participants in the process of forming educational community. My first focus centered on ecological shelter, specifically the possibility of straw bale construction being used to create physical shelter for learning centers. I could just see busy students creating their school grounds or communities to be a more inviting and "natural" place.

As a companion to that investigation I wanted to look at existing communities, school related or not. The intention was to see whether their social structure could inform educational centers of new ways of creating a deeper feeling of community.

Soon I recognized that to investigate and propose a type of architecture or construction materials would be yet another well-intentioned add-on to already fragmented school transformation attempts. My ideas to translate social structures from successful communities would fare no better.

In the course of this preliminary thinking, I experienced several profound yet obvious insights; the first was the realization that, for myself, I needed to begin with a much broader picture that would guide me to a range of related studies. I would focus on important details such as school architectural design and healthy construction later.

My other deep interest in systemic views seemed somehow related to this quest. Could I find a way to draw a larger context for my interest in community and ecological design by thinking of them as components in a system? Was a larger perspective available? Would it create the context needed to place the details into a larger holistic picture?

I identified three major perspectives from which to address the overarching question about learning and community and the many enfolded questions. These questions considered my assumptions and their relationship to one another. Living these questions called for systemic thinking.

First, I felt it necessary to enlarge my appreciation of the capacities of the learning human. If we begin to think in terms of community and relationship, what then do we perceive about the individual learner? What propels us as humans to want to know and do? How does our environment respect what I consider our innate tendencies for learning?

Second, I wanted to investigate what contexts might give meaning to those involved in a learning community. Are common worldviews necessary and indeed conducive to collaborative learning? We are living in a time that is increasingly understood to be one of transition. This description at times goes beyond transition or paradigm shift to the words crisis and chaos. The ruptures in society, including the debate about the purpose and delivery of education, have heavily affected thinkers who wish to understand our present dilemma and possible direction for the future. From what sources do we draw our worldview and thus sense of meaning that will help us address the challenges before us? Are the sources and the visions themselves transforming? How are these changing views emerging in our culture as we define our place in the world?

Third, I believe that our values will be clarified as we examine our worldview as a context for living. This clarification of values will reciprocally influence our behaviors and actions. I try to imagine the results that might evolve from the understanding of the needs and capacities of humans as these understandings interact with a new vision and

meaning. My special interest, and one of the given tenets of this course, is that whatever we do must be measured by its ecological integrity and its flexible sustainability. What actions are people who are investigating these emergent-thinking patterns taking?

Fourth, in what ways might I discern the inter-relationship of worldview and actions that originate in contemporary society as they influence the process of creating educational communities? What types of environments and atmospheres support this movement toward holistic living?

I have been a teacher and learner for most of my life. The beginning of formal work as educator came from a degree in Education some thirty-six years ago. Most of the years spent teaching followed after an international training in the Montessori approach to education as I taught in Montessori schools in various parts of the world.

An aspect of Montessori education that draws my attention is ecology. While some teachers are committed to this aspect I have noticed as a school consultant a neglect of this area. The Montessori school in which I last worked (Nova Montessori School, Christchurch, New Zealand) was one that a colleague and I began and owned. I felt free to experiment with ideas from my years of experience and ideas offered by other educators.

Since 1990 I have had the privilege of working with adult teachers. Being with children and the adults who teach provides for me the possibility of contacting great sources for change in the world.

More recently, I have been involved with community groups who focus on promoting healthy, organic living especially through a New Zealand project know as

Kids Edible Gardens. These gardens are on school grounds. The number of schools who wish to participate has astounded us.

Combining my previous experience with this investigation leads to an evolution in my thinking about the relationship of the learner and the natural environment. I began to be even more convinced of the impossibility of a separation between the two. I reviewed my points of interest. I want to know more about the learner and learning. I want to investigate contexts and worldviews that aid in forming learning communities. Will the combination of these aims reveal values and behaviors that are inter-related and inform one another? A new way of asking my original question comes into view: In what way might learners and the environment co-design processes, forms and patterns that prepare, nurture and sustain one another? Am I being so bold as to suggest that the natural environment has the power to participate in the design of our learning community?

As it is stated in the Bhagavad Gita:

> All actions take place in time by the interweaving of
> the forces of Nature;
> but the person lost in selfish delusion
> Thinks that he himself is the actor.

One night while reading Sophie's World (a young person's book on philosophy) with my daughter, it occurred to me that I was contemplating variations and elaboration on the most fundamental questions that have fascinated and frustrated inquiring philosophers through all time.

- Who am I? (A question pursued in chapter 2)
- What is the world? (Perspective on this query becomes Chapter 3)
- What do I value? (Edges of creativity help me to explore Chapter 4)

- What am I to do? (Chapter 5 Address actions)
- How am I to know? (Chapter 6 Addresses Learning Communities that advocate mutual inquiry)

These questions have been approached differently according to time and place. Cultures build themselves around the answers and the seeking of these answers. The process becomes a source of meaning. Humanity takes many paths in its search for meaning. The less formal expression of these questions is all around us through traditional folk wisdom, music, art, story telling, spiritual seeking and a myriad of other expressions that defy classification.

Through formal academic channels names have been given such as philosophy, religion, science, education or humanities. In giving label to these searches, isolation sometimes occurs and our searching ends among scattered fragments. The move now is to integrate the fields through which we search. E.O. Wilson expresses it by using the word Consilience.

Over the many months of reading, writing, research and participating in communities my vision has both simplified and expanded. I began to understand my own questions with greater amplification. My approach originally was one of adding-on new elements to the educational setting. A fragmented approach needed to evolve into a territory that was wider and yet more interrelated. I looked at the original question again.

What does it mean to design and create ecological, integrated educational communities?

I realized that I was not certain of the meaning of the question itself. How will I unweave the elements for my own understanding without permanently isolating them? In what ways will consilience remain my guide?

It became necessary to identify some of the salient elements of a learning community. Am I able to describe a learning community? In what ways might the ideas of community, learners and learning be joined? In my reading I often noticed variations of the terms "educational community", "learning community" and "community of learners" but without consistent reference. I found it necessary to work through my own conceptual framework to come to a working definition.

For me educational community is a more formal definition of a group of people gathered together in a setting such as a classroom in a school. We can trace the word *educare* to its origins of meaning to draw forth. One source indicated that it also meant to draw forth the evil from the child and leave only the good.

Today, at least in my frame of reference, "education" implies a room of individual people who arrive, hear a lecture, leave, study, are tested and repeat the process until all that is required about a subject is learned to an external standard of adequacy.

"Educational Community" changes the perspective dramatically in that it has an implication that there is interaction between the students, teachers and their surroundings. Some might even say that the student becomes teacher; the teacher becomes student. Mutuality occurs and moves to interactions and experiences with the world outside the classroom both in the human culture and in relationship to the non-human world. Thus combining education and community there is a movement toward participation and involvement.

"Learning community" adds a subtle nuance with a less formal identity of the group with a school setting than does the word educational. To me any group, such as

the community service groups to which I belong, are most definitely in a process of learning and change.

In this general look at the relationship among elements of a learning community, I do not restrict the age, composition or location of such a community. While entire schools have shared in this work, my practicum has also been introduced to less formal associations of people who work together in community projects. I believe that this blurring of lines of what is formal education and what is informal learning is a healthy movement.

Therefore, I next ask myself to define what I understand about the word learning. Learning seems well identified in the work of Henryk Skolimowski with his emphasis on learning being increasing sensitivities. All organisms learn, respond and adapt or perish. The sensitivities of simple to complex organisms allow response to ever changing surroundings. The human being adds reflective capacities to inform responses to interactions with the world. We have the capacity to filter the ways in which we think about required adaptations. This process creates choice.

With this understanding of the term learning, we might then come to an even more subtle yet profound interchange of words. Difference in concepts between the description of "community of learners" and "learning community" may be significant as the group identifies and re-identifies itself. Is it individuals learning in an atmosphere of sharing with other people or is it that groups of people can come together in community and learn as a unity? Is it possible that the community itself can be considered an entity that has a cohesion that is greater than the sum of the individual learners? Might it learn,

become sensitive, reflect, and move to actions that none alone could or would take? Is there an inter-play among these possibilities?

Who are the learners, and what do I need to include in this perspective about them and the learning process? What will they want to know about themselves? I need to explore contexts that might bring information to this group that would act as a basis for stimulating insights concerning how the world works. Have we noticed that the impact on our thinking that the concept of Gaia has brought? The implication is that Gaia supports life and life supports life. In other words, a context that might offer meaning to the process of designing and creating learning communities is a relatively new theory with a very long history. We will look in detail at this concept of Gaia in Chapter 3.

My search turned toward identifying more of the "why" of learning communities. Why would we benefit by looking in the direction of ecological understanding as a basis for creating a new perspective on the process of education? In what ways would change in our educational theory and practice if we considered not just studying about or even applying the principles of ecosystems to our social structures, including education, but went the next step. What if we modified our perception and realized the simple fact that we as individuals are each one an ecosystem and we are each also interrelated as a unity within the larger planetary biological systems as well as social systems? Would we be able to see the possibility of an ecogenesis? A fundamental new beginning based on a holistic, ecological view rather than on a model based on a hierarchical, factory, patriarchal or a monastic model could well spark investigation into a new way of teaching, learning and living.

In order to create a path for such an investigation I searched for an organizing principle so that the themes identified by my assumptions can be investigated in a systemic pattern of relationships. Again, systemic thinking came to the fore.

Introducing the Model

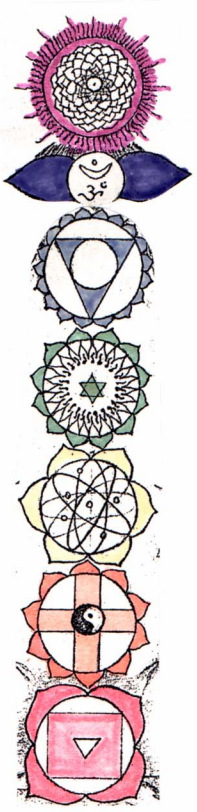
In the remaining portion of this introductory chapter I will introduce the model or map that has evolved during the course of this study and outline the themes contained within it.

The process of using dynamical systems to model human process traces a long history from the time of Newton and his calculus. One of its names is Erodynamics (Abraham 1994, 2). It is used to create human social and cultural forms reflectively and consciously. Elaborate maps predict outcomes of specific human activities from sets of variables. The dynamical systems view that I employ is an adaptation and is no longer a strictly mathematical model. It is a model that jogs our thinking and creates a vocabulary to reflect upon the arrangements that we make with one another. It is a symbol, a tool. We are asked to Grok the model rather than analyze it. The process implied by grokking is experienced in the practicum and recorded in that chapter.

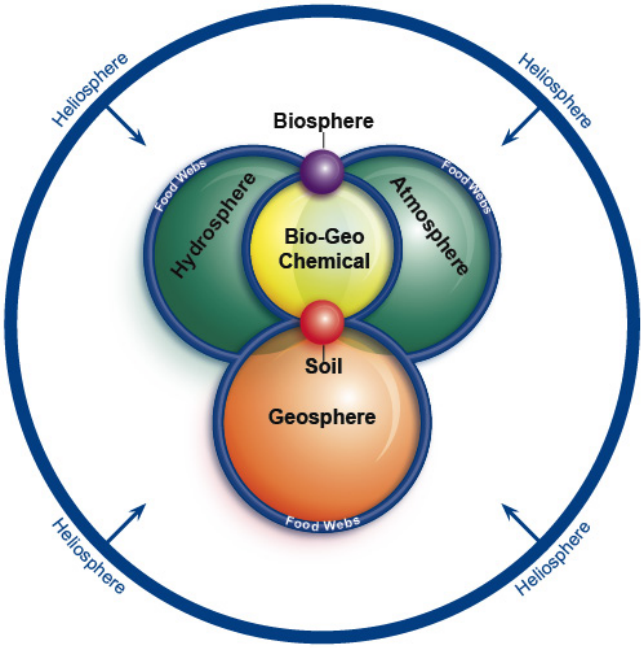
I began with an intriguing systems diagram created by John Colleta. This work used a General Systems model that outlined or mapped the study of evolutionary ecology. Ed Clark gave the original article that introduced the map to me at a Global Alliance for Transforming Education (GATE) seminar at Goddard College in 1991. It was interesting to me at the time but the paper passed into a file cabinet and its contents into the recesses of my awareness. As my investigation into systems expanded, I discovered that there was a name to the process of using living systems maps, which describe the relationship of complex, dynamical mathematical systems to social systems.

Ralph Abraham describes it in his book, Chaos, Gaia and Eros. He tells us that erodynamics is a way of seeing life's inter-relationship. I saw the possibility of opening new perspectives by using the concept of systemic mapping or erodynamics as both my organizing principle for my work and as a model for a learning community. I had another look at the systems map designed by John Colleta and it made more sense to me as I saw its evolutionary characteristic as relevant to my investigation.

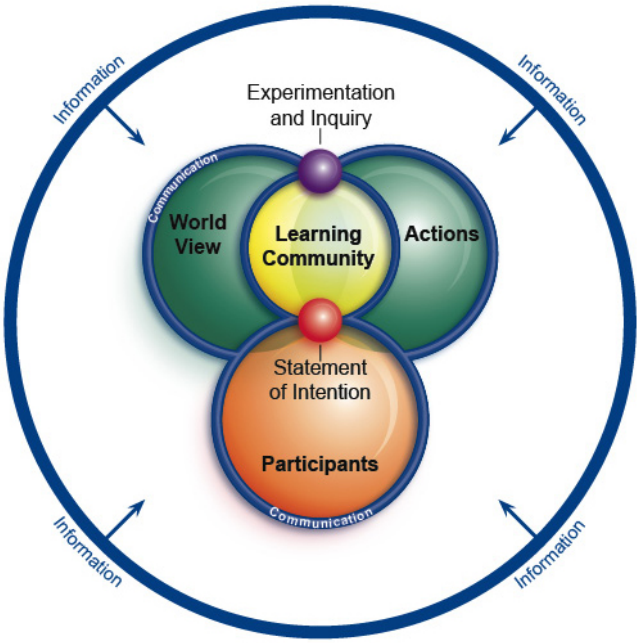
To make my brain happy I added color and story to the model. I chose the rainbow as the source of these colors. The colors have changed their position as my ideas evolved. These changes occurred often and caused much chaos in my thinking. The chaos was disturbing until I gradually began to understand the joy of accepting chaos as a principle of the universe. Chaos describes both the destruction and its partner creativity. I had to learn to let go of rigidity if I wanted to invite creativity.



Now I happily change the locations of colors as I see some new perspective. I relate the color to the chakras of the human body as seen from an Eastern Worldview. The same rainbow display of color indicates a unity between the human eye and the Earth's elements. It no longer disturbs my sense of order that each day I can see ways of moving each of the elements or functions to different positions. This is true whether I am moving the images of the elements of an ecosystem:



…the elements of a human social community:



… or the perspectives from which I view the construction of this paper from one position in the map to another.

For example, the context or "worldview" was at one time in the position of resource base. It moved to the position of partnership with action as its duality. I realized that the human learner could be considered as the resource base. It is the individual human who perceives the world in a unique way and this perception creates their worldview. This creates a partnership with action. I believe that there is an objective world but it is through our perception that we *bring forth a world*. We then act from the context and the values thus constructed.

The process is enjoyable and freeing in its challenge. This model, when released from pages of text, is a game, a story that changes as often as new information, perceptions and insights occur. Conversely, when I change a position, new perceptions and insights flow from the adjustment. The original article portrays a model for the evolution of biology. This model now provides a framework for the evolution of perceptions, values, actions and reflection. It creates a context for meaning as we grok its possibilities to see patterns and relationships.

With the sharing of such a map or organizing point, the learning community is given an option to see itself as an ecosystem instead of the typical approach to studying *about* ecology. Studying about ecology generally has a focus on identifying problems and seeking solutions. The problem-solution approach to our ecological crisis promotes action and is commendable. However, I did not intend to write yet another ecology curriculum when the word *ecogenesis* came to me. There are many curriculums now in

existence and application. To me it is unfortunate that some of the study of ecosystems is often presented as something to do with events outside ourselves with no relationship to our own social structure suggested.

Inquiry is undertaken that links both the welfare of the ecology and the welfare of the learner and then goes a step farther in creating relationship. Theodore Roszak (Roszak, 1992 p.320) states it in this way. "The needs of the planet are the needs of the person, and the rights of the person are the rights of the planet. The human and the divine are linked in common synergy of planet and personal well-being."

We can investigate the possibility of basing educational process on the same principles on which natural systems are based. It draws learners to a literacy of ecology as identified principles that are related to creating human social patterns. As we live not just in harmony with, but as the participants in ecosystems we learn more about both the interrelationships that exist in the natural world and the social cultures that we create.

We have long depended in the West on a model of hierarchical structures that were implicit in the science of Newton and Descartes. Our social structures echo our understanding of how nature works throughout human history. Philip Snow Gang (1989), in Rethinking Education, uses four prepositions to describe the long phases of human to nature relationships. The first and longest phase places humanity IN nature, the second is characterized by the early domestication of animals and the beginning of agriculture and is described by the preposition WITH, the third phase is analogous to the industrial revolution and is designated with the preposition OVER. Now we have come to a time of Humanity THROUGH nature (1989, p. 35). I am wondering whether we need to go one step into the future and hope that humanity can begin to live as humanity

EMBEDDED in nature and nature embedded in humanity. Would we then speak not of a relationship to but rather a participant in a universal dance?

It is the phase of humanity OVER nature in which we have been stuck in a rigid pattern for quite some time. How we see the world around us is apparent in the way we arrange our cultural values and behaviors.

Are we able to turn now to the new sciences and to cosmology and ecology to crate an interrelated frame of reference around which to construct a new model of social inter action? If we become aware of the similarities and differences between human systems and ecological systems, could we perceive and act in new ways? Might this way of perceiving and acting see the connection between the welfare of the whole of planetary systems and the welfare of humanity? In turn, would such a view inform actions that benefit the whole?

I believe that Erodynamical Models are enticing in their invitation to envision these relationships as we explore our embeddedness in the more than human world.

In no way do I claim that I am using such concepts as Dynamical Systems models in their original design. A mathematician, who normally uses such models in tandem with computer technology, would probably not be able to generate numerical values that validate the relationships of the component parts. Dynamical systems maps were originally designed to put numbers to the variability in a system for the purpose of understanding of the varying changes in systems and their consequences for other parts of the system. The complexities implied in Erodynamical Mapping may contain such an element of chaos that it eludes numerical values for now. Thus, I do not claim that a scientist could use this evolved model in a technical way to understanding learning

communities. The use I make of the organizing principle, that the map implies, is to have a metaphor for relationships of the elements that I choose to study. I alternately refer to it as a map, a symbol, a model, a tool of perception or even a metaphor. One strong intention is to develop a common language within a group of explorers. I enjoy the concept of a "designerly way of knowing" that will be explored in the practicum.

The map begins with the relationship of all natural systems taken to symbolic form. It becomes lively when brightened by the colors of the rainbow. It is an interplay of circular rainbows that can be seen in its unwoven and woven forms, details and wholes, at the same time. It symbolically stands for a dynamic portrayal of life.

The map becomes a holon, to use a word from systems thinking, containing interrelated holons that expand to greater complexity and contain many layers. Venn Diagrams might be seen as aids to imagining the type of hierarchy that contains the next within itself. Perhaps a Russian doll, which contains a series of smaller dolls within, is a general comparison. I see a relationship between the way in which we can use the Gaia Theory to understand life's role in the Earth cycles and the way in which we can use erodynamics as a model or concept of social systems. Since social systems are created and recreated by humans as they meet their needs and exercise their tendencies it seems that ecogenesis might also be a way of expanding our perception of an evolving consciousness concerning that process.

I can perceive in new ways because the metaphor is non-linear even three dimensional in my mental picture. The unities are interrelated to form greater unities rather than disparate fields of study tenuously related. In this way, I have proposed two of the three characteristics of scientific investigation as defined by Humburto Maturana (in

Capra, 1996). There is an organization that remains intact and within that organization there is structure that can adapt to changing relationship. This can be seen in the constancy of the map's shape and in the change of foreground each time a described element is brought from the background. Dissipative structures that we shall later examine are examples of this long held philosophical observation concerning form and flow.

Working with the Model

There remains the challenge of explaining a non-linear model in linear terms. We begin our image with the drama and creativity of real living systems. Looking out to the water in the bay surrounded by high cliffs and gentle hills with the edge of sea meeting land and land meeting sky we are in the cosmos. Add a birdcall and the green bush and we are in ecos. We are now in the dynamics of the relationship of cosmos to ecos. Translating that experience into a spherical, intersecting mental model produces a reduction in the sensation of being in nature. Placing the mental model onto a flat sheet of paper tidies it further and makes it somewhat sterile. The circles are too perfect and the intersections too clear. It loses the messiness of creation. Still, with the gift of our imagination we can transport ourselves back to the real and see our place in the web of life before us. A reminder of the wonders of being embedded can be had through the symbol of the dynamical systems model.

This study is shaped and defined with visual images symbolic of our understanding of natural systems. While representative of an immensely complex and elegant reality, the "systems map" has given me a clear and flexible structure for this inquiry. Each chapter in this final document relates to one of the positions or functions of an ecosystem.

The various themes that I drew from the systemic maps create the possibility of pulling one section or topic from the framework, considering it, and resettling it again. In that regard in the reading of the text, I ask that it be noted that the key to the format is in looking at the relationships as keenly as the separate functions.

Since the composition of this paper is in the form of a systems map and the entire inquiry arises from this perspective, it is necessary to explain the map or model in a general way in this introduction. The key maps can be found as plates on pages i, ii and iii. If more detail is desired at this time, it is recommended that Chapter 7.1325 be consulted. This chapter details the model as it is presented in a workshop format and thus gives enlarged explanations and experiences in working with the model.

Ralph Abraham who was mentioned previously is a dynamical system mathematician. He has written a book called Chaos, Eros and Gaia. It is a far ranging panorama of history as related to the factors that he identifies in the title of his book. He compared his writing style to another broad scope author.

> Wittgenstein wrote in the Preface to his Philosophical Investigation, 'The very nature of the investigation compels us to travel over a wide field of thought criss-cross in every direction. Thus this book is really only an album.' (Abraham1994, xiii)

In turn, I offer an album that brings together my past, present and offers a tentative guide to future directions. Thus, I begin my "album" of relationships. I choose the path of symbols to unify the study but eventually, of necessity, divide it by chapters. A brief narrative that expands on the Table of Contents is included.

Chapter Summaries

CHAPTER One: Introduction ***(Stability Point – Red)***

> THE COLOR RED IS THE LEAST BENT WAVELENGTH IN THE RAINBOW AND OVER-ARCHES ALL OTHER COLORS. THE RED OF THE CHAKRAS REPRESENTS

THE BASE OF THE SPINE OR FIRST POINT OF ENERGY AS IT TRAVELS UPWARD IN THE HUMAN BODY.

One of the characteristics of an ecosystem is its stability point. In the systems of Gaia we can portray this as the **soil**. In this document it is the words of intention that as an inquirer draw me back to key ideas when diversions, creativity or curiosity intervene and take me elsewhere.

The words of introduction that present the rationale for the inquiry and introduce the model of erodynamics, represent my personal enthusiasm and commitment. They are the core of my stability point, my intention and the soil from which nurture is taken. In addition, I keep close-at-hand several documents that bring me to my center. I have re-visited these reminders often. They are:

- Mario Montessori's ecology lectures given at my teacher training course in Bergamo, Italy - 1970-71
- GATE Document (Global Alliance for Transforming Education Document: Education 2000),
- The Institute for Educational Studies Intention Statement,
- Vermont College Student Manual of Requirements.
- Reports on our Ecological Health

*CHAPTER Two: Participant Learners: Perspectives on Human Capacities (The **Human Learner, Resource Base - Orange)***

THE COLOR ORANGE IS ASSOCIATED WITH THE SECOND COLOR OF THE RAINBOW AND THE SECOND CHAKRA THAT IS SEEN AS THE GENERATIVE, SEXUAL CENTER.

This characteristic of an ecosystem is aligned with the idea of resource base and is represented by the **Lithosphere**. In this study, I place the learner in this resource base circle. In my observation the learning human brings forth the world, each in a unique

way. Each one's perception of the world forms their worldview and each one becomes the actor upon that understanding. Education at its best draws forth the human into participation. Learning communities support this process.

One perspective of the learning human is formed by the needs of humans and the natural avenues or tendencies that aid the satisfaction of these needs. I also undertake a survey of recent understanding of learning capacities.

*CHAPTER Three: Context. What is the World***?** ***(World View: Partnership - Green)***

> LIGHT IN THIS POSITION BENDS IN THE INTERMEDIATE POSITION. IT IS NOT THE SHORTEST OR THE LONGEST LENGTH OF LIGHT WAVES. IN OUR BODIES, THE GREEN HEART CHAKRA LIES IN OUR MID-CHEST.

After much shifting of position, **Atmosphere**, as an interrelated system of Gaia, came to rest here in partnership with the "hydro-sphere". In many creation stories the winds are the breath of creation. In the modern scientific story, the earth and wind were early companions.

This chapter explores the idea of a shift in paradigms that may be occurring now. The emergent paradigm is characterized by an attempt to renew a holistic perception. This worldview sees the influence of new findings in science, especially cosmology and biology and a respect for indigenous ways of knowing. These views are echoed in the cultural world.

Some of the topics that are woven into this picture are Cosmology, Complexity, Chaos, Ecology-Gaia Theory, Systems Thinking.

CHAPTER Four: Process — Action ***(Actions: Partnership - Green))***

> We stay with the same color and the same chakra to signify the other member of this partnership, **actions.**

In an ecosystem, I place **Hydrosphere** in the same position. Water and air are varying concentrations of the same molecules. Actions and worldviews modify one

another in a dynamical human system. It has been a struggle from the beginning to choose whether to reverse the order of chapters between action and edges. One clearly addresses the more spiritual, psychological, or philosophical aspect which link to values and the other the more material side of human needs. I have chosen, for now, to consider the partnership positions of worldview and actions before approaching the ideas represented by edges. The reader may feel free to play with this order.

CHAPTER Five: Integrative Education ***(Unity - Yellow)***

> YELLOW IS THE THIRD RAINBOW COLOR AND INDICATES THE SOLAR PLEXUS IN THE HUMAN BODY.

The unity in an ecosystem draws together life and pre-life in relationship. It can be associated with the **Biogeochemical Cycle** or nutrient cycle.

This chapter approaches the ways in which emerging social phenomena impact educational practice**.** Education that meets human needs, tendencies and learning capacities, has an emphasis on ecological literacy, and its flexiblity supports the design and creation of learning communities that are communities of meaning. Taking information and action from outside the education circle and reflecting it within the circle is a characteristic of the unity or synthesis function.

CHAPTER Six: Communication ***(Feed back loops - Blue)***

> BLUE INDICATES THE THROAT CHAKRA AND IS THE THIRD FROM MOST BENT WAVELENGTH IN THE RAINBOW.

With the throat chakra and the blue light of the rainbow, I identify communication with the **feedback loops of ecosystems**. In ecosystems themselves, we might place such things as food chains.

When thinking how this function of an ecological system might relate to a human system and to this study as well we translate communication to correspond to the feedback loops of nature.

How will the form that communication takes honor our human way of knowing? Story, arts and humanities that are expressions of expanding perspective help us learn in new and innovative ways. These same forms of learning are possibly as ancient as humans themselves.

A closer look is taken at communication through words. Words used with processes and forms that are compatible with the dynamics of the emergent paradigm are highlighted. In what ways can we expand communication to include the universal principle of communion?

CHAPTER Seven: Ecopsychology, Ecophiiosophy (Edges or Transition Zone: Indigo – a color between)

> THE IDEA OF EDGES MIGHT INDICATE THE THIRD EYE IN THE CHAKRA PATTERN THE NOTION OF ENERGY FLOWING IS EXPRESSED.
> THE FOCUS IS ON THE SECOND FROM SHORTEST COLOR IN THE SPECTRUM.

In an ecosystem, such things as the wetlands where water meets land illustrate these edges or transition zones. The blended colors indicate the character of edges, areas of creativity where identity is challenged as species or land zones meet. These are areas of the greatest peril and the greatest opportunity for adaptation.

We find in edges that values are being formed and reformed from increasing sensitivity to the textures of worldview and reflection on actions. The edges are themselves blended ideas and actions. I have arbitrarily selected placement for them. As

with all members of this model the relationship, distinctions as they form patterns, are key to seeing an ecogenesis in its emergence.

CHAPTER 7.132: Practicum ***(Chaos/Creativity - Purple)***

> THIS CHAKRA IS AT THE TOP OF THE HEAD. IN SOME TRADITIONS THIS INDICATES CONTACT WITH THE GENERATIVE FORCES OF CREATION AND TRANSFORMATION. THE MOST DISTURBED OF THE LIGHT WAVES AS IT IS SHAPED INTO NEW FORMS.

In the ecosystem map, **Biosphere** in all of its dynamic evolution takes this position. When applied to this study and to learning communities in general chaos can be characterized by creating ways to share and co-create new sensitivities. Participants, environments, contents, and process are considered as we create a workshop in order to share this learning with others. The activities are tailored to each group. Participation and co-creation are invited.

The irrational number indicates all that is missing. It is non-linear and creative. It evolves in fractal form each time that the plan of the practicum interfaces with participants.

CHAPTER Eight: *Concluding Remarks with Reflection through Self-Research*

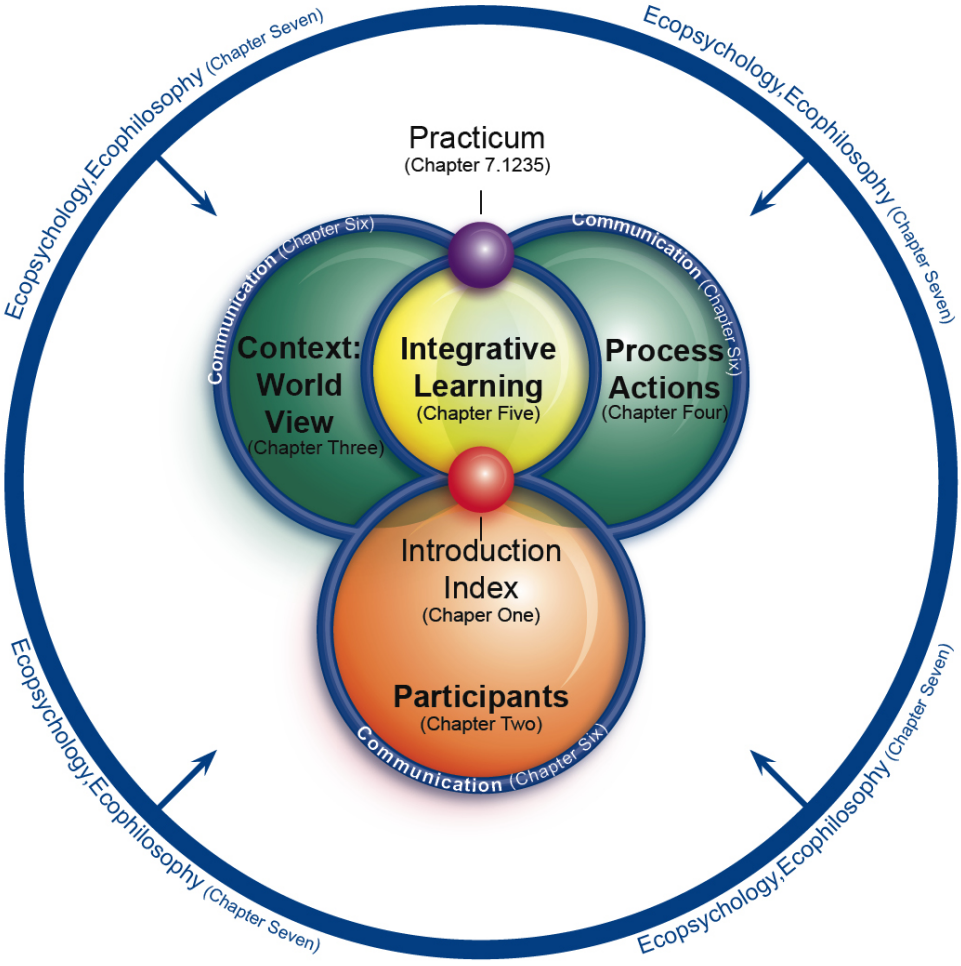
In all Gaia systems the fundamental, singular source of energy is the **SUN** around which the planet Earth revolves. Gaia and Cosmos are united. All life is dependent upon this source of heat and light. The forms this energy takes are diverse and include wind, fire, and water. The color is the white of light woven back from the rainbow into its totality.

In human systems and in this paper in particular we might also designate, in a certain sense, **information** as a source of energy. The energy of information informs

these concluding remarks. The research is self-reflective as this work is recorded and changes as responses that stem from this inquiry are observed.

The increased sensitivity accrued by the learning process produces energy and enthusiasm to propel the expansion of this inquiry.

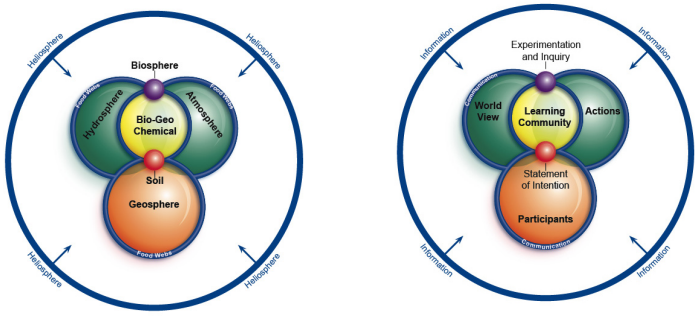
Mapping this Project



CHAPTER TWO:
PARTICIPANT LEARNERS:
PERSPECTIVES ON HUMAN CAPACITIES

We assert that the primary-indeed the fundamental- purpose of education is to nourish the inherent possibilities of human development.
GATE Document Education 2000

In this Second Chapter we orient ourselves with the Natural Map. The Lithosphere or Rock Cycle holds the position of the Resource Base among the cycles of Gaia (Same a maps on page 16):



In reference to a Human Learning Community, I placed the Participant in that same position.

At the time that I made that placement I was not aware of physicist Brian Swimme speaking about the human as a walking rock. By this he was imaging our interconnectedness to the beginning of all that is.

To sing, the rocks had to become human.

It is an honor that we are created out of rocks.

It is something to live up to (http.www.brianswimme.org).

Even more amazing, we owe the honor of the rocks finding expression in us to the bacteria.

> Bacteria have always transported minerals about in quantity….And so the Earth's rocky crust, itself formerly stardust, has reason to see the bacteria, plants, and animals created in its metabolic dance as its own inventions, meant to serve its needs (Sahtouris 1996, 207).

If the participants in a learning community are to be the resource base for the community it is well to know more about us; how do we interact in communion with one another? In what ways can we understand the process of learning? I see learning as Henryk Skolimowski describes it, "…learning is above all a capacity, a sensitivity, to react to environmental conditions" (1994, 13).

At one time in the very recent past it was believed that we, as humans, were the pinnacles of life. We were given the position of importance just under God. The Indian sage, J. Krishnamurti, is known to have commented that the English thought that they themselves were the crowning point of all evolution. Charles Darwin broke that illusion with his discoveries. He recognized that only a small group of characteristics separated us from other beings.

> If no organic being excepting man had possessed any mental power, or if his powers had been of a wholly different nature from those of the lower animals, then we should never have been able to convince ourselves that our high mental faculties had been gradually developed. But it can be shewn that there is no fundamental difference of this kind. We must also admit that there is a much wider interval in mental power between one of the lowest fishes, as a lamprey of lancelet and one of the higher apes, that between an ape and man; yet this interval is filled up by numberless gradations (Darwin as cited in Plotkin 1994, 129)

Darwin's main message was that, extraordinary as human rational powers may seem to be, they do not set human beings apart from their fellow creatures. Rationality is an attribute that we share with other species — and from whom we have inherited it.

Continuity between species is omnipresent, whether it be a matter of instincts or rational ability.

In these times of intense change, how then are we to envision ourselves? Where do we fit in the scheme of things? What are the things that fill that interval between the human and our closest relatives? If we take the view of evolution as biologists or ecologists, the most honored that we can hope to be is a participating member in a healthy web of life. *Earthdance* takes us on a tour with eyes of the others with whom we share the planet. If we look at that web we see that the bacteria would (from some views) have the prime position.

> They exist in vastly greater numbers than any other kind of living creature… They evolved the whole Gaian system, having it to themselves for most of Earthlife. …Then, take the funguses—a kingdom of life in themselves. They, too, are spread out almost everywhere, and though most are too small or fine-webbed for us to see, are so extensive underground that we know them to be the largest creatures on Earth (Sahtouris 1999, 205).

This theme can be carried on to the plants and animals with each being related to and dependent on the other. Who was made for whom? And back full circle to the rocks we arrive. They are continuing to shift as they ride their tectonic plates. "From rock's point of view, it directs even the course of evolution through its motion. …all is no more and no less than rock rearranged (207).

If we can accept our grand privilege to be a member of this honored family of Gaia then what makes us unique as each other creature is unique? Our uniqueness is perhaps rooted in our self-reflective consciousness, our penchant toward imagining, and our ability to express ourselves through language and our arts. From these traits we create. One of the things that we create is culture.

> Our culture is our bondage. Our culture is also our liberator. Our culture is our nourisher. Our culture is also the mesmerizer—keeping us transfixed in the mould it has established, and hardly allowing for alternative perspective (Skolmowski 1994, 265).

If culture is one of our creations then do we have an explanation for how this conditioning is passed among and through us? In recent times evolution biologists have given us the idea of memes. Memes are human ideas or pieces of information that are passed on throughout the culture: "In this view, we humans are programmed physiologically by our genes and socially by our memes" (Sahtouris 1996, 209).

It is pointed out that memes are metaphors for intergenerational transmission of behavior but they are in fact wholly unlike the biological process underlying evolution. The idea of memes is a fascinating one in that it addresses the possibility of altering traits of a cultural conditioning in a direct way through communication-education. Is it possible to imagine a way in which new memes enter the culture and change behaviors that have been thought to be inherently human? What if this concept is the way in which we could re-establish the bond of human and natural environment? The emergent field that is studying such possibilities is memetics, which is "sometimes thought of as the germ theory applied to ideas" (Ecopsychology List Serve, 7 Jan 2000).

With this plethora of new ideas and ways to think about the human, especially in relationship to our place in the web of life and in our unique capacities, I sought a stability point for my inquiry. Again I ask myself, "What is the nature of the individual human who forms relationships with others and with their environment? Who is it that lives and learns in community? What propels the processes that we call learning, knowledge, intelligence?"

A tentative picture of the uniqueness of learners individually and communally might be gathered through two perspectives. The first could perhaps be an anthropological view of what characterizes a human in the constant process of unfolding. The second view is focused on a brief survey of current information on learning theory: learning, that is, as gaining new sensitivities.

I required a "point of stability" to anchor the incoming data "chaos" — to use a concept from the dynamic systems view. For the anthropological view I returned to my Southern Cross of navigation, toward home. I recalled the ideas of Maria and Mario Montessori. The information first came to me in my Montessori teacher education in Bergamo, Italy in 1970-71. The concepts have become such a part of my thinking and working with students that I did not bring them to consciousness immediately.

Montessori's Descriptive View of Human Capabilities: Needs and Tendencies

Maria Montessori was a medical doctor and later an educator who worked in the early part of this century. She came to be with children in educational settings rather by accident. She brought with her a scientist's training in observation and the anthropologist's appreciation of the long development of humanity. Mario was her son and collaborator. He was one of my teachers in Bergamo.

As an anthropologist Maria Montessori saw human evolution through the lens of *ontogeny recapitulates philogeny*. The individual follows the stages of development (albeit at a differing rate) that humanity has followed. She also saw children as carrying the universal needs of humanity with innate behaviors that guide them to actions designed to find ways to meet those needs. Her background led her to notice the behavior of children and come away with more questions than answers.

As she observed children she noticed that the children operated on their environment and in turn the environment was reflected in the children. They seemed in some way to create aspects of themselves from the environment. (See Capra, 1996 for a discussion of autopoiesis.)

Were these behaviors the same that allowed the multitude of generations before to survive and prosper in the environment in which they found themselves? She believed that "Whatever is supplying this ability to respond to the environment has belonged to all human beings from the beginning. It, therefore, represents a universal principle of human behavior." (Lillard 1996. 10).

Montessori wanted to see for herself what some of those behaviors might indicate. She did not preconceive human needs and tendencies and seek to develop an educational plan based upon them. It happened the other way around. She observed children, identified repeated forms of behavior and then suggested environments that responded to those behaviors. She described the ideas of what we might define as natural capacities or innate traits as what she termed "human needs and tendencies".

These latent potentials were to be nurtured by creating an environment that allowed them to flourish. She presented these human needs as an "impressionistic" diagram. She used this word "impressionistic" often when referring to drawings and metaphors that would stir awareness and invite exploration rather than as facts that children and adults would accept without examination.

Human Needs

“Needs" link humanity by the nature of their commonality. The ways in which the needs are satisfied are diverse according to time and the place. Thus is created our history in relationship to geography.

The needs are observed as belonging to two general but interactive categories. Some of these needs she described as material or physical needs. They are the more obvious ones. The need for things such as nourishment, shelter, clothing, transport, and protection number among them.

Montessori called attention to the spiritual or psychological needs. These unseen needs may result in physical forms but usually begin in questions. Who am I? What is the nature of this world in which I find myself? How did it come to be? What is my purpose? In what ways am I able to know? We might say that a religious, philosophical or scientific orientation emerges from these questions.

Another aspect of the unseen needs is human relationship. Who am I in relationship to my fellows? What is love? The fields of psychology, anthropology and sociology are among the formal studies that today address these issues. How may I express or communicate my knowledge, understanding and feelings? The arts in a cultural setting may inform my search for expression.

This generative search for meaning is a fundamental need of humans in this view. This is an important point. The search for meaning both personally and culturally might be seen to rest on our seeking to meet our inherent needs in creative ways. What relationship might these observations have on the processes of community and education? Do we require a degree of commonality of our mental models or metaphors for telling ourselves what the world is like and how to operate in it?

Human needs propel interaction with one another and with the environment. These physical and spiritual needs may be seen as both the source of our interaction with one another and our environment and the impetus for the creation of a "supra-nature" or human-built environment.

I discovered other views of basic human needs that expanded or deviated from the thought of Maria Montessori. A modern day list compiled by the Sarvodaya Movement struck me most deeply since it came from a non-Western perspective and is more recent than Montessor. Sarvodaya means, "Everybody wakes up". The list of ten needs (abbreviated here) brings us into the urgency of today.

- Environment. Among the factors conducive to the fullest personality development a clean and beautiful environment takes pride of place.
- Water. Every individual requires water for drinking, for bathing, for washing clothes, watering the garden.
- Clothing. Clothing is necessary to protect oneself from heat, cold and from flies and mosquitoes.
- Food. All living beings exist on food. …Sarvodaya workers should strive to establish conditions to supplement dietary needs of young children, expectant and lactating mothers, invalids and old people.
- Housing. A house with adequate light and ventilation, affording protection against sun, rain, heat, cold, and mosquitoes is a basic human need.
- Health Services. Health care activities that can be undertaken at the community level are many and varied.
- Communication. A roadway to every village and at least a footpath to every house is essential. For transportation all should have access to bus, and use of cart and bicycle.
- Fuel. Join in our work to evolve efficient means to generate energy from solar rays, wind and water, methane gas from dung and nightsoil.
- Education. Lifelong education is a basic human need.
- Cultural and spiritual development-Even when material and social needs are met, human life is incomplete without a cultural and spiritual base (Macy 1991, 149-151).

Today it is critical that we realize that the degree to which humans satisfy their needs covers a wide spectrum. We might ask ourselves what is *necessary*, what is *sufficient* and what is *superfluous* in meeting those needs? Are the needs met with equity

around the planet? What impact is meeting our needs having on the natural environment? These are perhaps becoming the most profound questions that confront us today and will certainly be so in the future. Answering these questions has created new fields of inquiry. One such is the human relationship to ecology and is being addressed. Two perspectives are calling themselves ecophilosophy and ecopsychology. These topics will be explored in Chapter 7, Edges, which interweaves the learners with their world view.

As we explore educational forms now and in the future I believe that it is essential to raise these questions are essential. Education is fundamentally linked with forming the context from which we view the world. How we view the satisfaction of our personal needs in balance with others and with the planetary becomes a legitimate question that educators are required to explore. Are we promoting the environments that allow the individual student to live in accordance with innate capacities of interaction with the world? Are educational communities being formed that address these issues?

Not only has humanity met these needs in different ways according to time (history) and place (geography) but also, each developing human expresses them differently according to a sequence of interrelated stages (human development). Is current educational practice respectful of these needs and capacities in developmentally appropriate ways? Are we able to adequately present in developmentally appropriate ways new "memes" addressing relationship and sustainable living practices?

If humanity is presented with needs that require satisfaction for the sake of survival then what capacities might be innately present that insure the possibility of their satisfaction? Are there innate tendencies that are present over time that allow us to explore our environment, learn from it and thus thrive?

Human Tendencies

We can return to the observations of Montessori as she named these capacities *tendencies* to differentiate them from *instinct* as this word was generally viewed in her time. Again these were points that she was suggesting for investigation and consideration rather than as a formulated theory. She mentioned at various times different descriptions of the tendencies. The following terms, however, can be considered representative of those that she addressed in her lectures. My understanding comes from my previously mentioned teacher training and is recorded in my notes. They are:

- Exploring. Montessori often mentioned exploration as a fundamental behavior of human beings from their beginning. Children begin their exploration of the environment from birth. The child has the possibility of completing her own growth, brain and body, through interaction with their surroundings and to adapt to the group.
- Orienting. It is discovering a mental model of one's relationship to the world in time and space. This tendency is closely related to exploration and helps to make pattern of the new terrain.
- Ordering. The third tendency is a tight bonding with exploring and orienting, and finally making sense of the pattern.
- Imagining. Maria Montessori is known to have proclaimed that *Human consciousness comes into the world as a flaming ball of imagination.* It is one of our finest gifts and comes into its flower in the child of six and above. Everything that has been created by the human has been based on the capacity of the imagination to act on reality. It is not to be confused with fantasy.

- Abstracting. Abstraction in partnership with imagination allows the human to create images taken from the world of experience through the senses.
- Manipulating. Through the interaction of the child's body, especially the hand, with the environment the imagination is combined with capacity for abstraction. These three, imagination, abstraction, and manipulation combine to assist in the refinement of intelligence.
- Repeating. The innate capacity to repeat an activity is observed even in very young children. Coupled with the preceding tendencies leads to the quality of perfecting.
- Perfecting. A young child is interested in the act of perfecting rather than a finished product. With maturity the tendency leads to completion of a high standard of work.
- Working. We are warned that drudgery is not to be mistaken for the work that Montessori describes. Complete engagement with the activity or experience at hand is more descriptive of the involved state that Montessori described as work.
- Observing. The eye learns to see by seeing. The preceding tendencies are enhanced by care in observing with all senses one's own and others' work.
- Communicating. The tendency to interact with other humans and the world at large is the final tendency to be considered. It is an avenue for new learning and for expressing what one has learned about the world. (Abstracted from Lecture Notes, Mario Montessori, 1970)

Mario Montessori, in acknowledging these descriptive contributions, indicated that these are not fixed categories. I interpret this to mean that they are rather indicators

that allow us to become aware of such tendencies and note them in our own observations and thus verify or challenge these insights.

I have changed the original words into gerunds—verbs waiting for actions. In other words I see the noun of *exploration* becoming the act of *exploring*. It is well for the educator to realize the need to create atmospheres, environments and experiences that appeal and foster these innate tendencies is that these behaviors "lead to their adaptation to society and ultimately, the possibility of changing that society" (Lillard 1996, 11).

Maria Montessori pointed out that it was at the interaction of the needs, tendencies, and intelligence that creativity occurs. In reading from a variety of fields that address this concept of intelligence I find it elusive to define the nature of words such as intelligence, memory, knowledge, or learning. Usage varies widely. The focus of these elusive concepts is the brain and therefore a fertile field for consideration of capacities. Maria Montessori was one among many that have made observations and then asked leading questions that relate to the capacities or attributes of the human in an effort to definite what it means to be human.

Applied Learning Theory

The second perspective that focuses on the unique qualities of the learning human comes from many disciplines. Gregory Bateson gives us a broad yet concise definition of a descriptive term: Epistemology.

> Epistemology is a branch of science combined with a branch of philosophy. As science, epistemology is the study of how particular organisms or aggregates of organisms *know, think* and *decide*. As philosophy, epistemology is the study of the necessary limits and other characteristics of the processes of knowing, thinking, and deciding (1988, 246).

It has been a fascination for many scholars of varying disciplines to explore the generative question of what sets us apart as humans and what unites us in relationship to

the whole. Today the approaches are wider and deeper as these questions are explored. The philosophers and the scientists from many fields of expertise as well as those of spiritual or political persuasions continue to attempt to provide insight into the nature of these capacities.

In the eyes of the scientists the number of human specific, genetically encoded directives shrinks in number yet our realization of the implications of these small differences expands. Which of the capacities uniquely set us apart as humans as it is proved more and more clearly that we as human sit in the circle of life rather than at the apex of evolution?

It has often been said that the last frontiers for exploration were the outer most realms of space and the most inner search into the human process of thought — the actual working of the brain, mind, consciousness, memory, behavior. This frontier has indeed been a fertile field with the nineties being designated the "decade of the brain". There seems to have been much shouting between the various approaches. In an article entitled, "We Need Science and the Humanities", John W. White reacts to what he calls the attack in the academic community of arts, social science, and humanities departments on science.

> In one sense, physical scientists have defined their discipline in a realm that ensures objectivity and reliability. This is done by restricting their interests to those quantities that are appropriate for operational definitions. However, it is also true that the borders of topics that are amenable to operational definitions continues to grow rapidly.
>
> Science is continually moving into realms that were previously the sole domain of the arts or the humanities. One recent example is the research into the human mind and how it works. Science appears to be able to shed light on thought processes and emotional responses that were formerly considered a part of other nonscientific disciplines.

> ...The point is that science and technology will serve humanity well only if our hearts and heads work in concert. Critical, rational thought (of a physical science style) and respect for the world in which we live (seeking truth and beauty in the tradition of the liberal arts) are both needed (Skeptical Inquirer 1996, 56).

Of interest are the exchanges between the many branches of knowledge that attempt to know more about how learning takes place. Of note to the education practitioner is the understanding of the capacity of the brain with suggested application to maximize healthy development. A synthesis of these findings is not a facile undertaking. I found some comfort in my confusion from the following words, of a slightly sardonic nature, of an expert in the field.

> ..."Why, Dan," ask the people in Artificial Intelligence, "do you waste your time conferring with neuroscientists? They wave their hands about 'information processing' and worry about where it happens, and which neurotransmitters are involved, and all those boring facts, but they haven't a clue about the computational requirements of higher cognitive functions."
>
> "Why," ask the neuroscientists, "do you waste your time on the fantasies of Artificial Intelligence? They just invent whatever machinery they want, and say unpardonably ignorant things about the brain." The cognitive psychologists, meanwhile, are accused of concocting models with neither biological plausibility nor proven computational powers; the anthropologists wouldn't know a model if they saw one, and the philosophers, as we all know, just take in each other's laundry, warning abut confusions they themselves have created, in the arena bereft of both data and empirically testable theories.
>
> With so many idiots working on the problem, no wonder consciousness is still a mystery. All these charges are true and more besides, but; I have yet to encounter any idiots. Mostly the theorists I have drawn from strike me as very smart people, even brilliant people, with the arrogance and impatience that often comes with brilliance-but with limited perspectives and agendas, trying to make progress on hard problems by shortcuts, No one can keep all the problems and details clear, including me, and everyone has to mumble, guess, and hand-wave about large parts of the problem. (Dennit, 1992, 126)

If an *expert* on these matters is challenged to *keep all the problems and the details clear* then it is of little wonder that educators come away from our search to expand understanding of human learning capacity with confusion. Fortunately, there are effective

translators of this bevy of new learning theory and research. Among them are the advocates for *brain based learning* Renata and Geoffery Caine. They provide us with an elucidating conspectus that allows us to approach the various contributions with a practical view for classroom and community learning.

Their Principles of Brain Based Learning that have been updated frequently are printed as handouts in the Chapter 7.1325, Practicum. They are used as a basis for exploration with teachers and community groups to learn more about the creation of effective learning environments. These are principles that are accessible and applicable in many settings.

Caine and Caine state their use of *brain-based learning* as a descriptor for their work. "Brain- based learning involves acknowledging the brain's rules for meaningful learning and organizing teaching with those rules in mind" (1994, 4). As surprising as this sounds, it is a recent concept that there is a correlation between knowledge of the brain and the process of learning and the teaching profession. One reason for this is that "Such an enterprise was impossible until recently because we had very little knowledge of the brain" (Restak 1995, 3).

The brain research that has come in the last twenty-five years has revealed more information than had been learned in the two hundred before that. Most of us have memory of the popularity of the left hemisphere-right hemisphere understanding of the brain. While this research was preliminary and in some ways misleading it did open the door for educators and the public in general to probe for more information. Further research has revealed that the complexity of the brain is characterized by the constant communication and synthesis between the two hemispheres.

The triune brain as described by Paul Maclean was another opening for lay persons to comprehend some of the evolutionary sophistication of the brain. Then we were exposed to the "Intelligences" or multiple ways of knowing as described by Howard Gardner (1993) and based on his research conducted at Harvard University. He listed seven intelligences and has recently added an eighth. The exact number may not be critical in our understanding of the many ways in which we learn. The chief service that this work provided was in recognizing talents and skills in alternative ways of knowing. Some are not the ones usually tested in schools. In working with adults I find people filled with immense relief as they discard some old and very false beliefs that they have about their learning abilities.

The Eight Intelligences are described as Verbal/Linguistic, Logical/Mathematical, Visual/Special, Bodily Kinesthetic, Musical/Rhythmic, Interpersonal, Intrapersonal, and now Naturalist. (Gardner 1993)

My first experience with explaining these ways of knowing came after I had completed a course designed for teachers centered on these principles. I came back into my classroom on Monday morning and shared them with my eight to 11 year old students. As I showed my charts they started pointing and smiling at one another. They had been together for most of their school lives and immediately knew how they learned most easily and how everyone else did too. With this confirmation I accepted the hypothesis.

Because of my interest in ecological thinking and literacy it was an essential next step to go more deeply into the latest iteration — described as the *naturalist intelligence*.

I wondered how this might synthesize with the idea of memes. Are these intelligences inherent in the human even if latent or transmitted by culture through education?

The next chapter, number three, which touches on our worldviews, has close relationship to understanding of the brain.

> First, a fundamental principle: The brain exists in order to provide an internal representation of "reality." Quotation marks are employed here in deference to the fact that no creature, including us, can ever know any other "reality" than the representations made by his brain. These representations, in turn, depend upon the brain's organization, which differs from one creature to another and, in our own species, from one person to another (Restak 1995, 5).

If we are able to see that each creature creates what it can apprehend of the world through its learning capacity, then we see clearly why learning can be enhanced and defined by increasing sensitivities. These sensitivities can presumably be activated by some of the exceptional features of the brain:

- The ability to detect patterns and to make approximations,
- A phenomenal capacity for various types of memory,
- The ability to self-correct and learn from experience by way of analysis of external data and self-reflection, and
- An inexhaustible capacity to create (Caine and Caine 1994, 3)

Still, with all this, there are important questions. What is beyond an understanding of the structure and chemical communication in the brain that makes us who we are? This question becomes more pressing as we step into what we can call the participatory paradigm.

In this chapter I have made a survey of the capacities of human beings as they learn their way through life. It is hoped that this exploration will pique interest in the possibility of designing environments that meet these inherent possibilities of human development. How do we challenge, inspire, prepare, nurture, and sustain the ever-changing human? How can being part of a learning community support this process?

CHAPTER THREE:
CONTEXT: WHAT IS THE WORLD?

"Thus before all else, there came into being the Gaping Chasm, Chaos, but there followed the broad-chested Earth, Gaia, the forever-secure seat of the immortals…and also Love, Eros, the most beautiful Of the immortal gods, he who breaks limbs."

Hasiod

We reveal ourselves in the metaphors we choose for depicting the cosmos in miniature. (Gould, 1996.p.7)

In reading and in conversation with thoughtful people it has become clear to me that there are movements dotted over Earth that speak to the need for revision of the metaphors that we have been selecting or perhaps have been selected for us. In my view the urgency of this revision encompasses and is being propelled by two interwoven threads:

1. The need to accommodate the emerging facts contributed by "new" science and their intersection with traditional wisdom, and
2. The need for a new, radical view if we are to survive as a species in a healthy web of life.

Introduction

This chapter searches for the essence of this emerging worldview. It is my assumption that it is becoming evident that this still tentative view is one that bases itself on synthesis. There seem to be more questions than definitive answers in this wide-ranging search for the inter-relatedness of such topics as cosmogenesis, ecogenesis, traditional wisdom, and daily living patterns.

As we struggle with ancient and new information we are seeking to understand relationships, make a synthesis, and test the ways our current institutions will need to change in order to echo the perspectives being generated. In my experience and in detailed reading it is an entity that I might describe as *the community* that is in dialogue about these views. It appears to me that a momentum is growing that is beginning to trust the possibility of *shared leadership* and *common wisdom* as being coherent with the emergent paradigm.

In discovering the essence of this shift in perception the characteristics that Fritjof Capra uses in his book to distinguish the criteria of life: *pattern, process and form* might serve as a guide for our inquiry (Capra 1996, 161). In what ways can the relationship of the myriad of views begin to reveal their form, demonstrate useful process and display meaningful patterns?

The forces of change are coming from many directions. I found that the first understanding that gave me a context for the changing content of world-view, and thus a stability point, came from the now pervasive notion of paradigm shift. The attempt at understanding the meaning of paradigm can come from a survey of the origins of this conceptual framework. Then the question of whether or not we are indeed in the process of a grand shift in paradigm, or if more precisely we are engulfed in many interrelated shifts, can be put forward.

A starting point in understanding this word and the underlying concept which it describes can come from its derivation as expressed in Oxford University Press Dictionary: "*paradigm* n. example, model or pattern a. from Greek *paradigma*, show side by side" (1984, 741).

The Hutchinson encyclopedia gives us additional background.

> Paradigm: term used by the US historian of science TS Kuhn to describe all those factors, both scientific and otherwise, which influence the research of the scientist. The term has subsequently spread to the areas of social studies and politics.
>
> Thomas S Kuhn 1922-. U.S. historian and philosopher of science, who showed that social and cultural conditions affect the directions of science. *The Structure of Scientific Revolutions 1962* argued that even scientific knowledge is relative, dependent on the paradigm (theoretical framework that dominates a particular scientific field at that point in time (1990, 605).

Henryk Skolimowski tells us that the revolutionary work of Thomas Kuhn is based on the work of Carl Popper and, "In a sense has stolen the glory that was due to Popper (Skolimowski 1984, 9). In a 1974 symposium that drew together both Popper and Kuhn the topic of the expansion of the explanation of paradigm was approached. The proceedings are printed under the title of *Criticism and the Growth of Knowledge* and included are these words.

> ...Philosophically speaking, a paradigm is an artifact which can be used as a puzzle-solving device; not a metaphysical world-view.
>
> Discussion of what a paradigm is, is limiting; it is rather more enlightening to ask what a paradigm does. Kuhn uses the idea of solving puzzles as the work of scientists. The normal scientist is a puzzle-solving addict: it is this puzzle-solving -not just vague problem- solving-- that the normal science prototypically consists. And a puzzle is always an artifact. It is all very well to say that the paradigm "supplies tools" or, vaguely, that it makes problem-solving possible. It remains true that for any puzzle which is really a puzzle to be solved by using a paradigm, this paradigm must be a construct, an artifact, a system, a tool; together with the manual of instructions for using it successfully and a method of interpretation of what it does (1972, 68).

While the scientific community itself did not accept in unison the implication of the assertion of the idea of paradigm, it appears to have found appeal in the popular culture. The idea that we interact with our environment and color our observations with

our own perspective that is in part defined by the conditioning of our culture and the capacities of our species imply that "our" world is a personal interpretation of "the" world. That notion fits with our current understanding of the capacity and mode of operation of our brain as we discovered in Chapter Two.

The implication that this has for science as a totally objective discipline is a challenge to the current paradigm itself. This is true if we begin to understand how our current Western scientific paradigm has dominated our culture whether we are non-scientists or scientists. If the observer's own perspective enters the equation, as is claimed by quantum mechanics and described by the emerging paradigm, and the culture too enters the determination of what a scientist can test and describe accurately, then a major challenge to reductionist science has been launched. We shall go into the process of this challenge as the chapter progresses. For now, let us consider the implications of this challenge in words that introduce to us the possible impact on our worldview:

> If quantum mechanics were to win, the ordinary atom, and with it the ordinary world around us, would be reduced to the status of illusion, or, at best, approximation to reality. All things would be connected to each other, and relationships among objects themselves. The way humans perceive physical reality would differ from today's perception as profoundly as today's materialistic perspective differs from the medieval, spiritual one. (Von Baeyer 1994, 219)

Science has not succeeded in keeping this notion of paradigm isolated to its own world. It has spread through at least certain elements of the culture in a broad view. As we see the elements of the deterioration of both the human community and the web of life to which it belongs we, as a people begin to question. Is how we have been viewing the world and thus conducting our daily lives based on a false premise? Henryk Skolimowski tells of his own search as a philosopher to examine this possibility.

> Here was a fundamental challenge to a philosopher: to examine the basic assumptions of our civilization, to find out (specifically) whether they are indubitable truths, or at least inspiring and sustaining myths; or whether, perchance, they have not become unwarranted dogmas manipulating our individual lives and dwarfing our larger horizons. It was the latter, by and large that I found to be the case (1984,13).

Matthew Fox, a Catholic priest who heads the movement *Creation Spirituality*, tells us much the same story from the view of how we do our work in the world and tells us that this questioning is the basis for change. "Today this paradigm is undergoing radical re-evaluation. The system is not working. That is how paradigm shifts begin: the established way of seeing the world no longer functions" (1994, 5).

The notion of paradigm and necessity of a shift to a radically different one is showing its strength in the popular culture. As an illustration, this description of a new paradigm is a quote taken from a box of Chai tea.

> A New Paradigm
>
> A paradigm is a window of perception, defining not only how we perceive our world, but how we choose to interact with it.
>
> In the old mechanistic paradigm, Nature was viewed as something to be dominated and exploited. In the New Paradigm, the key word is "kinship."
>
> Each species of life is a vital strand in the overall tapestry. The question we must ask ourselves is "How can we live and prosper in a way that benefits all our relations?"

We are spreading the possibility of "problem solving" beyond the confines of science and into the culture that seeks new understanding and perhaps at the same time also making the meaning of paradigm into a "metaphysical world view".

To lead us on to the factors that are challenging the "old paradigm" we need to know more about the beliefs that underpin both the old and the new paradigms. In relationship to the still dominant paradigm we can ask questions such as: What period of

time does it dominate? What are some of it strongest characteristics and from where did these view originate? The remainder of this chapter and the chapter on edges will explore these questions more fully. It is necessary to use caution and clear thinking and avoid judging *new* as better than *old* in a superficial way. The crucial factor seems to be in looking at how the genius behind evolving views impacts the values that we hold and the way in which we live.

At the same time and before we leave the idea of "paradigm" to explore its details and contrasts I need to make mention of why this has bearing on this inquiry about the nature of a learning community.

Two threads that form a pattern emerge. One tells us of our personal place in the greater cosmos so that we come to community with an internal pattern of belonging. This emerging paradigm might alert us to review our definition of who we are and how we participate as learners, and what implications this might have in adapting to more recent perspectives on our personal learning capacities and on new understandings of how the world works.

The second thread may imply that from the new stories we can restructure our human communities and thus our culture from the lessons learned from the nature of our world. Fritjof Capra, among others, clearly states his position in relationship to shifting paradigms as they are related to community. He restates his 1986 comments that appeared in “Re-Vision” in his book The Web of Life. He recalls that the shift in physics that Thomas Kuhn analyzed was an integral part of a much larger cultural transformation. He proposes an analysis of this larger cultural transformation can extend Kuhn's original definition. Capra generalizes it from a scientific perspective to

that of a social paradigm which he defines as "a constellation of concepts, values, perception, and practices shared by a community, which forms a particular vision of reality that is the basis of the way the community organizes itself" (1996, 6). In this case he was not referring specifically to learning community although he takes up that topic within the same book.

From this statement might we ask whether this incorporation of a particular vision of reality in a community is a natural but unconscious evolution, or whether we can actively and consciously learn to model our human culture on the lessons of our understanding of the principles on which the cosmos and the ecos operate?

Brian Swimme and Thomas Berry make a similar assertion when they state that "…participating in a community's search for common wisdom is one of the central and satisfying activities humans engage in." (1992) This statement implies that the process of becoming wise as described in their book may be based on understanding and celebrating the cosmos and may indeed be a conscious process.

We are exploring new ways of knowing about the world as it is being increasingly described by the new discoveries in science and revisiting traditional ways of knowing. This is being done in communities of people in contrast to the individual investigation that has characterized recent decades. These topics will be examined in detail throughout the remainder of this inquiry.

Shifting Paradigms

> What stories we tell ourselves, of origins and endings, of form and transformation, of gods, the word, the law. All people, at all times, must have created myths and stories to sketch a picture of our place under the sun. Cro-Magnon man whose paints of animals seem to exhibit a respect and awe, let alone line and form, that equals or surpasses those of later millennia, must have spun answers to these questions. Who are we? Where did we come from? Why are we

> here? Did Neanderthal, *Homo habilis*, or *Homo erectus* ask? Around which fire in the past 3 million years of hominid evolution did these questions first arise? Who knows? (Source unknown.)

A general view of the large periods of time in human history may create a window for appreciating the way in which our species has envisioned the world over linear time. As reviewed in Chapter One: Introducing the Model, Philip Snow Gang (1989) in his book, *Rethinking Education*, gives us a metaphor by describing our relationship to nature in a series of four prepositions. These prepositions of relationship may help us to visualize the ways in which humanity has related to the natural world over the long sweeps of time. First humanity was embedded "in" nature. This period seems to have lasted for most of the time that humanity has been on earth. Certainly much was learned about nature and there was interaction in this long period.

Sometime around 10,000 years ago another long sweep of relatedness took shape as humans began to domesticate animals and plant crops. Humanity might be described as living "with" nature. Much more recently, some of the planet's population gained great power by living "over" nature. The industrial revolution had changed the thinking of a small percentage of the earth's population yet the consequences were enormous. As the environmental and human tolls of this "over nature" period have become apparent there exists a call for another view of humanity's relationship to the natural environment. Indeed a "new paradigm" or worldview might be described as humanity "through" nature. The four prepositions of relationship *in, with, over, and through* give us a mental picture of where we have been as well as a direction for next steps (Gang 1989).
We can see a pattern of relationship in the way we relate to the natural environment. Through the eyes of four prepositions we can describe this relationship. The time

involved with each descriptive preposition is shortening. Religion was once the filter and Science now is the filter for our relationship to the environment. They were and still are, for some people, one in the same.

In the first paradigms humanity lived in nature. This paradigm was long and changes occurred very slowly. At the time of the cultivation of vegetation everything changed. Humanity began to live with nature. During the industrial revolution humanity took a position of humanity over nature. We are hopefully about to enter a new paradigm. We must take on a new worldview, a new preposition that describes our relationship to nature if we are to survive.

Can we begin to see ourselves living through nature? Can humanity begin to create for itself a new metaphor that incorporates all of the proceeding ones and combines primary culture's view of the great being of life with the new science of understanding of the relationship of matter and energy. An emerging view of unity must create a new epistemology that creates dynamic thinking beyond the now static Cartesian duality. We must learn to think differently for all actions were once thoughts. We helped to create, what I referred to earlier as *supranature;* and only we can re-image the possibility of meeting our needs in harmonious ways.

In what ways is it possible to create a context for expressing our human needs and tendencies that would be integral with the image of the preposition "through"?
Ralph Abraham (1994) in his book *Chaos, Gaia and Eros* makes a model of time sequences of human history beginning 25,000 years ago based on mathematical sequences. In a series of repeating cycles his focus turns to the most recent 10,000 years. It is instructive to narrow our view to this time period, as there is a greater amount of

information that can directly illuminate our current phase. The themes of various relationship of human-to-natural world are described. These themes relate, in mathematical terms to: stability, oscillation, and chaos. He aligns these themes with three phases, which he associates with periods of time, particular sciences and genders. The stability phase is static, related to the concept of Gaia and is reflected in the physical sciences and is associated with female gender: Oscillation is associated with periodic, the concept of Eros, biological science and male gender. Chaos is related to the social sciences and partnership. He applies these terms to the last 10,000 years in this way.

1. Static/Gaia: 10,000 - 4,000 B.C. (agriculture and partnership)
2. Periodic/Eros: 4,000 BC, - AD 1962 (the wheel, patriarchy, and science)
3. Chaotic: after 1962 (neopagan and postmodern)

He then brings to our attention this same trinity that he calls the Orphism is also associated with three revolutionary movements underway in the sciences.

- The Chaos Revolution was named in 1975 for a new branch of mathematics that provides models for many intrinsically irregular natural processes.
- The Gaia Hypotheses, named in 1973, proposes a self-regulation capability of the complex system composed of earth, ocean, and atmosphere, and the living ecosystems of our planet. According to Gaia theory, which views Earth as a living system, the biosphere acts to create and maintain favorable conditions for life.
- Erodynamics, named in 1989, applies dynamical systems theory to human social phenomena. (1994, 11)

Abraham then had to ask himself about the strange synchronicity that these same terms were referred in the book, Theogony, that was written by Hesiod, one of the early Greek poets.

> His poem is a creation myth telling stories of the origins of the gods. Here the word *chaos* does not mean disorder. Instead, it represents an abstract cosmic principle referring to the source of all creation. It also appears in connection with

> two other fundamental concepts: *Gaia* (the created universe) and *Eros* (the creative impulse).
> (1994, 2)

This story typifies the crossing of borders between what was once considered separate subjects. In this case: a mathematician who studies Greek literature in order to invite us to explore history and the role of dominator cultures and partnership cultures. This synthesis is becoming a more common way of telling the story of our emerging paradigm. We are reminded of the memes that we seem to have forgotten. Elisabet Sahtouris explains, "In our capacity to look forward we have often dreamed of a Golden Age to come, yet it seems we have quite forgotten the Golden Age of our past, which Hesiod was the last to recall" (1996, 209).

What happened after Hesiod to radically change the metaphors that we use to describe the cosmos and our place in it? Having learned from the idea of paradigms that no science or any other cultural artifact can be seen outside the paradigm in which it was created, it seems rather pointless to continue to lay the blame for our situation on a particular religious or scientific period. Often Descartes and Newton are cited as the chief architects in the creation of a reductionist science that is at the root of many of our challenges. It is true that the metaphor used by Newton to describe his clockwork universe seems mechanical and too involved with details to see the grand picture. Isaac Newton speaks for himself in this passage:

> I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.
>
> We would like to fathom that distant ocean, but it is no shabby thing to fondle those pretty pebbles on the shore
> (Newton, cited by Gould 1994, 426).

He and Descartes must be considered in a state of resistance to a culture in which the church held great power over all aspects of life and portrayed a rather whimsical and often angry God who's goodwill could be secured only through the church. A kindly God in charge of a dependable watch (and a new marvel at the time) might have seemed a relief.

We might also observe that Rene Descartes is held to have been the originator of the separation of mind and body that stills lingers with us today and is only able to be reclaimed as brain research tells us that there is no thought without emotion. However, this

> …philosopher and founding father of modern medicine was forced to make a turf deal with the Pope in order to get the human bodies he needed for dissection. Descartes agreed he wouldn't have anything to do with the soul, the mind, or the emotions—those aspects of human experience under the virtually exclusive jurisdiction of the church at the time—if he could claim the physical realm as his own (Pert 1999, 18)

While it seems that after noting some of the influences from reductions science and its focus on the finer details of the world with a seeming loss of the workings of the whole have much to answer for in its impact on the current dilemma. We may acknowledge some of the roots of a destructive mind but it seems also that our energies are better focused on looking closely at the many influences that are moving these views into to a new unfolding.

It appears that our Western Culture is searching for meaning with great urgency. Some are finding it in material gain or daring life-styles. Still there is the urge to return to the perennial questions that have haunted our psyche for millennium: What is the world? How did it come to be? What is my place in it?

These questions have been approached differently according to time and place. Cultures build themselves around the answers and the seeking of these answers. The process becomes a source of meaning. Humanity takes many paths in its search for meaning. The less formal expression of these questions is all around us through traditional folk wisdom, music, art, story telling, spiritual seeking and a myriad of other expressions that defy classification.

Through formal academic channels names have been given such as philosophy, religion, science, education or humanities. In giving label to these searches, isolation sometimes occurs and our searching ends among scattered fragments. The move now is to integrate the fields through which we search. E.O. Wilson, the Harvard scientist who coined the word biophilia, expresses it by using the word *Conscilience* as his book title (1998, 8). While he uses a framework that is based on the unification of science by the old rules of reductionist science and believes that to extend the conscilience beyond science is metaphysics, I will take the idea and align with the minority of scientists who see the grander picture of conscilience. In a movement toward this process of syntheses all of the channels of human expression and information seem to be converging.

Process and content merge. For example Brian Swimme, a mathematical cosmologist, breaks some of the cherished images of science and is becoming an oral storyteller. He believes that it may be informative and transformative to vitalize the story that our culture can tell about our cosmic/human journey. For many this story has been lost. Yet this may be the first informed story that we need to tell one another. As Skolimowski explains, “Cosmogenesis is both a material (physical) and a spiritual

process: matter is transformed into matter, but matter is also transformed into spirit" (1994, 12).

I use for inspiration *The Universe Story* (Swimme and Berry 1992). Please refer to the reference material in Chapter 7.1325. There is a story based on Swimme's work written by Anne Hillman.

As we become able to once again find meaning in a cosmic story we realize that enfolded in that is also the story of the "blue pearl" planet-Earth. That story, in turn, tells of the unfolding of life including that of our human species. James Lovelock and Lynn Margulis bring that story to the forefront in the Gaia Hypothesis/Theory. When Lovelock was asked, "Why do you stop with the Earth? Why not consider if the Solar System, the Galaxy, or even the Universe is alive?"

> My instant answer was that the concept of a living Earth, Gaia, is manageable. We know that there is no other life in the Solar System, and the nearest star is utterly remote. There must be other Gaias circling other docile long-lived stars but, curious though I may be about them and about the Universe, these are intangible—concepts for the intellect, not the senses (Lovelock 1988, 206).

This sentiment matches mine perfectly as I call for an Ecogenesis for Education: A Context for Learning. Cosmogenesis is the fecund host for the emerging Ecogenesis. We are beings that live in the community of life on Earth. Its systems run through our very veins. The stars and the planets provide inspiration for our dreams and rules for our living but Earth is home and has her own lessons to teach.

Let us make a clear statement of the Gaia Theory because within that is the basis for all of systemic thinking that is related to Earth. First, we start with what it is not: Gaia is not a synonym for the biosphere or for the biota of the planet. Then what is it?

> The Gaia hypothesis, when we introduced it in the 1070's supposed that the atmosphere, the oceans, the climate, and the crust of the Earth are regulated at a

> state comfortable for life because of the behavior of living organisms. Specifically the Gaia hypothesis said that the temperature, oxidation state, acidity, and certain aspects of the rocks and waters are at any time kept constant, and that this homeostasis is maintained by active feedback processes operated automatically and unconsciously by the biota. Solar energy sustains comfortable conditions for life. The conditions are only constant in the short term and evolve in synchrony with the changing needs of the biota and it evolves. Life and its environment are so closely coupled that evolution concerns Gaia, not the organisms or the environment (Lovelock 1988, 19).

This view of the planet was a radical notion and challenged the scientific community. Only slowly have confirming experiments allowed the hypothesis to become theory. We can read in this statement of the Gaia Theory that complexity lies at the heart of the description of Earth and its interrelated systems. This work took a new kind of thinking, a new kind of thinker, a new kind of scientist:

> The specialists concentrate on detail and disregard the wider context. The systems scientist, on the other hand, concentrate on structure on all levels of magnitude and complexity, and fit detail into its general framework. They discern relationships and situations, not atomistic facts and events. By this method they can understand a lot more about a great many more things than a rigorous specialists, although their understanding is more general and approximate. Yet, some knowledge of connected complexity is preferable even to a more detailed knowledge of atomized simplicity, if it is connected complexity with which we are surrounded in nature and of which we ourselves are a part. (Laszlo 1996, 9)

I chose to attempt such thinking in this inquiry. The pattern of relationships among the participants, context, processes as they applied to creating learning communities took priority over detailed study that would expand within the systemic model over time.

This systemic thinking is also named ecological or wholistic thinking. Systemic thinking was revolutionary in the time of the Macy conferences in the 1940s. It then became associated with a rather more narrow application within the scientific community. Gradually it has spread (perhaps a wild meme) into the wider culture.

Within that wider culture its associations with the concepts of Gaia seems to have deepened as they have spread. A new book from the perspective of business has this to say:

> Complex systems are worth knowing. Until recently, we haven't even acknowledged systems, let alone understood them. Life–reality is a complex system composed of complex systems. If we are not even aware of the basic nature of systems, how competent c*an we be* at life? (Haver 1998, 17)

Some of the ideas of systems thinking are approached in Chapter 7.1325 Practicum. The name of this chapter itself comes from one of the more recent sciences, that of Chaos Theory. Since the practicum is concerned with a colloquium that presents material related to the new sciences information about natural systems is located in that chapter. There is also an introduction to the ideas of Chaos theory in this chapter.

Just before leaving this idea of our worldview, which gives meaning and context for our lives, some thumb nail sketches of this shifting paradigm might be helpful. The first figure represents the mind sets that come from the old and new paradigm; and the second figure represents the contrast in thinking and values that emerge.

Old	**New**
Determinism	Indeterminism
Machine	Organism
Separate units	Interconnection
Atoms	Fields
Exact quantities	Articulated structure
Observation	Interaction
Control	Participation
Competition	Co-operation
Freedom is illusory	Creativity

Figure 1. Physicist, Chris Clarke's Implications of the new scientific paradigm demonstrate a contrast between the classical scientific paradigm and the emerging alternative paradigm

Thinking		Values	
Self Assertive	*Integrative*	*Self Assertive*	*Integrative*
rational	intuitive	expansion	conservation
analysis	synthesis	competition	cooperation
reductionist	holistic	quantity	quality
linear	nonlinear	domination	partnership

Figure 2. New paradigm thinking and values. (Capra, Fritjof, 1996, 10)

Summary

Each time sweep seems to having a characteristic relationship to nature. In the long multiple generation periods people transited gradually as contrasted with the present rate of changes that are happening within one person's lifetime. The edges between the old and the new become prominent and often jagged. The conscious realization that we can perhaps participate in the formation of the contexts that create and are created by the emerging paradigm seems to be generating energetic responses that are both hope and fear filled. We can see the contrast between the previous generation the following one. Are our choices wise in how we reveal ourselves in the metaphors we choose for depicting the? Are the new stories birthing meaning in our everyday life and in our communities of learning?

CHAPTER FOUR:
Process – Action
Permaculture is a design system for creating sustainable human environments.
Bill Mollison

Permaculture

I have chosen Permaculture as the focus for this chapter on actions. When we relate it to the systems map that guides this document it is the water. The hydrocycle that touches and interacts with everything, just as the concepts inherent in the movement touch all of the topics that I have investigated.

If my inquiry concerning educational communities and systemic thinking had led me only to this one place I would have found treasure. Permaculture seems to put into practice all of the things that I have studied. It has built a community of friends and co-designers creators of living environments.

Two courses taken at the Christchurch Polytec as well as a Facilitators Course are just the beginning of a lifetime of study and experiment. In addition, monthly meetings and *working bees* have formed the basis of my social life. The organic garden produce is just a bonus and part of a lifestyle that will lead toward living more lightly on Earth with increased personal well-being.

The fact that it was permaculture that led me to the Organic Garden Cities Trust and to the Kids Edible Garden project makes an almost "too perfect" fit with my original intention. To have been able to work with the adults of the Trust and Kids Edible Garden on the concepts contained in this paper is a debt I owe to them. They let me experiment on them as I

learned new things. Pictured above is Lily White — who attended all of the Christchurch-based colloquia, often with her daughters, Ayla and Saffron — and helped me build gardens as well as become my special friend.

Permaculture is a word that was originated in 1978 by Bill Mollison, an Australian ecologist and David Holmgren, one of his students. The word is a contraction of "permanent agriculture" or "permanent culture".

The foundation of the approach is working with earth systems to live as sustainability and comfortably as possible. It is about design based on systemic principles. The design process is applied to food production systems and ecological human habitats.

> It is a land use and community building movement, which strives for the harmonious integration of human dwellings, microclimates, annual and perennial plants, animals, soils, and water into stable productive communities. The focus is not on these elements themselves, but rather on the relationships created among them by the way we place them in the landscape. This synergy is further enhanced by mimicking patterns found in nature.
> (http:www.attra.org/attra-pub/perma.html 5/2/99)

There are practical applications of permaculture that arise almost immediately upon beginning to learn about the process. I have found that creating the design plan is an intricate and time-consuming project that benefits from community feedback and advice. The feeling of having friends to help create what has been designed is remarkable. Each time I look into my garden I see the team that assisted in its creation.

One of the first lessons of my permaculture class focused on understanding the Ethics of Permaculture. These ethics are worthy of reflection. They are adorned by a lovely drawing and hang on my wall.

The Ethics of Permaculture

Permaculture is unique among alternative farming systems (e.g., organic, sustainable, eco-agriculture, biodynamic) in that it works with a set of ethics that suggest we *think* and *act* responsibly in relation to each other and the earth.

The ethics of permaculture provide a sense of place in the larger scheme of things, and serve as a guidepost to right livelihood in concert with the global community and the environment.

- **Care of the Earth**

  …. includes all living and non-living things—plants, animals, land, water and air

- **Care of People**

  … promotes self-reliance and community responsibility—access to resources necessary for existence

- **Setting Limits to Population and Consumption**

  … gives away surplus—contribution of surplus time, labor, money information, and energy to achieve the aims of earth and people care.

Permaculture also acknowledges a basic *life ethic,* which recognizes the intrinsic worth of every living thing. A tree has value in itself, even if it presents no commercial value to humans. That the tree is alive and functioning is worthwhile doing its part in nature: recycling litter, producing oxygen, sequestering carbon dioxide, sheltering animals, building soils and so on.

Permaculture is an approach that was carefully designed and that element is central to the process itself. It is the kind of design that seems to allow the next generation of trained people to expand the concepts. With the constant refinement of

what the process is new extensions are being created and the movement has spread worldwide.

If for a system to have meaning it must have a clear source, then permaculture has done that through its ethics and clear characteristics. (Permaculture Course notes Gilda Otway, 1997)

Characteristics of Permaculture

Permaculture is one of the most holistic, integrated systems analysis and design methodologies found in the world.

Permaculture can be applied to create productive ecosystems from the human use standpoint or to help degraded ecosystems recover health and wildness. Permaculture can be applied in any ecosystem, no matter how degraded.

Permaculture values and validates traditional knowledge and experience. Permaculture incorporates sustainable agriculture practices and land management techniques and strategies from around the world. Permaculture is a bridge between traditional cultures and emergent earth-tuned cultures.

Permaculture promotes organic agriculture, which does not use pesticides that pollute the environment.

Permaculture aims to maximize symbiotic and synergistic relationship between site components.

Permaculture is urban planning as well as rural land design.

Permaculture design is site specific, client specific, and culture specific

There are three guidelines that most every permaculture enthusiast says:

Let nature do it. For any activity that needs to be accomplished, first consider if there are any biological or other natural ways to accomplish the goal before considering mechanical and chemical means.

> **Integrate you functions.** When considering the different elements of a landscape, consider not only their products, but also their functions. There should be multiple functions for single elements.
>
> **Plan the physical layout.** The three main concepts here are zonation, sector planning, and relative location (Jackson 1984, 40).

Now that we have at least a beginning clarity about the ethics principles and guidelines we come to a typical jolt that is offered by Permaculture. When asked for a definition of permaculture Bill Mollison replied,

> I'm certain that *I* don't know what permaculture is. That's what I like about it – it's not dogmatic. But, you got to say it's about the only organized system of design that ever was. And that makes it extremely eerie (Atkisson 1991, 50).

From the perspective of natural-systemic mapping that we have previously explored, the stability points can be articulated and the expansiveness of the chaos point can be appreciated. Recently, I have been trying to articulate a synthesis between what I have learned of cosmic principles and permaculture. The three principles articulated by Thomas Berry *in The Dream of the Earth* have startled me in their simplicity and profound wisdom. He tells us that the universe functions on three principles.

Differentiation is the primordial expression of the universe. Life on planet Earth finds expression in an overwhelming variety of manifestations. Everything is different from everything else.

The second principle is *subjectivity*. This is the interior dimension of things. Everything has an inside and an outside. Everything reveals itself and hides itself simultaneously.

Communion is the final principle. Everything is related to everything else.

I can see these principles in operation in the reality of a garden. *Diversity* is an absolute in a healthy living system. Monoculture planting is not ecologically sound. *Each*

member of the garden needs to be placed in a way to give the best conditions for growing. *Communion* through a plant giving its life to become part of another complex organism is one level is one aspect and then there is the ritual communion with others of the human species to celebrate the gathering of the food. Brian Swimme interprets this to mean that the ethics of the cosmos would tell us that our greatest contribution can be in our difference from everyone else and to encourage their differentiation and then live in communion (Canticle to the Cosmos 1990, Video 4).

This gives my systemic view of the garden a new intention. My intention is not to grow the most or the biggest plants. It is to provide as nearly as my wisdom and resources allow the arrangement of the plant's surroundings so that in its growth it might most fully express its latent interiority. I do not cause the plant to be healthy I invite its singularity to manifest. It makes me sing to think of this in the garden but I won't tell just anyone why.

It does seem as if it is an approach that appeals to people who like to create and go beyond previous boundaries, even of permaculture. So we see that it goes beyond ecological food production to include energy-efficient buildings, waste water treatment, recycling, and land stewardship in general.

Now enthusiasts of the approach are extending its intentions toward economic and social structure with co-housing and eco-villages in order to meet the needs of people who are interested in forming intentional communities with other practitioners.

Communities and Their Created Environments

One of my original interests was in understanding more about the current trend that, while still a minority movement, is growing in strength. I am speaking of the phenomenon of both intentional and emergent community. Community seems to be

redefining itself constantly from the community of past generations. Neighborhoods were often the core of community. Families did not have access to cars that carried them far from their local neighborhoods for socializing and work. Then suddenly there were two cars and families were socializing far away from home. And then the family structure itself is undergoing immense changes. This perhaps happened first in the United States but it has been my experience in New Zealand as cars began to be imported and families have followed much the same redefinition as the U.S.

There is now some effort to re-establish local community through activities such as gardens and local projects to protect landscape. There are people who are living in rural setting in groups that value sustainability. Others see the value of re-establishing the cities of the world on different values.

The experience in today's cities tell us that this is an essential rethinking that requires strong action to restore healthy, safe and ecological sound neighborhoods. We remember the list of needs for the non-affluent communities of the planet and have to question whether or not the material affluent areas are not also contending with water, air, noise, and health deterioration problems.

For example we could consider the philosophy of Robert Gilman, founder of In Context Magazine — itself an intentional community:

- We're building structures and communities that alienate us from each other and from the natural environment.
- The materials used in the construction of buildings normally contain enough toxins to make some of us very sick and many of us chronically uncomfortable.
- Many popular building materials are extracted an enormous cost to fragile ecosystems in various parts of the planet.
- Land-use patterns in may areas make life without an automobile nearly impossible, contribution to our wasteful use of finite fossil fuels and the

> automobile's dubious distinction as the world largest single source of pollution.
>
> Meanwhile we ignore or waste resources freely provided to us in the form of indigenous materials, rain, sunshine, fresh air, and landscaping.
>
> The scope of the problem is vast. For example:
> - Buildings account for more than 40 percent of all US energy use, in terms of both energy for materials and construction and energy for heating, lighting, equipment, etc.
> - Building placement – land use – dictates much of our need for transportation, which accounts for 26 percent of US energy use. (Gilman In Context 35 1993, 1).

We could ask ourselves again about the way in which we satisfy our human needs. Can we set up criteria for what is necessary, sufficient and what is superfluous?

Some activists seek solution in the form that their community can take. Others look to "restorative design". One architect seeks to design in order to "inspire, touch the heart, elevate the spirit, and restore a degraded environment."

> We are waking up to our failure to recognize that our buildings and communities are part of nature. Rather than working with nature, we've been setting ourselves and our built environment apart; we've been blind to the devastating impact our choices have had on the natural environment.
>
> …So at this point, we need to go beyond diminishing the impact of each design decision and begin to consider how we can restore the environment with each design decision.
>
> We're rediscovering that we can create building and neighborhoods that respond to their environment, just as a living system would (Bob Berkebile, In Context 35, 9)

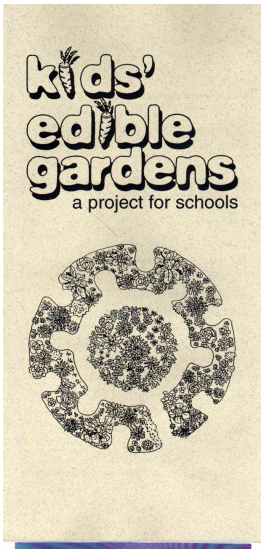
We see that there are options with good design and appropriate technology. The course that I attended at *Yestermorrow* in Warren, Vermont introduced me to both the design skills and the availability of more ecologically sound materials. The focus of the course was not on "community" by intention, but I easily observed that the community in

which these builders lived was an emergent community. The families were often together because they wanted to share their lives.

I still dream about building our straw bale house in a community but that plan must be delayed for the present. Permaculture has given the same impetus for emergent community. There is something about sharing the meeting of our human needs in a direct way with others once again takes us back to natural relationship of conviviality.

Kids Edible Gardens

The project that was born from the Organic City Trust in Christchurch now has gardens in 17 schools with more on the waiting list that we can accommodate. Funding for the program are always scarce. Workers are always doing more than energy and time would indicate. We do have an office and still meet regularly for planning.



Children, teachers, school staff and families join with the green worker to create a raised bed garden in the school ground. They have worm bin and composting demonstrations as these activities are set up. There are classroom lessons as well as time outside.

In October we will set up an interactive display and demonstration area for a three day garden fair for families all over the city. Children will get to plant their own small gardens to take home and bake pizza in a cob oven. These kinds of

activities are beginning to be created in many places in the United States, New Zealand, United Kingdom and elsewhere. I see each of these kinds of initiatives to be learning communities in action. Some are school related and some not. The classroom knows fewer boundaries. Learning is just part of all of life. This will surely have an influence on the schools themselves as their definitions are extended into the community at multiple age levels.

CHAPTER FIVE:
INTEGRATIVE EDUCATION
and
COMMUNITIES OF LEARNERS

Thinking is a form of sensitivity.
The power of sensitivity is the power of co-creation.
(Skolimowski 1994, 14)

What does it mean to co-design and co-create an integrative, ecological community of learners?

> Life is Social. It exists in communities and collectives. There is a useful world in physics to describe the properties of collections: *colligative.* ...Collections of living things show properties unexpected from knowledge of a single one of them (Lovelock 1988, 18).

> Humans evolved within a world of nature, and an appreciation and *need* for, nature are real and ineradicable components of the human psyche. We risk eroding the human soul if we allow the erosion of the richness of the world of nature around us (Leakey 1995, 248).

> Our education, training, and experience rarely contain a systems view of any subject. Yet, everything we know or have ever known, from atoms to our universe, from an individual embryo to ecosystems is composed of thousands of interdependent life forms, is a complex system. Being unaware of systems amounts to having no idea of what life is about (Havener 1998, 17).

Break the pattern which connects the items
of learning and you necessarily destroy all quality.
(Bateson 1979, 7)

With these words the main themes of this paper are drawn into the unity of integrative education and learning community. We are learners by the very act of becoming sensitive and aware of what is around us. There is a connection to nature that is so deep that to break it is to break the items of learning. Learning to perceive the world with a systemic view gives us meaning and satisfies our deep needs. The search for pattern, form and process tells us all of these perspectives are necessary.

The mental model that I hold as I combine the words integrative with education is threefold. First, the mental, physical, psychological and spiritual aspects of each learner

have possibility of internal coherence. Second, the individual has a reflective understanding of relationship to other people and to the expanded world. Third, learning involves the development of skills, knowledge, powers of discernment and wisdom resting on a context of inter-relationship that provides meaning.

Integrative education emphasizes a set of working assumptions that include the following:

- Education cultivates a critical awareness of the many contexts of learners' lives — moral, cultural, ecological, economic, technological, political.
- All persons hold vast multifaceted dimensions that we are only beginning to understand. Human intelligence is expressed through diverse styles and capacities. These include the rational, logical, and verbal as well as the intuitive, emotional, physical, imaginative, and creative.
- Learning is active, self-motivated, supportive, and encouraging of the human spirit. It is a lifelong process in which *experience* facilitates learning.
- Educators have the opportunity to be change agents... and to be changed in the process.

The root word for integrity or integrative is from the Latin *integratus*, meaning to *make whole, restored*. Integrative education is a field of study that transcends the boundaries of traditional learning in a search for meaning beyond the separation of disciplines. It incorporates an ecological worldview that crosses disciplines and is socially transformative. It compels educators at all levels to develop a natural systems approach to teaching and learning... one that meets the global environmental, social and

political challenges that we are now facing (Gang & Morgan unpublished document 1999).

When there is an emphasis on relationship this necessitates the need for both individual development and development within a community. Are there guides to help us create such integrated communities?

Before we can approach this question we may need to find where we are at present. We do know that in pockets there are highly innovative educators that do the job of inspiring, preparing, nurturing and sustaining learning. For the most part there is a perception that educational institutions are not functioning well. The forms and policies of education are certainly a reflection of the values of a culture and if indeed we are moving into a cultural paradigm shift, perhaps on a global scale, then we would expect our institutions to be under stress. When we survey how our worldview came to be, might we survey some of the key points of our educational evolution in order to gain insight into our current dilemma?

From what we know of early non-literate peoples the learning of a culture's skills would have been in keeping with modern whole-brain learning theory. It was experiential and related to the needs of daily life. The environments may have required a rather narrow band of behaviors and thus creative innovation may have been limited. Yet the culture was passed down in ways that were effective enough for them to extend over long time periods.

With the advent of reading things began to change. In order to remain a part of the culture skills had to be learned in a more formal way. Some stages of apprenticeship were common but soon that was in combination with a new invention—the school—that

became the focus for learning. For the past five hundred years it has remained true to much the same pattern. The main elements of this pattern are:

- It is authoritarian. The children are grouped in classes supervised by a teacher. The teacher, or his/her superiors, decides what, when, and how the children will study.
- It dominates childhood time. While there have been many variations throughout history, serious schooling normally takes the best hours of the day while school is in session, most of the months of the year and most of the years of childhood.
- It separates the child from the world. It normally occurs at a special location devoted solely to schooling and walled off from the outside world. Frequently, students lived at this location, further isolating them from the rest of life.
- It has had a narrow range of emphasis on a certain kind of learning that did not recognize the uniqueness of the varieties of learning capabilities. Order, structure, and discipline were highly valued.
- It is a competitive social filter. The social and economic rewards for successful completion of the schooling program have usually been attractive enough to draw more students into school than the society needed as graduates. The school has been expected to winnow out the "successes" from "the failures" (Gilman In Context 6, 22).

This system suited an elite portion of the population who learned by rote and preserved the past. Then came the printing press. The society became more complex. School attendance grew. Finally, it became a legally enforced requirement. Debate began to grow over teaching methods. Child centered education that was suggested was pushed aside by the industrial revolution and the need for workers who were trained in specific behaviors. This simplified review does not go into to the many offerings of alternatives that have interfaced with the dominant form of education but still there seem to have been influences.

How are we to find fundamentally different approaches based on a different context, not just for children but for adults as well? For those who have concern for both the process of education and for our ecological deterioration, this can be discouraging.

> Conventional wisdom holds that all education is good, and the more of it one has, the better. …The truth is that without significant precautions, education can equip people merely to be more effective vandals of the earth (Orr 1994, 5).

In *Earth in Mind*, David Orr, chair of the environmental studies program at Oberlin College and Director of the Center for Ecoliteracy, describes what he believes is wrong with our education.

> Toward the natural world it…emphasizes theories, not values; abstraction rather than consciousness; neat answers instead of questions; and technical efficiency over conscience. (1994, 68)

The culture in general seems to by caught in a chasm between biophilia and biophobia. Biophilia is defined "as the innate tendency to focus on life and lifelike processes" (Wilson 1984, 1). Biophilia is innate and indicates health but as David Orr points out there are other tugs on us. "The affinity for life competes with other drives and affinities, including biophobia disguised beneath the abstractions and presumptions of progress found in economics, management, and technology" (Orr 1994, 132).

Orr believes that we have to think carefully about how to change our orientation to the natural world and the education that we now have.

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

These four points are revolutionary. Along with Fritjof Capra and others at the Center for Ecoliteracy he is taking, through direct action, ecoliteracy programs to the schools. Garden development is one of the avenues of action. Cleaning of creeds is another. Within these activities children learn and practice all of the skills and knowledge that are usually taught in a classroom plus many more.

The Organizational Philosophy of the Center for Ecoliteracy makes a statement that is in alignment with what I have discovered with this inquiry and that I believe states many of the important points.

> In our efforts to build and nurture sustainable communities we can learn valuable lessons from ecosystems which are sustainable communities of plants, animals, and microorganisms. Being ecologically literate (or ecoliterate) means understanding the basic principles of organization of ecological communities and using those principles for creating sustainable human communities; in particular, learning communities. In other words, Ecoliteracy offers an ecological framework for systemic educational reform. (Center for Ecoliteracy 1999)

With humility I add the work that I am doing to the many voices that also believe that education is the greatest leverage point that we have for change and recovery from the damage that still now continues. With the chapter that I name by the fractal for "what is missing and left unsaid" *Chapter 7.1325*, I use some of the work of Fritjof Capra in an activity with the teachers and community members with whom I work.

There is little doubt in my mind that we are indeed in crisis ecologically and socially. Yet there is hope and optimism. I will close this chapter with a reminder from the work of a physicist, Chris Clark. He reviews with us the changes in life and educational practice that the New Paradigm principles imply. The way in which we can change our perceptions of world will be key to any dialogue that we can create about the revolution needed in many areas of our life, most especially the context for education.

How this might affect my own attitudes to life and professional educational practice

New Paradigm	**suggesting ....**
Indeterminism	Each present moment is open to new opportunity
Organism	My relation to the world is modelled on my relations to living creatures
Interconnection	Empathy, for people and other-than-humans, is physically real
Fields	Each of my actions propagates infinite effects
Articulated structure	My sensitivity to patterns is a key to understanding
Interaction	I accept being changed by what I encounter
Participation	I am committed to engagement with the world
Co-operation	I look for mutual benefit
Creativity	I am willing to shift to new ways of perceiving

Chris Clarke, Blaker Foundation, 6/5/00

CHAPTER SIX:
Communication

Restorative Communion –
The development of mind through our relationship
with nature as we explore, plays and reflect.

This chapter is related to the feedback webs of an ecosystem. For the human learning community we might substitute the word communication. It is implied that we will be in an exchange of information. We can perhaps resist thinking of information as a thing to be distributed but rather as a field in which action takes place. We may also think that one of our communions with the world is through the act of being a member of the grazers in the food web. We cannot step out of the web went it comes to satisfying this basic need.

We may first think of the many ways in which we - connect, communicate, commune - with the world.

Surely the ways of non-language communication comes to our attention. In how many ways have we used our bodies to communicate? We dance, sing, touch, draw and more. We create art forms to refine these skills. We attempt to find ways to extend what we know and feel to others and receive the same from them. We make attempts to connect to the being-ness of other than humans as we try to grope our way back into the web of life.

Still for many of us it is through language that we communicate. We write, we read, we listen, and we speak. Much of our schooling is devoted to assisting us to be fluent in these skills. If we are awake to the world these exchanges come to have meaning beyond the skill as our presence is revealed and we accept the presence of others.

This pattern of exchange through direct contact and then to contact across time and space with the development of the written world has shifted dramatically in the recent past. The world of the computers arrived and then they became available to greater portions of the population. Computer availability is still limited to the affluent but that too is changing as the power of communication is becoming apparent to people who have no other voice with which to communicate. We now can hear the words of those in all parts of the planet.

I am enthusiastic about the possibilities that open with this technology. On the surface this would seem to contradict my urgency to set our values by ecosystem and cosmic rules rather than technological ones. The experience that has changed this for me has been the kind of communication that I have shared with people who are living all over the planet. We can come together to dialogue about the urgency for our education to become more integrated, our professions to become more integrated, our lives to become more integrated. The computer has made this possible. The virtual campus has become my second home for entertaining my friends and asking them to share my thoughts and my life.

I was first part of the first learning community of the TIES/ Vermont College partnership. I felt that we as a group, despite frustrations of wandering into unknown territories on a regular basis, developed something very unique. My experience was and continues to be one of feeling that I was part of a mosaic that was created by each person in the community contributing through there emphasis perspective to the richness of the mix. I did not have to research all of my areas of interest; someone else would do it and bring for all to share.

Photo of Our Learning Community (LC1)

The computer medium of contact far from being isolating brought me into intimacy with people who I would never have known otherwise if we were constrained by distance.

During our first summer I had a very restless dream that eventually resolved itself by creating a room for my computer that was glass on one entire side. On the other side of the glass was a sylvan forest with every shade of green. I did not require a dream therapist to interpret that dream. It has come to be my vision, however.

How can we use this medium of communication to weave a network of people all over the planet that want to share the work they are doing. How can we join our voices in the sharing of approaches to ecoliteracy? How can we work for the meeting of all of our basic needs? How will we participate in the coming paradigm changes? In what ways will we learn to be less heavy on Earth? Communities of learners are loosing their boundaries just as the departments of academia are loosing theirs. We are not confined to classrooms or even to locations in cities or countries. I hope that my experience of being

more deeply committed to my home community as I correspond and live in the energetic field of cyberspace.

Perhaps we are on our way to being practical alchemists. Weaving and unweaving the rainbow of the particular and the whole, the close and the far as we move more quickly than we would sometimes choose into the future.

CHAPTER SEVEN:
Edges:
Ecopsychology, Ecophilosophy

A notable concept in ecology is the notion of *edge.*

> When two ecosystems meet - say in the forest and prairie – a border of rich diversity and fertility precipitates between them, a place of increased imagination. They evolved; well-practiced narratives of two systems are mixed in a terminus, a verge of opportunity and peril (Jay 1996, 52).

Whether it is a swirling dance between ecosystems or the touching of two intertwined circles on the natural map that guides this inquiry, edges are a rich source of change. I place *ecopsychology* and *ecophilosophy* in edge positions. Indigo is the color suited to these edges as it is neither a primary nor secondary color but sits subtly in the rainbow between blue and purple.

Ecopsychology

> Ecopsychology is an inquiry into the relationship between humans and nature. Merging ecological and psychological concepts, ecopsychology suggests that self-knowledge comes from our ecological identity rather than personal history of the self. Ecopsychology is based on the premise that the Earth is a living organism and through humanity the Earth is contemplating itself (Davis 1997).

While this, among many attempted definitions of ecopsychology, gives us some insights into the meaning of the term exact description of this psychology is still illusive.

Many cheer this vagueness, as there is constant self-definition and refinement. Others are less comfortable as they seek legitimacy for academic credentials. Some have left the dialogue and named the work the "greening of self", "psychology of ecology" or some other descriptor.

I have read books, subscribed to newsletters, attended a course for educators, and been a member of an ecopsychology email list for more than three years. Still my understanding is intellectually incomplete but intuitively I am convinced that this descriptor holds a key to our becoming conscious of our primary matrix of being. Does this idea what we have lost in our, perhaps wrongly described, advanced Western Culture.

This culture has as an objective to control or at least protect us from nature. Nature is a vital and often destructive force. The laws of the cosmos demand both destruction and creation. What is the cost that we have paid for this protection?

We are profited by keeping in mind that "The evolution of a species and the evolution of their environment are tightly coupled together in a single inseparable process" (Lovelock 1988, 12). In the millennia that our ancestors lived "in" nature this singular process of mutual evolution was probably little disturbed. In these long stretches of time as we practiced being human our latent tendencies developed and language was created as a means of communication.

> Our ancestors probably became bipedal and brainy in the fertile shift of the tropical forest and savanna verge. In function and practice language is more truly edge ecology, a vibrant brood between the human soul and the natural world (Jay 1996, 56).

We wonder when and how our separations of soul and the natural occurred.

In a study of the language that describes the natural world it is of interest to note that "standard reference works began to include entries under Environment and Ecology only in the late seventies" (Luinenberg & Osborne 1990, 8). It is necessary examine the word Nature to find clues as to the noted relationship. It is recorded that "Lucretius … discerned Nature to exist independently of humankind during the 1st century BC" (9). Luinenberg and Osborne go on to explain:

> Our present dilemma might be said to stem from the ancient perception that nature and the works of humankind existed independently of each other. Observers over the ages have pointed out the flaws in this thinking, but only the last century or so of industrialism would seem to have proved them right in the mind of the public (9).

Whatever we may notice that helps us understand how we arrived at this time in history comes secondary, in my opinion, to the finding of ways to live more fully as humans in our rightful place in the cosmos/ecos. We return to ecopsychology for clues. Chris Wilden, writes in her Learning Plan:

> Ecopsychology offers a holistic, transformative way of understanding the human - nature relationship. I believe that Nature can teach us how to live compassionately and sustainably. The world can re-establish its fundamental oneness with nature by transcending its dualistic ways of thinking and being. I believe that the transformation from dualism to oneness is essentially a spiritual journey. Ecospiritual practices and beliefs are essential to both personal and cultural transformation.
>
> The challenge lies in the transformation. (Wilden 1997).

Wilden is one of the members of my Learning Community at Vermont College/TIES program. She writes of the process of ecopsychology and through experiences in wilderness settings helps other to know and fell their connections to the natural word. This points to one of the several ways in which ecopsychology manifests

beyond words. In addition to wilderness experiences proponents are devising other ways to reconnect us through active therapies such as gardening.

Fortunately, there are many voices at this moment that are insisting that we look at this aspect of humanity with urgency. I will highlight the work of only two of the many.

Ralph Metzner, ecologist, psychologist, teacher, writer, has long been a spokesperson for the "Greening of the Self" as he calls it. He points us in several directions for consideration. He claims that as part of the paradigm shift the sciences that inform us are moving from physics to ecology as the dominant perspective. "Ecology has been called the 'subversive science' because it deals with systemic interrelationships, and is therefore, in essence, trans-disciplinary and subversive of academic specialization (1999, 2).

He goes on to explain that this blending of disciplines is ecologically based.

> Ecological concepts are ideally suited for helping the knowledge disciplines transcend their specialized blinders, and consider the wider contexts of ecosystem and Gaia (1999). The resultant radical movements, bioregionalism, deep ecology, ecofeminism and social ecology are challenging the very foundations of the modernist industrial worldview and our 'humanist superiority complex.'" (1999, 3).

The other voice that I will briefly introduce is that of Buddist scholar, general systems theorist, writer and experiential ecologist, Joanna Macy. In her celebration of the "greening of self" she make these cogent points.

> The self is a metaphor. We can decide to limit it to our skin, our person, our family, our organization, or our species. We can select its boundaries in objective reality. As the systems theorist sees it, our consciousness illuminates a small arc in the wider currents and loops of knowing that interconnect us. It is just a plausible to conceive of mind as coexistent with these larger circuits, the entire "pattern that connects," as Bateson would say (1991, 189).

> This view of human nature is not new, of course. Many have felt the imperative to extend self-interest to embrace the whole. What is notable in our situation is that this extension of identity can come to be present and own our pain (1991, 187).

I wonder if this pain is one of the deterrents of our coming back into relationship with all that is. When we return to be joined with a badly damaged Earth the pain will be great. Her work in "despair and empowerment" addresses this issue. There is urgency in all the voices that abide in the pain and in the hope. This, along with permaculture, stirs an urge to know and experience the synthesis between these two avenues of inspiration.

I will end the ecopsychology section with the words of my classmate as she strongly states the case for our awakening and giving attention to the profound message of ecopsychology.

> The hope and challenge is to awaken our full potential and to close the abyss our mind has created between our hearts and our minds. Ecopsychologists have two tasks. First they must serve as hospice workers to a struggling humanity. Second they must act as midwife to the emerging culture. The reawakening of our fundamental connection to the Earth can be described as an evolution of consciousness (Wilden 1997)

Ecophilosophy

A second edge for our consideration, ecophilosophy is also an edge with ecopsychology. At times the only separation in these subjects is an identification of the author to be more familiar with one or the other term.

In the original sense of the word philosophy the prefix "eco" might not be necessary. It meant the "search for wisdom, for practical guidance in human affairs through understanding the natural order of the cosmos to which we belong (Sahtouris 1996, I).

Again two appreciated voices that each claim to speak from the position of ecophilosopher will be highlighted. By the wonderful powers of the universe and long distance jet travel I was able to hear both of these marvelous story-tellers spin their tails.

David Abram is linguist, researcher ecophilosopher and author of *Spell of the Sensuous*. I had read his book cover to cover several times before attending a conference at Vancouver, Canada in 1998. His work came alive with his own ability to use language. This is not surprising since the subject of language figures large in his interpretation of what has gone wrong in the human nature relationship. His view is that in pre-literate cultures language did not separate human from ecosystem. Now we are literate and the bonds of our language and thoughts are translated to written form we have lost some of the magic of words.

How do we now speak and write without breaking the bonds. How do we again feel words in our body. How do we communicate beyond words among ourselves, or and more importantly, with the "more than human world", as he likes to call it.

Certainly the most vivid memory of Abram's presence remains with his ability to not break the bond of human-world. His medium and method was the oral story. He told of his experience while alone in a canoe in the frigid water with a polar bear on an ice flow as his possible foe. Tears and laughter mixed at the time. Even now I am back in the story with his singing and waving of arms and meeting the bear where the bear was, so to speak. Abram's presence attested to his survival of the incident. He was able to share his insight into the world of his and the bear's experience through one of the oldest exchanges among humans, storytelling.

Another other person that has impacted my thinking and being in the last decade in the name of ecophilosophy is Henryk Skolimowski. He was appointed the Chair of Ecophilosophy at the University of Lodz in 1991 after writing and lecturing about his topic in many parts of the world.

If any words can described a rather complex philosophical framework that Henryk Skolimosky has developed it would be relating to the concepts of Participating in the co-evolution of the universe and a reverence of all of life. His book, *The Participatory Mind: A New theory of Knowledge and of the Universe* speaks to the theme of participation. Much of the research section of this document is derived from his suggested participatory research model.

Reverence is articulated in another book that he has written called: *The Sacred Place to Dwell: Living with Reverence upon the Earth*. When I heard him speak in Christchurch last April he wove the two, participatory and reverence into a synthesis of hope tempered by the reality of the difficulties ahead.

He made strong points around which to build a picture of the philosophy that could take us into the future. He asks that we begin to think of the world as sanctuary. That world of sanctuary will be characterized by four qualities, that of reverence, responsibility, frugality, and eco-justice. Living those qualities is our guide to participation.

The edges merge. Shall we see both the peril and the opportunities of the vital that resides in the verge?

CHAPTER 7.1325*:
The Practicum
Designing A Colloquium

Intention

To design and create a colloquium that will invite participants to explore and experience the formation of learning community.

Planning for each TIES colloquium will take into consideration the participants, the process, the environment, and the content through development of a contextrual map for each different group. The core ideas remain unique yet the unfolding is diverse as communion with each group creates its own experience. I will be searching for patterns, forms and processes that are characteristics of life and can also be identified in human community.

The overarching question is stated:

IN WHAT WAYS MIGHT A COLLOQUIUM BE CREATED THAT INVITES PARTICIPANTS TO EXPLORE WHAT IT MEANS TO FORM AN ECOLOGICAL BASIS FOR THE COOPERATIVE DESIGN AND CREATION OF A LEARNING COMMUNITY?

Part One: Introduction

- Welcome and getting acquainted as appropriate for the group
- Brief rationale for the colloquium and the invitation for participation
- Information about the format and timing of the colloquium and other housekeeping information
- Learning Communities and how they relate to the gathered group be it education or community oriented

*This chapter title comes from the name of the fractal for "what is missing and left unsaid." It contains an accounting of my practicum that took the form several experiences with varied audiences. It is written with common "oral" language and uses an unusual format that contains the resources I used to create these experiences. I have chosen to include all this material in the body of the paper because its influence is pivotal to understanding the paper as a whole.

- Introduction to some of the vocabulary and the concepts that will incorporated in our work together
- Exercises that illustrate the possibilities of being flexible in shifting our perceptions as we work together and explore possibilities

Part Two: Natural Mapping Human Embeddedness in the Web of Life

Our Planet, Our Home, a cooperative game for small groups of people that leads to the questioning of human relationships to the natural and human created world. The game is a pictorial representation that can be modified to the requirement of the group as they attempt to find relationship and meaning among the various pictures.

Exploring the Concept of Gaia and an evolutionary arrangement of the interrelated aspects of Gaia through uses the photographs from the previous game.

Introduction to Natural Mapping which is seeing connections between the way that Gaia creates relationship and the way in which humans might follow similar patterns.

History of Natural Mapping and salient features that recommend it as an approach for us to better understand human cultural structures.

Can this idea help us to find our embeddedness in the web of life?

Systemic Thinking and Ecological Thinking are two ways of describing the natural phenomenon of inter-relatedness.

Can it assist us in discovering new ways to relate to one another as leaders and participants in community?

Part Three: Reflection and Creation through the use of a Contextural Matrix

Using the uniquely human capacity of reflection and creativity to assist either an individual or a group to ask questions that can lead to new insights and stimulate creative activity. This approach can also be used to give leaders a way to involve the group in co-design and co-creation of their learning community.

Contextural thinking invites questions centered on the content, process, participants, and atmosphere/environment of a potential learning community. The assumption is that if these areas are considered, a fresh view of what is necessary to consider about a learning community and its participants will be revealed. The second assumption is that questions will contain their own seeds of next steps.

Context Setting

Create a setting with an appropriate atmosphere and environment.

Participants

Who are the members of this particular group and what interests are they considering.

Processes

Modalities that allow the participants to experience and self organize as they come to know one another and explore ideas together.

Content

Explore areas of information that create a sense of meaning for the group. For different groups these topics might focus on:

I. Participants

The Participants and their Human Capacities:

Needs and Tendencies
Learning Capacities
Brain research
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Process Examples

Guide To Colloquia Activities

This is the "tool box" as the permaculture facilitator's course taught me to call my repertoire of activities that intends to integrated content and process.

The processes can be attached to content areas in many ways and is often lead by the direction of the group as the colloquium self organizes. I list a few as I do in my mind maps to remind me of possibilities. I am always looking for new experiences or exercises in literature or in workshops that can be used or modified to illustrate content related to this work of community and nature relationship.

Getting Acquainted Ideas

This idea was presented to our first gathering of my Learning Community when we met at Norwich University. It has been enjoyed many times since.

Participants Make Circle- A first person begins with saying their name and giving an action. Group does action and repeats name. Second does the same and repeats the first, as does each person in the group. Goes around circle until all are introduced and whole group does action.

Learned at a creativity workshop: Partners have a balloon between them that they are asked to keep in the air by hitting with their hands. Different actions are given for larger groups to form, just one hand, and so forth. After people feel relatively relaxed and having fun they return to their sitting areas and then are asked to reflect on what they learned about their partner and share it with the group as an introduction.

Non-dominant Introduction: Half sheet of paper and writing instrument is given to each person. They are asked to draw in silence and with their non-dominant hand. Their name is written some things about themselves that they would like other people to

know….words, stick figures, sketches, etc. Then while remaining in silence people walk around the room looking carefully at each person and their drawing.

By the end of the exercise everyone wants to talk. Small groups can share the sensation of non-dominate hand drawing, inquire about meanings of drawings, etc.

Story Telling: I Obey

A story of "little squishy creatures" in the sea that is told interactively with audience participation and props. (This story appears later in this chapter.)

Singing
Often added to by participants.

Chants

Oh Great Spirit
Earth Fire Sky and Sea
You are around us and All inside me.
Good now in beauty,
'Til we meet with our hearts in the light.

Wobbly Archer, Wobbly Archer, Doo-de-lee-doo. Etc
I've sung all the rest; I like this one best.
Action song with cross pattern hand motion…lots of laughter

Garden song … Many others

Other Activities

Our Planet Our Home

Pictures that the groups are asked to arrange in a way that is meaningful to them. They are asked to especially note relationship in the pictures and in the way they work with one another. Each group is viewed and brief reflections given. This game precedes the introduction of the Natural Mapping activity.

Piggy Back

Exercise can be used with variety of work. The GATE 10 principles, the Ecosystem-Learning Community Principles, the Brain Based Principles and the Diagnosis of Living Systems have been used as content for this process.

A large sheet of paper, four people one on each corner, each with a different color marker. The topic or principle to be examined by the group of four is drawn in the center of the paper. Each person writes a response of how they could see the principle being translated into action. After 5 minutes or so the paper is turned and the next person must weave into the new idea before them. Keep turning until everyone has built on the other ideas.

Helpful for an on-line learning community to learn in person how to weave ideas and question their understandings.

Drawing or other art projects

Ask participants to sit quietly for a few minutes and recall some of the key events in their lives that brought them to this place at this time. Then go to work with any of the art materials or invite a poem….what ever seems to attract them Amazing creativity from non-artist and artists alike have emerged and the conversations after began to draw people together.

Group work

Variety of ways to work with different kinds of groups. Content concerning paradigm often allows people to help give what they understand of the way we have been and some of the new ideas that are emerging.

- Meal Preparation – Can be a first builder of community or a unifying one for those who know one another well.

- Dialogue with the whole group. A handout has been prepared that is read and interaction about the nature of what is meant specifically about Bohm Dialogue. More and more people are familiar with this activity and help the group to move quickly.
- Presentations by the groups. Act out with props or without a theme line such as reviewing the day before or their arrival.
- Three walks around the Systems of Gaia. After the Natural Mapping Work this helps people put the shape and the circles in memory. A rope is placed in the floor that represents the feedback loop---communications. People take the various places within the circles. Three phases are explored as the systems respond with different movements that affect the stability of the systems. The learning is about the stability and health of natural and human systems according to the feedback loop. If more that one day….a daily review in many forms
- Chaos Game: Volunteer detectives are asked to leave the remainder of the group. The larger group are given an organizing principle by which the group to move together. Each has to stand between two people whom they choose in silence. Much movement until finally the group will self-organize just as a natural system does. All participants come back together. Detectives watch the game again and try to work out what the organizing principle is. They may ask questions and the Chaos people must answer them with questions. Most often people want to repeat this game.

Perception Exercises

- Looking out in space visualization.

- Soft eyes to use sitting in natural setting
- Two people sit facing one another. They are asked to be their best acting self. Combinations of people that they have met are proposed. One member of the pair is to perceive the other as: friendly, "out to get them", as a "divine being" and last both at the same time as all loving beings. Amazing!
- Tray of Objects – arranged and re-arranged by other in turn. Each can demonstrate "how it is suppose to be".
- Change yourself. Again pairs. In repeated attempts changes just three things about themselves. Again, and again, and again…..Interesting to see how far people are willing to explore the minimal instructions.
- Ending Ceremony Candle Lighting in spiral arrangement highlighting events in the unfolding of the cosmos. Varies according to culture.

Content Resource Examples

Natural Mapping

An Introduction to Dynamical Modeling of Social Systems,

Erodynamics

DYNAMICAL MODELS MAY BE USED AS NAVIGATIONAL AIDS FOR COOPERATION OR CONFLICT RESOLUTION IN SITUATIONS WHERE GOODWILL PREVAILS YET DOES NOT SUFFICE.

Ralph Abraham, *Chaos, Gaia, Eros*, 1994

Dynamical Systems Modeling has its roots in the mathematical work of Sir Isaac Newton. Soon after his development of the calculus in 1666, he became interested in world history and prehistory. He pursued applications of astronomy to the chronology of ancient kingdoms, and probably envisioned dynamical models for cultural evolution. Others have taken up the idea and it has undergone many evolutions. *Chaos, Gaia, Eros* by Ralph Abraham is a fruitful source for tracing the idea of systems modeling.

Since it is an idea that grew from a context and period of increasingly reductionist science there is a note of caution to continue the evolution of this modeling process toward eco-consciousness. If the modeling process is to be useful in our currently emerging paradigm, as we are seeking to sharpen our perception of the interconnected pattern of the world, it will continue to be dynamic rather than static. In other words, when we diagram or model we keep our attention on the relationships and wholeness of the picture as we note the distinctions and details imbedded within the map.

I am indebted to John Coletta for the design of an evolutionary dynamical systems map. As I have worked with it has demonstrated its dynamic quality. For my purpose, expanding my perspective, it has served well and I have felt free to make many modifications as I played with the pattern and form of his model. It is no longer a model that would allow a mathematician to assess the evolution of an ecosystem. As it is easy

for a scientist to create scientism, that is mistake the scientific model of a phenomenon for the reality, I am ever cautious to avoid "modelism", mistaking the model for the reality.

Each one of us my see the combinations and aspects or distinctions in different ways. That process enriches and values the diversity so necessary to the vitality of a natural ecological system. At the same time we have a common vocabulary that brings us back to our constancy of purpose and mutual good will. There is stability and there is creativity.

Natural Mapping is a name that Ray Wright, a New Zealand colleague, gave to a model that I had been working with for several years. It fit perfectly and gave the model the aliveness and flexibility that had been buried by more formal naming.

The model is built on a General Systems Model with the concept created by the Gaia Theory enfolded within it. Now I hear a new rhythm and find myself referring to the model as natural mapping. It is reminiscent of a jazz dance that Laszlo describes.

While this model may have an historical association with mathematical modeling the Erodynamical model explored here could not be used by a mathematician to create predictive series of numbers in order to quantify human - world inter-relationship. This model is a rather a metaphor or a symbol. It is flat and incomplete. It needs to be in three dimensions with each circle be represented by interconnected spirals. Yet, it is a beginning. It can become one in which our rational intellect may find congruence with a metaphorical knowing. We may find that it appeals to “The ghostlike mystical mind we all possess – the metaphoric mind – contain nature’s own expression.” (Samples 1976 p2)

James Lovelock and Lynn Marguilis are the co-originators of the concept of Gaia in modern scientific terms. They use name of the Greek Goddess Gaia to describe the role life plays in co-creating the environment of the earth. The aliveness of the earth is a constant thread through time as humans have described our planetary home. This concept of Gaia is mindful and intelligent.

Jim Lovelock defines Gaia "as a complex entity involving the Earth's biosphere, atmosphere, oceans and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life on this planet. The maintenance of relatively constant conditions by active control may be conveniently described by the term homeostasis.

When we realize that this Gaian system contains and elaborates all other eco-systems we can begin to see ourselves as part of this inter-relationship. Our social systems are developed from our thinking. Thus they become an expression of our consciousness. As our consciousness becomes more rooted in ecological form our thinking and our social systems may also change. In other words we might use a perspective of natural mapping to "grok" the relatedness of our social patterns to living systems in a fresh way.

How might a group of us, as we come together, vision the natural world and its principles and functions? In what way could this vision re- design and re-create our social systems in this time as we are reaching a turning point?

Combined with our conscious intention to live in a connected and sustainable way, can we go beyond the present model of domination of both nature and one another? Are we able to move from antagonistic political, legal, economic forms to a vision of

cooperative participation that wishes to mutually prepare, nurture, and support our community?

Natural Mapping can perhaps give us some of the why and the what of our coming together that will give us a "stability point" and "resource base" Perhaps this understanding will invite our creativity in designing actions based on coherent values and effective ways of co-operating.

This concept is based on processes that enlarge our perspectives as we go. Natural Mapping is a metaphor based on an interconnected way of looking at the world. Dialoguing together about our integration with the world and with others may allow our behavior to continually change to ever more ecologically sound forms.

Analogies between natural systems and ways in which we can mirror the functions and principles of ecosystems in designing our human social systems form the key understanding. The process has been described as "Natural Mapping". This process can be apprehended from a process of *grokking*.

We grok something (an archaeological find, artifact, artwork, text, poem, letter, natural process and so on) by a cycle of observing, thinking, poking, and once again observing. This is not the same as explaining it, representing it, or translating it.

The word grok is a translation of the technical term Verstehen, meaning, "to understand." My German friend, Holger Kohl, demonstrated it by jumping out of his chair and positioning himself in a myriad of ways around the pictures, "Yes, in German we have several words to expressing 'understanding'. Verstehen means looking from as many perspectives as possible. We all clapped that we had gone beyond words and grokked the actions of Holger and grasp the idea of how to apprehend the map.

Grok and verstehen are associated with the Greek word hermeneutics, which means "unfolding the significance." In our time hermeneutics has become "a cognitive theory, in which the observer and the observed are locked in a tight embrace of interaction." (Abraham1994, 236) Grokking, verstehen and hermeneutics all imply a special form of sympathetic, experiential and intuitive understanding.

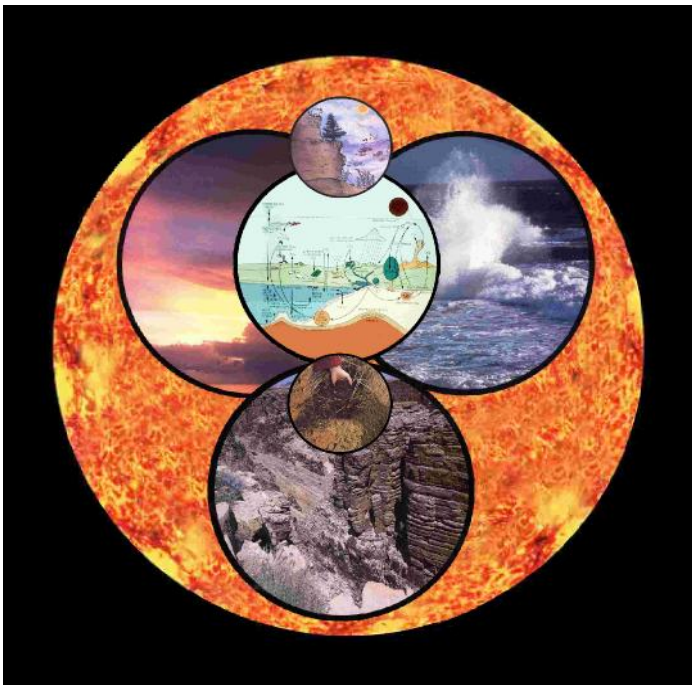
> What I call the grok circle is similar to the dialectical process of thesis, antithesis, and synthesis, and it constitutes the basic process in hermeneutic thought, called the *hermeneutic circle.* Some think of it as a spiral – the turning of this circle or spiral being the motor for the growth of our understanding (1994, 14).

This process of grokking in no way implies eliminating an examination of details within the pattern in a logical way. It is the dance back and forth between the overall pattern and the details just as with any good story that reveals the next thing. If we are grokking the model of natural mapping we are closely following the way in which we apprehend a metaphor or greet a symbol. Indeed the model can be seen as a symbol or a metaphor.

Slide Script

EXAMPLE OF COMMENTS AS SLIDES ARE PROJECTED or
WHEN THE CHARTS ARE PRESENTED

The series of pictures that appears on your screen is taken from a active game that Phil designed 10 years ago called Our Planet Our Home. We had been working on adapting the ecosystem model for some time and one evening it seemed obvious that we needed real pictures, as both of us are very visual learners. That is why you recognize the pictures that you just played with in the Our Planet, Our Home game.



I searched the house and found a few pictures that we had in our collections that would work and then we began making plans to do some photographing. Suddenly I realized that we had been working with the systems photos but in another context. I had a basis for beginning my photo collection. The positions have been shifted as new learning emerges. Others will want to move pictures to the way in which they see our

interrelationships with Gaia. For now I am content. Ideas and photos have self-organized. They depict the miracles, mysteries, and constraints of our existence.

All maps or models that in the following slides are networks within that first overall network. The outer circle on any of the maps indicates the map preceding and any one circle can be examined as an enfolded network. Venn diagrams portray the same concept. It is perhaps easiest to begin to think of the nested Russian dolls as a somewhat common image. A current way to describe then might be in terms of holarchies, nested one within another.

The circles are too perfect and too flat. Feedback loops are not such neat little circles in ecosystems. Edges between the spheres belie the significance of the peril and opportunity that exist there. Still we are able to see relationships rather than linear objects in separation. Try to see whether or not you can to see the circles as spheres each producing spiral that dance with other spirals. Complexity portrayed on a flat surface is a challenge. It is a start toward new perceptions.

Eight functions are indicated. They characterize inter-connected aspects of the ecosystems and are essential in creating the form and organizational pattern of a system. The pattern is enmeshed in the energy field that is in constant exchange with all parts of a natural system. These functions are listed in the circle that represents them on the map. Let's see how the systems pictured here relate to the functional pattern of Gaia. (Participants contributions are invited.)

- **Energy Function** -- All living systems are powered by an external source of energy. The **SUN** supplies all of the energy in different forms for the Earth.

- **Maintenance Function also known as Stability Point** -- All living systems must maintain themselves to insure the stability and continuity of the system. In this map the stability point is the **SOIL**.
- **Resource Base Function** -- All Systems require a resource base to provide the necessary raw materials for survival. The **LITHOSPHERE OR ROCK CYCLE** takes this position.
- **Partnership or Duality Function for two adjacent circles** -- The roles of predator and prey are necessary to the formation of an ecosystem. The basic duality principle in the universe is present in all living systems as an "explicit duality expressing a unity". The **ATMOSPHERIC** and the **HYDROLOGIC CYCLES** take these positions.
- **Unity Function --** All systems must have an integrative force that unifies the system and holds it together. The **BIOGEOCHEMICAL SYSTEM** better known as the Nutrient Cycle takes this unity function. The carbon and nitrogen cycles are examples of this exchange. The cycle of carbon usage is the means by which energy flows through the earth's ecosystem. On a global scale the carbon cycle involves an exchange of CO_2 between two great reservoirs: the atmosphere and the earth's water. The Nitrogen Cycle is the process in the course of which atmospheric nitrogen enters the soil and becomes part of living organisms, before returning to the atmosphere.
- **Feedback Function -** All living systems contain complex feed back loops which enable them to utilize the matter, energy and information for the purpose of balancing stability and growth. The **FOOD WEBS**. Grazing food web and the

decomposer food web are characteristics of this complex, which determine the direction toward stability or chaos.

- **Growth Function** -- All systems must grow or die! Growth, as in change, provides the creativity and direction to the system. It is known as the Chaos Point. Growth often happens when the environment produces resistance that challenges the system to differentiate and adapt. The **BIOSPHERE** takes this position as it constantly creates both the environment that supports life and the adaptation processes of life.

This fundamental network of systems is the basis of all living systems on Earth.

A Cosmic Story

This story has been read in installments with several groups and includes a ceremony of candle lighting.

The Cosmic Story

As told by Anne Hillman in Dancing Animal Woman. This writing came forth after her work with Brian Swimme and his telling of the Universe Story.

Today through our telescopes, light, billions of years old is coming into view for the first time in human history. With our newest technology, we are able to see and celebrate the twenty-billion-year unfolding of the universe in our own time. In that very real sense we are present to the early creativity of the universe. It is that creativity, to which we are now heir and servant, on which our entire lives and the life of the earth itself depends.

The universe *is story.* As we become more able to read it in starlight and fossils, embryos and genes, we may modify its details slightly, and as the story becomes clearer, its importance to us does also. The story of the universe, unlike our local myths and religious traditions, is the only story, which all human beings share in common. It is the foundation for our functioning as an entire species. All of us are called by this sacred story of the cosmos in which we have our home. We, as very young creatures, shall tell it to our children thus:

Listen to me, and I shall tell you a story, which began long, long ago, and is still going on in you. It is a great drama, which you have been born into,

and you are here to contribute to its unfolding. It is your story and your children's story and your children's, children's story.

Out of the deeps there exploded, some twenty billion years ago, the origins of all that is, spewing fire and power and light, a blazing beginning that we have come to call the Fireball or the Flaring Forth. Our of that mighty event has burst everything that was ever made or known--every star and every child; every painting, every grief. Granite and trees and compassion and awe; hawks and deer and thoughts and love. All were born of that first passionate mystery, the first creativity of the universe, which is still pouring forth.

Billowing out of the Fireball came galaxies whirling into being over millions of years, like snowstorms of stars. Out of that first moment came galaxies. Came all the protons and neutrons which make up the universe, Came flowers, birds, your body. You are the Fireball: all the particles, the energy in you, were created out of it. Your body is made of starstuff. It is a mystery….

Five billion years ago our earth was formed and all the planets which surround us. We can watch it happening before our eyes: look up at the night sky! Look at the numinous light from the deeps of the dark, timeless past. Our beginnings, an ongoing mystery-now!

EON AFTER EON, THE CREATIVITY UNFOLDS: ALWAYS A SURPRISE, NEVER A MOMENT REPEATED. NEVER ANOTHER PERSON LIKE YOU. NEVER ANOTHER GALAXY LIKE ANDROMEDA. EVERY SNOWFLAKE A UNIQUE EVENT. EVERY SINGLE EVENT SHINES WITH ITS OWN LUMINOUS BEAUTY. EACH FLOWER. EACH STONE. YOU.

All that you are was fashioned by the stars, the planets, the plants and animals that came before you. All were required for this moment; all of the beauty and violence; all of the joy and pain of evolving; all of the suffering which led to creation. How shall we celebrate all of the beauty and the terror that has come before us?

Our Story is a work of art--a single unfurling event. All of the universe depends on each being in it. Each depends on the whole. Mountains, rivers, lizards, children. Each of us is necessary. All of us belong.

We are all on a journey together. The most important journey of your life is the journey to the center of the universe. It is deep. It is here, unfurling itself within you and about you. The fireball was the first center. But now look deep: Into yourself. Into another. For at the center of each created thing, the real spills out-- reality, creativity and power. It is to a center that is everywhere, that is the holy journey, and there are many who will teach you along the way: people and animals, plants and events; the desert will teach you, and the mountains, Strangers, Your heart. Perhaps your greatest teacher will be your own tears.

First you need only look: notice and honor the radiance of everything about you. Be glad for the being that cries out of all things to be seen. Play in this universe. Tend all these shining things around you: the smallest plant, the creatures and objects in your care. Be gentle and nurture. Listen. We are all learning to listen with all of our selves: Our hearts. Our bodies. And that

which hopes in all of us; our very souls. Once we listen, then we can respond. Once we see, our response can be only joy.

Who would not be joyful? Long after it was first formed, the earth's center gradually began to create, as centers do. Under the pressure of gravity and nuclear forces, it heated up and brought forth its metals of every kind. Molten rock, laced with veins of silver and gold, copper and lead, platinum and iron, flowed beneath the crust of the earth. All the bubbling in the depths raised up the mountains in all their glory. It created the seething volcanoes, and out of their fuming gases and vapors, the salty oceans were formed.

Did you know that there was only one time in the Story that oceans could have been formed? Only once in the unfolding mystery of the eons were the conditions ready for the coming of oceans. They can never be created again. That is true for everything we know: the time of creating life out of no life is over. Our human intelligence has been formed once and for all. There was only one moment in all of history for you. *And for your own creativity.*

Millions of years passed and very slowly, deep under the oceans, tiny bacteria began to fill the sea! Over a long period of time, these living beings began to eat up all their food until it seemed there might be nothing left for their lives. Would life end right then and there, when it had hardly begun? The when it seemed most hopeless, the creativity of the universe took a new step. Out of the great masses of bacteria continuing to survive in the old ways, a few found a way to live on sunlight. And as these autotrophs took in that light energy and used it to sustain themselves, they created the single most

important chapter in our creation since the Fireball itself. Without them, the coming of the prokaryotes and, later, the single celled plants which created chlorophyll, none of us would exist: neither the later animals which needed oxygen and ate the plants now we humans who depend on both plants and animals for our sustenance.

We are children of light. All of us, we and the other creatures on earth live on the light from the Fireball. It is light present in our own sunlight that plants transform into energy for their own growth. Light was first transformed by creatures that could not see. (Yet when we open our eyes, it is almost with their exact process that we capture light.) Sunlight. And so we are brothers to the grasses, sisters to the apple tree, children to all the animals who came before us: the snake and the dinosaur, the wolf and the hawk, the mosquito and the tortoise. We are relations. Countless species of plants and animals weaving together a design, slowly and carefully over millions of years--all in passionate relationship to the sun. 3500 million years since life's fragile beginnings in the ooze; what care it has taken for life to nurture and sustain its millions of forms and expressions over the eons!

Look! Now we can see it! Creatures appearing over a thousand million years, displaying an explosion of creativity in the fossil layers of our earth: sea creatures to trilobites to dinosaurs. Algae to ferns to redwoods. All have been there waiting for us to finally see the story as it has unfolded. We see it under microscopes, through our telescopes, in the Grand Canyon and in fetal

development. In every display of its facets and creativity, the universe is telling us to look! Join in! Care.

Celebrate! Can you imagine what it was like when the flowers finally came to earth, bringing ravishing beauty and brilliant?

Colors where the had been none before? Bringing stored energy for the first time in nut and fruit and seed, so that creatures didn't have to spend all day feeding to survive? Can you imagine the kind of celebrations we human might all create together, to honor---instead of wars or generals or a local religion--the coming of flowers and their meaning for life forms as diverse as bees and squirrels and people?

Celebrate! How might we celebrate the coming of human beings? What a moment in the story! Could we enact what it felt like to emerge in an animal body--to be the first to look around in wonder at what we saw? And then to begin to express that awe in painting and dancing and song?

At first, we knew no difference between ourselves and all the rest. We saw the trees and the animals, the lightning and the sunshine as ourselves. We live in ecstatic relationship with these beings; looked up at the starry night sky and felt "delirious with bliss." * They were our companions. They spoke to us. For four millions we lived together, participants in the wonder, wandering from place to place, carrying what we needed on our backs, hunting and gathering our food in the wild. *We were wild.*

Then, ten thousand years ago some of us learned to farm, to grow our food and tend our animals so that we could live in one place. Life was easier

for us. We became domesticated. And everything changed. From living in small tribes of 25-40 people, we began to grow communities of thousands. We began to lose our feeling for our ways and our relatives in the wild--the animals and the forests became more distant cousins to our hearts. We lost our wildness forever. Our innocence and our ecstasy.

Because our mothers and our grandmothers in those days worked the land, they guided our communities. Their particular skills of relatedness and sensitivity to the others of the earth community were sustained by a perception of the earth as loving mother, the provider of abundance. Our ancient grandmothers owned the land and passed it on to their daughters. It was a long period of peaceful living. We shared what we had among us. And because we did not accumulate things at first, we did not resent each other.

Just like the stars and the earth and the creatures before them, so our ancient grandmothers' and grandfathers' creativity flourished: they made pottery and baskets. They wove cloth and craft. They sang songs and told stories to one another. And out of these stories and songs emerged the great myths, the symbols, heroes and heroines to express the meaning of their lives: a whole framework for our human spirit and for our relatedness to the earth. To the universe.

We can still see one part of this chapter of our story in Crete, where the abundance of the earth is painted on ancient walls and vases; where joy and graceful play between men and women are honored as they endlessly tumble in brilliant colors over the backs of painted bulls and the palace of Minos.

In the meantime, while some of our early parents and grandparents flourished in communities, others of us kept moving with the animal herds and developed different strengths. When our nomadic mothers were bearing and caring for children, they needed to depend on the strength of our nomadic forefathers to protect them. Because we faced different kinds of dangers and harsher climates, it was important for our fathers and grandfathers to be brave and strong warriors. These tribes wandered all over the face of the earth. They traversed every continent. And then the Days of Cold began. Those ancient grandparents sought the warmth and eventually found the great river settlements that were our other heritage. (If we look at that region today, we can still see with the eyes of nomads and the astonishing beauty and grace of Egyptian women carrying water as it has been done of millennia along the river Nile. We can still feel the unresolved pain and struggle of our tribal ancestors in the desert lands of the Middle East.)

Then came the drastic change in the unfolding of our story; a major break in our two ways of life* For in the coming together of wanderers and farmers these two lines of our human family clashed. Because of the loamy richness of the soil and the warmth of the sun, the earth provided those of us who lived in the river valleys an increasing abundance. We began to build storehouses for our goods and to keep our surplus in large vats and urns. And as those of us who were tribal suffered the dangers of the great Cold Days of our history when the winter never ended, we became aware of the great store or food and goods in the villages. We were hungry and tired from the journey.

We wondered at the wealth before us and wanted it for ourselves. We conquered the gentle ones who had not learned to defend themselves. And we decided to stay.

With the cold winds at our backs many more of us came from distant journeys and discovered the riches of the villages. Those of us who stayed had to learn to protect the land from those who would seize the harvest. As more of us came together for safety in numbers, we created cities and built high walls around us. We had to learn a way of organized warfare, for the nurturing ways of our mothers and grandmothers of the farmlands no longer protected us.

Out of this need for strength and for power came something new: dominance. The idea of winning in battle soon spread to extending power in their domains of life. The powerful ones of us began to dominate everyone else: some of us were categorized as part of powerful groups, others of weak ones, men gained complete power over women, the people who owned the land had power over those who worked it. In using other human beings in this way, we had enslaved ourselves. Even the earth came to be seen as something to be owned, dominated and controlled.

Out of this moment in our story came more great advances in our thinking processes and in our civilizations. At the same time, it was a period of great losses. It is this moment in our story that is at the root of our current ecological, social and personal pain.

Out of the mighty clash of these cultures, out of the idea of domination and control were forged a subject/object consciousness such as we have today.

No longer were we one among many, participants in wonder and related to the earth community. We developed a separate sense of self. We each became an "I". A subject. We began to see each other and the rest of creation and the universe as "other." Objects. As a result, we were freed to think in a whole new way. Abstract thinking came into being: philosophy and astronomy, mathematics and geometry all burst upon the scene.

And politics. For out of the same conflict, the idea of the state arose.* In this period, our communities grew to 100,000 people, and we began to develop organizations to control people and goods. Rulers and priests, warriors and merchants became the elite ones of us: a few with a great deal of power who ruled the many. Today we call this use of power "hierarchy," and it has come to be a model our entire modern world: for our families, our religious institutions, schools, corporations, governments, international economies and political relations. It is also the model for our minds. In western civilization, we prize intellectual and ego control--at the cost to the fullness of our beings, and the richness of our relations.

Like our ancestors who developed a separate sense of self, each of our great states, the great Classical Civilizations, experienced themselves as an "I" and sought control. As states, we began exploring the whole world, in the hope of acquiring the riches of their regions. Gradually, trading our accumulated goods around the world became more important to us than farming. Soon violence and competition for turf, for wealth and for power surrounded us. We have lived in that condition ever since.

When we lived in the forests, we knew our experience in nature to be sacred: the stars, the stone people, the four-leggeds, the winged, those that crawl, the sun and all that was. When we lived in our communal farming villages, we knew the earth and her abundant provisions to be sacred. Those of us in the herding tribes brought a new kind of worship which has also been with us ever since. Five thousand years ago the story of the creator God emerged: reflecting its culture, this was a masculine god, a transcendent god with concern for and power over the people. Compared to the more concrete realities of previous sacred experiences, this kind of god was an abstraction. A sky god. Gradually, as the story of the new God evolved and was interpreted, the sacredness of the earth and all of creation was lost. The sacredness of being was lost to us as well as the ecstasy of being alive.

Each of these major changes in our human ways of living has occurred more rapidly than the one before. When our ancestors emerged out of our pre-human beginnings, the time we lived in with wild spanned hundreds of thousands of years. When be become settled and farmed the warm river valleys, we think it lasted about 4,000 years, The rise of the great states took place in a few hundred years and lasted about 4,000 years, until 1800.

The most recent change in our human ways has taken less than 200 years; and it has brought devastation to the earth. The Industrial Revolution, the creativity of our own grandparents and parents, has led us to the present dilemma in our story. This age of industry, made possible by the theories of Bacon, Descartes and Newton, exploded in a burst of invention beginning in

the 1700's. Electricity was snared from the sky. Black coal, dug from the earth, fired new furnaces to power textile mills. Then steam and smoke began to belch from ships on the sea and iron horses on the land--the locomotives. Oil, sucked out of the ground, powered Model T Fords. Huge dams stemmed our rivers and factories lined the shores of our river and lakes. Chemistry and medical technology exploded.

Our dilemma is a two-edged sword. Petrochemicals strewn on the earth increased by an order of magnitude the bushels of corn and wheat our farmlands produced--and poisoned our land, the waters, and the many creatures, which fed there. The exclusive use of hybrid plants reduced the genetic pool of available seeds. Medicine saved and healed countless lives, with unexpected consequences. And finally, with nuclear technology, we discovered both a new source of power and a weapon of mass destruction.

The inventiveness of the last two hundred years has brought us health, immeasurable wealth and freedom. But is has also completely changed the face of the earth. Unwittingly, our creativity has made us destroyers; the technology meant to free us has so run away with itself, we do not seem to know how to stop it. We have tamed electricity and nature, juxtaposed incredible modes of healing and overpopulation, landed on the moon and created mass starvation. *Precisely because of the intelligence we prize,* we live on the brink of the extinction of all life.

We know this place; the story I have been telling you is a story of the creativity of the universe. We have been here before. About to starve, the

autotrophs learned to feast on light. Facing extinction in the Days of Cold, our wandering ancestors learned to cultivate their food. Time and again, faced with annihilation, life has adapted. Once again, we must learn wholly new ways or perish.

Each of us needs to participate in this unfolding of the story. Each is a center of the creativity of the universe itself. More than any other time in history, we are called to offer our own deepest creativity at a time of great crisis. We are called to journey to the center of the universe; our intellectual creativity is too limited. So are our emotional and instinctual responses. We must find a way to weave those together into new ways by turning to something more profound. Something our intellects cannot fathom or contain. For it is only at the center of each being that what is truly real exists. And when anything displays its innate nature--what to whom it really is--that is where the universe itself is able to create with care.

The story that I have been telling you is a story of care. Over billions of years, life has sustained and cared for an ever-growing display of its beauty: a sheer beauty of being. This beauty is a manifestation of variety and differences that we have just begun to see. The story of care is one of nurturing that variety and honoring differences.

As we begin to make the descent to the other side of life's mountain, we learn to rely less exclusively on our intellect and our determination. As we become more willing to admit that we do not know, we learn to trust. As we increase our trust, our masks fall away, and we are able to see more clearly our

real human natures. As we realize more of whom we really are, we discover we have been making the holy journey to the center of the universe. Then, as we experience and accept all that we really are--within as without--we grow in care. We begin to embrace other as ourselves, and learn to live as one among many.

The story of the universe is a story of hope. It calls us out of our despair to become all that we are: each of us fully human, relating and functioning as a whole species, as integral members of the earth community, in a leap of loving such as we have never imagined. This is our hope.

The entire universe, the entire story up to now, was required for you and me to stand here today. All the creativity of the Fireball, of the supernova, the stars, all the genius of the plants and animals and people before us were needed for this moment. All these things in the universe call to us to be seen, to be felt deeply within us, to be known. We need to reach out to embrace them, and to recognize that in our cells and our genes, deep in our souls, they are. We need to feel in the longings of our hearts, in the callings which attract us, they are. We need to re-member all that has gone before us, from the Fireball and the stardust to the ferns and the redwoods, from our earliest human parents in the savanna to our present grandparents and parents--to know we really do carry them in *who we are.* We need to stretch out our arms wide to the universe and say: ***"THIS IS OUR BODY."***

"I Obey"

This is an expansion of a story that I was introduced to in my Montessori Teacher education course. It was the first time that I was conscious of this kind of science story used as a "morality" story for human behavior. It is thought to be a way in which children can understand that all parts of the cosmos have certain "tasks" in order to create the whole. It is told at the time that children become aware of rules and then begin to question them.

I enjoy telling it to adults as they can glimpse the many layers. This usually occurs after Natural Mapping and after they have had an opportunity to find an "object" that (to them) can represents the whole of Gaian Systems.

Once long, long, long ago……..before you were born, before your parents were born, before your grandparents were born….so long ago that the dinosaurs had not been born there were creatures that lived in the sea that we will call *little squishy creatures*. The thing that was already there was a kind of pollution.

The poor little squishy creatures were being choked by the very water in which they lived. If that wasn't bad enough they were being eaten be other creatures and knocked around the ocean by the waves and currents. They decided that they had had enough trouble and needed to find a solution. They all came together to try to find out what to do. One little creature said that they really wanted two things. They should have some way to protect themselves and they should have clean water. Finally, they all decided that they should ask for some help and advice. But where to start?

A bright little creature over on the edge suggested that they should begin by asking the Ocean water in which they lived.

"Ocean, Ocean. We are trying to live here in your waters but something is choking us and we cannot go on like this. Can you help us? Are you the thing that is poisoning us?" They sang out together.

The Ocean Home replies, "Oh, My Dear Little Creatures. I give you and home and provide you with so much. I would not intend to hurt you. I am very sorry that my waters are not healthy for you. I only do my cosmic task of receiving the waters as they come from the land or from the sky. I then give my water back to the air when then sun warms me. As I think of it perhaps the Sun that watches over us all might have some idea of what could be poisoning you. Perhaps you should call loudly into the sky to the Sun."

Thank you, Ocean Home, we shall in one great voice call to the Sun, "Sun! Sun! Sun! We are here, down in the ocean. We have a terrible problem. We are choking on the something and the ocean says that the Ocean only does its cosmic task and would not hurt us. Perhaps from where you are you have an idea of the cause of our problem."

"Oh! Tiny Ones of the Sea, My little Squishy Creatures. My Cosmic Task is to give energy to all of Earth. That is a very important job and I spend all my time trying to do that work very well. I have to warm the land and its creatures and the oceans too so the waters may flow in their cycles. When I invite the water to rise from the ocean it often gets suspended in the air. When the waters come together they make clouds and perhaps the clouds have some wisdom about what could be causing your trouble since they drift over both land and sea. Good luck, little ones."

The little squishy creatures were a bit discouraged but at least they knew whom to ask and this time surely they would find out who was hurting them. The Sun and the Oceans were very kind and helpful. This time we have to find a cloud blowing over and give it a big shout.

"Clouds, clouds, come over this way will you? We have a question to ask you. We are just little squishy creatures living in the sea but we are having a hard time surviving because we are always choking and having a hard time surviving"

"Hey, I haven't got much time. I wish you well but I have too much Cosmic Work to do to spend much time talking. My job is to hold up a hundred tons of water in thin air. I have to keep building clouds night and day. But my partner the wind who moves me around might have some clues. It is the breath of life so if I were you I would ask. I wish you well."

Again we have no answer but we have another clue. Let's not get too discouraged. The wind does travel far and wide and my have the information that we need. I feel it coming now, whoosh.

"Wind, Please blow by and stay a moment to help us." They once again explained their problem and the wind circled around to listen more carefully.

"Now, you do have a big problem but I don't who could be hurting you. It surely could not be me because I am so busy going all over the earth doing the Cosmic Task of the Wind that I'm afraid I didn't even know that you existed. My work is to swirl the air and water about the land and sea. When I take the clouds on their way I sometimes take them to the tops of mountains so that they can fall as snow. Sometimes I take them to very warm places and the raindrops fall all over the land. I know that the water likes to

join with other water to make lakes and rivers that flow back to the sea. Since they are on their way back to the ocean maybe they know something about water that I do not."

Now the little squishy creatures really were discouraged and getting sicker all the time. They had not solved either of their problems. Still they must try again.

Now their voices were getting tired and soft but still they called to the waters that flowed over the land. They told their story quickly as the water rushed by.

"I hear your troubles little creatures of the ocean. I can help you to understand my Cosmic Task and perhaps tell you who to ask for help. I am sure that no one means to hurt you. Now you see that my Cosmic task is collecting the water that falls on the land that has come from the clouds that the wind has brought when the sun sucked the water from the ocean into the air. I must take the water back to its ocean home so that it will come to visit again. Go on now, ask the rocks that I tumble past."

With no hope left but just enough strength to whisper their question to the rocks and the sand at the shore, they spoke out. "Land, Land you are the last that we can ask, are you poisoning us."

The rocks of the land heard the little squishy creatures and had much compassion for them so wanted to help just as the others had. Now let us think about this together. It is no good to blame any other that is only doing a cosmic task. They are following the laws of Earth. I too follow my Cosmic Task. I do change the ocean when I dissolve myself in the water but change is a main Cosmic Law itself. All would die if we didn't keep changing. Let's us see what you could do with this change in the ocean.

This made the smallest little squishy creature of all have an idea. Do you remember that we had two problems? One is the choking and one is the lack of protection. If those went together maybe we could unfold something new on Earth.

Can you guess what happened? Let's look under this blue cloth. What is this? Not only did the squishy creatures clear the water and protect themselves; they brought us a gift as well. They made these beautiful shells. Once they found their Cosmic Task they knew how to help all of us. They keep making their shells and keeping the ocean healthy. They use tons of Calcium Carbonate to do their Cosmic Task.

I wonder what is the Cosmic Task of the humans like us? Do we know? How shall we find out?

Cosmic Calendar

Cosmic Calendar (From The Dragons of Eden - Carl Sagan)

[Image]

Pre-December Dates

Big Bang	January 1
Origin of Milky Way Galaxy	May 1
Origin of the solar system	September 9
Formation of the Earth	September 14
Origin of life on Earth	~ September 25
Formation of the oldest rocks known on Earth	October 2
Date of oldest fossils (bacteria and blue-green algae)	October 9
Invention of sex (by microorganisms)	~ November 1
Oldest fossil photosynthetic plants	November 12
Eukaryotes (first cells with nuclei) flourish	November 15

December

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Significant oxygen atmosphere begins to develop on Earth.	2	3	4	5 Extensive vulcanism and channel formation on Mars.	6
7	8	9	10	11	12	13
14	15	16 First Worms.	17 Precambrian ends. Paleozoic Era and Cambrian Period begin. Invertebrates flourish.	18 First oceanic plankton. Trilobites flourish.	19 Ordovician Period. First fish, first vertebrates.	20 Silurian Period. First vascular plants. Plants begin colonization of land.
21 Devonian Period begins. First insects. Animals begin colonization of land.	22 First amphibians. First winged insects.	23 Carboniferous Period. First trees. First reptiles.	24 Permian Period begins. First dinosaurs.	25 Paleozoic Era ends. Mesozoic Era Begins.	26 Triassic Period. First mammals.	27 Jurassic Period. First birds.
28 Cretaceous Period. First flowers. Dinosaurs become extinct.	29 Mesozoic Era ends. Cenozoic Era and Tertiary Period begin. First cetaceans. First primates.	30 First evolution of frontal lobes in the brains of primates. First hominids. Giant mammals flourish.	31 End of Pliocene Period. Quaternary (Pleistocene and Holocene) Period. First humans.			

December 31

Origin of Proconsul and Ramapithecus, probable ancestors of apes and men	~ 1:30 p.m.
First humans	~ 10:30 p.m.
Widespread use of stone tools	11:00 p.m.
Domestication of fire by Peking man	11:46 p.m.
Beginning of most recent glacial period	11:56 p.m.
Seafarers settle Australia	11:58 p.m.
Extensive cave painting in Europe	11:59 p.m.
Invention of agriculture	11:59:20 p.m.
Neolithic civilization; first cities	11:59:35 p.m.
First dynasties in Sumer, Ebla and Egypt; development of astronomy	11:59:50 p.m.

Invention of the alphabet; Akkadian Empire	11:59:51 p.m.
Hammurabic legal codes in Babylon; Middle Kingdom in Egypt	11:59:52 p.m.
Bronze metallurgy; Mycenaean culture; Trojan War; Olmec culture; invention of the compass	11:59:53 p.m.
Iron metallurgy; First Assyrian Empire; Kingdom of Israel; founding of Carthage by Phoenicia	11:59:54 p.m.
Asokan India; Ch'in Dynasty China; Periclean Athens; birth of Buddha	11:59:55 p.m.
Euclidean geometry; Archimedean physics; Ptolemaic astronomy; Roman Empire; birth of Christ	11:59:56 p.m.
Zero and decimals invented in Indian arithmetic; Rome falls; Moslem conquests	11:59:57 p.m.
Mayan civilization; Sung Dynasty China; Byzantine empire; Mongol invasion; Crusades	11:59:58 p.m.
Renaissance in Europe; voyages of discovery from Europe and from Ming Dynasty China; emergence of the experimental method in science	11:59:59 p.m.
Widespread development of science and technology; emergence of global culture; acquisition of the means of self-destruction of the human species; first steps in spacecraft planetary exploration and the search of extraterrestrial intelligence	Now: The first second of New Year's Day

Back to Carl Sagan Home Page

Wall Charts

CHILD in the UNIVERSE

IF THE IDEA OF THE UNIVERSE BE GIVEN TO THE CHILD IN THE RIGHT WAY, IT WILL DO MORE FOR HIM THAN JUST AROUSE HIS INTEREST, FOR IT WILL CREATE IN HIM ADMIRATION AND WONDER FAR LOFTIER THAN ANY INTEREST AND MORE SATISFYING.

Maria Montessori
To Educate the Human Potential

THE WARRIOR'S CONNECTION TO NATURE

NATIVE PEOPLES RECOGNIZE THAT THE MOST EMPOWERING AND HEALING TOOL THAT WE HAVE AVAILABLE TO US IS OUR CONNECTION TO NATURE AND THE WILDERNESS.

Angela Arrien The Four Fold Way, 1993 Harper San Francisco p 29.

"ART TEACHES US THAT WE ARE MADE UP NOT OF MANY PARTS, AS THROUGH WE WERE MECHANICAL OBJECTS, BUT RATHER OF AN INFINITE NUMBER OF STORIES."

The Re-Enchantment of Everyday Life
Thomas Moore

EDGE

A NOTABLE CONCEPT IN ECOLOGY IS THE NOTION OF THE EDGE . WHEN TWO ECOSYSTEMS MEET-SAY THE FOREST AND PRAIRIE- A BORDER OF RICH DIVERSITY AND FERTILITY PRECIPITATES BETWEEN THEM, A PLACE OF INCREASED IMAGINATION. THE EVOLVED, WELL-PRACTICED NARRATIVES OF TWO SYSTEMS ARE MIXED IN A TERMINUS, A VERGE OF OPPORTUNITY AND PERIL.

Tom Jay

Holarchies

SOCIAL SYSTEMS, LIKE SYSTEMS IN NATURE, FORM "HOLARCHIES". THESE ARE MULTI-LEVEL, FLEXIBLY COORDINATED STRUCTURES THAT ACT AS WHOLES DESPITE THEIR COMPLEXITY. THERE ARE MANY LEVELS, AND YET THERE IS INTEGRATION.

Ervin Laszlo

HUMANS HAVE GROWN AWESOMELY DISTANT FROM NATURE. IN THE EARLIEST TIMES, THE DEEP AFFILIATION WITH THE NATURAL WORLD CREATED ECOLOGY OF METAPHOR. THE MIND HAD NOT YET CREATED THE TOOLS FOR RATIONAL THOUGHT. METAPHOR PREVAILED. ALL THINGS WERE SEEN TO BE RELATED. THE NATURAL WORLD AND ITS SHIFTING PATTERNS OF CHANGE WERE NOT MORE THAN AN EXTENSION OF THE PROCESSES THAT CREATED HUMANS THEMSELVES.

The Metaphoric Mind
Bob Samples

Cosmic Metaphors

WE REVEAL OURSELVES IN THE METAPHORS WE CHOOSE FOR DEPICTING THE COSMOS IN MINIATURE.

Stephen J. Gould

Mythic View of Nature

THE EARLY MYTHS WOVE A TAPESTRY OF AFFILIATION IN WHICH THE MINDS, BODIES, AND SOULS OF HUMANS WERE NO MORE OR LESS IMPORTANT THAN THE MINDS, BODIES, AND SOULS OF TREE, SKY, OR COYOTE. HUMANS WALKED, RAN, GREW, LOVED, AND DIED AS PART OF THE WHOLE SYMPHONY OF LIFE. ALL THINGS WERE ALIVE. THOUSANDS OF YEARS WOULD PASS BEFORE RATIONAL THOUGHT WOULD DOMINATE AND FORCE HUMANS INTO DECIDING THAT SOME THINGS WERE ALIVE AND SOME WERE DEAD. ONCE THIS DISTINCTION WAS MADE, IT WOULD BE EASY TO DECIDE THAT SOME LIVING THINGS WERE MORE IMPORTANT THAN OTHERS, AND THEY WOULD BEGIN TO USE THESE LIVING THINGS AS THROUGH THEY HAD DOMINION OVER THEM. THUS THEY WOULD INTERRUPT THE NATURAL RHYTHMS AND SUBSTITUTE A DESIGNED, ARTIFICIAL CADENCE.

Bob Samples

THE REAL VOYAGE OF DISCOVERY CONSISTS NOT OF SEEKING NEW LANDSCAPES, BUT IN HAVING NEW EYES.

Marcel Proust

A New Paradigm

A PARADIGM IS A WINDOW OF PERCEPTION, DEFINING NOT ONLY HOW WE PERCEIVE OUR WORLD, BUT ALSO HOW WE CHOOSE TO INTERACT WITH IT.

IN THE OLD MECHANISTIC PARADIGM, NATURE WAS VIEWED AS SOMETHING TO BE DOMINATED AND EXPLOITED.

IN THE NEW PARADIGM, THE KEY WORD IS "KINSHIP". EACH SPECIES OF LIFE IS A VITAL STRAND IN THE OVERALL TAPESTRY.

THE QUESTION WE MUST ASK OURSELVES IS, "HOW CAN WE LIVE AND PROSPER IN A WAY THAT BENEFITS ALL OUR RELATIONS?"

A quote from a box of Chai Tea

New Thinking Required

If this "me-verses-you" model is your estimate of your relationship to nature and you have an advanced technology; your likelihood of survival will be that of a snowball in hell. You will die either of the toxic by-products of your own hate of simply by overpopulation or over grazing.

IF I AM RIGHT THE WHOLE OF OUR THINKING OF WHAT WE ARE AND WHAT OTHER PEOPLE ARE HAS GOT TO BE RESTRUCTURED. THE MOST IMPORTANT TASK TODAY IS TO LEARN TO THINK IN A NEW WAY.

Gregory Bateson

Paradigm n. example or pattern, especially of inflection of noun, verb etc.

From Greek **paradigma**, show side by side.

✳✣✡✻✣★☆★✧ ✦✯✻ ✳★✣ ☆✡✳✳✣✻★✳ ✳★✣ ✣✯★★✣✣✳

SEARCHING FOR THE
PATTERNS THAT

CONNECT

SEARCHING FOR THE PATTERN

THAT CONNECTS

Creating Symbols

HOW DEEPLY CAN YOU ENTER INTO THE IMMENSITY OF THE UNIVERSE?

AS DEEPLY AS YOU CAN EMBRACE IT IN THE ARMS OF YOUR PARTICIPATION; AS DEEPLY AS YOUR SYMBOLS ENGAGE YOU IN TO SPECTACLE OF THE INTENTIONAL UNIVERSE.

THE CREATION OF SYMBOLS IS ONE OF THE PECULIAR POWERS OF THE MIND. IN THE MAKING OF SYMBOLS WE HAVE FOUND ANOTHER WAY OF AUGMENTING OURSELVES.

THUS THE RICHNESS OF OUR LIFE CAN BE DEFINED BY THE DEPTH AND RICHNESS OF THE SYMBOLS THROUGH WHICH WE CAN RECEIVE, DECIPHER AND TRANSFORM THE ABUNDANCE OF LIFE.

Henryk Skolimowsk

Unifying Dance

THE TRADITIONAL CONTRADICTIONS OF ORDER AND FREEDOM, CHANGE AND STASIS, BEING AND BECOMING — THESE ALL WHIRL INTO A NEW IMAGE THAT IS VERY ANCIENT—THE UNIFYING DANCE OF THE GREAT POLARITIES OF THE UNIVERSE.

Margaret Wheatley

Chaos

CHAOS IS EVOLVING FROM A SCIENTIFIC THEORY INTO A CULTURAL METAPHOR. AS A METAPHOR IT ALLOWS US TO QUERY SOME OF OUR MOST CHERISHED ASSUMPTIONS AND ENCOURAGES US TO ASK FRESH QUESTIONS ABOUT REALITY.

LANGUAGE IS METAPHORIC.

IT BEARS OUR ATTENTION BEYOND OURSELVES TOWARD THE WORLD. IN SPEECH WE MEET AND AFFIRM THE GRITTY MYSTERY OF BEING AND IN THAT AFFIRMATION LANGUAGE IS A LIVELY MARRIAGE OF SOUL AND COSMOS.

LANGUAGE IS NATURALLY EROTIC, A NEARLY FORGOTTEN FORM OF LOVE, AND THE CARESS OF THE SHAPED BREATH. DENIED ITS CONNECTION-ITS EROS- WE WITHER IN THE ALIENATED SELF-REFLECTION OF JARGONS.

I SEE LANGUAGE AS THE SPOKEN RECORD OF MYRIAD MEETING BETWEEN HUMANS AND THE COSMOS, TWO NATURES WOVEN INTO WISDOM, A FERTILE BORDER, A SKIN WITH SOUL ON EITHER SIDE, A SEMI-PERMEABLE MEMBRANE, A GO BETWEEN, A JANUS-HEADED ROBIN HOOD MERCURIAL, TRICKY AND TRUE, INSIDE OUT A GLOVE FITS EITHER HAND....WEIRD OLD WORDS.

Tom Jay

Nature as Teacher of Wisdom

IN RECOGNIZING OUR PLANET AS AN EXPERIENCED LIVING SYSTEM WITH A GOOD DEAL OF "BODY WISDOM" TO TEACH US, WE GAIN THE PERSPECTIVE TO SEE HOW WE MIGHT APPLY SOME OF THAT WISDOM TO OUR OWN HUMAN PROBLEMS.

ALL OVER NATURE, THROUGHOUT THE GAIAN LIFE SYSTEM-RIGHT UNDER OUR NOSES, SO TO SPEAK, AND ALL AROUND US-WE FIND THE CLUES TO MAKING OUR OWN HUMAN AFFAIRS MORE ORGANIC AND ETHICAL, MORE CREATIVE AND WISE, AS THE EARLIEST PHILOSOPHERS BELIEVED WE WOULD.

Elisabet Sahtouris

Shifting Perceptions

IF QUANTUM MECHANICS WERE TO WIN, THE ORDINARY ATOM, AND WITH IT THE ORDINARY WORLD AROUND US, WOULD BE REDUCED TO THE STATUS OF ILLUSION, OR, AT BEST, APPROXIMATION TO REALITY.

ALL THINGS WOULD BE CONNECTED TO EACH OTHER, AND TO THE RELATIONSHIPS AMONG OBJECTS THEMSELVES.

THE WAY HUMANS PERCEIVE PHYSICAL REALITY WOULD DIFFER FROM TODAY'S PERCEPTION AS PROFOUNDLY AS TODAY'S MATERIALISTIC PERSPECTIVE DIFFERS FROM THE MEDIAEVAL SPIRITUAL ONE.

Hans Christian Von Baeyer

Conceptual Map of Reality

IN MODERN PHYSICS A VERY DIFFERENT ATTITUDE HAS NOW DEVELOPED. PHYSICISTS HAVE COME TO SEE THAT ALL THEIR THEORIES OF NATURAL PHENOMENA, INCLUDING THE "LAWS" THEY DESCRIBE, ARE CREATIONS OF THE HUMAN MIND; PROPERTIES OF OUR CONCEPTUAL MAP OF REALITY, RATHER THAN OF REALITY ITSELF. THIS CONCEPTUAL SCHEME IS NECESSARILY LIMITED AND APPROXIMATE AS ARE ALL THE SCIENTIFIC THEORIES AND "LAWS OF NATURE" IT CONTAINS.

Fritjof Capra

Promotional Materials

This abstract was prepared for a group that wanted a several page introduction to what would be included in the proposed workshop

An Ecogenesis for Education: Communities of Learners as Living Systems.

Oh, Great Spirit, Earth – Fire - Sky and Sea,
You are around us and all inside me.

This simple Native American chant encapsulates the inquiry into the notion that education might consciously be based upon our connectedness.

- Is it possible to create our educational systems with the clear understanding that individual learners, as well as communities of learners, are living systems with functions and principles that mirror the functions and principles of other natural systems?
- On what is our educational system now resting?
- What criteria might we used to understand the nature of the relationship of human systems to ecological systems?
- What implications would such a shift in perspectives have on the both the theoretical and practical basis of education?

In this colloquium our emphasis will not be directed toward environmental education, per se, however those with such contributions are invited to share their particular insights related directly to that subject. Rather we will be looking at the impact that we are observing as an increasing number of questions are being raised concerning the relationship of current education to the broader culture.

There is a growing voice that is questioning what is perceived to be a lack in our current mode of education. Does it have the ability to prepare, nurture, and sustain the

most essential qualities of our relatedness as we gain knowledge and information about the world and how it works? Robert Muller has spoken of the shift from our "alienation" to a word he uses "inalation".

When I use the term ecological I am heavily influenced by the work of Fritjof Capra as expressed in his book, The Web of Life, 1996. He in turn takes his view from the Deep Ecology originated by Arne Naess in the early 1970's

> Deep Ecology does not separate humans–or anything else -from the natural environment. It sees the world not as a collection of isolated objects, but as a network of phenomena that are the fundamentally interconnected and interdependent. Deep ecology recognizes the intrinsic value of all living beings and views humans as just one particular strand in the web of life…. When the concept of the human spirit is understood as the mode of consciousness in which the individual feels a sense of belonging, of connectedness to the cosmos as a whole, it becomes clear that ecological awareness is spiritual in its deepest sense. (Capra 1996,7)

In my view a cosmogenesis is the beginning of the story of ecogenesis. The idea of a learning community as a living system implicitly indicates embeddedness in the entire cosmos.

The challenge becomes asking the right questions. They are probably not the ones that we can answer but yet are the ones in which our perspectives are changed and through which our living patterns evolve. Asking the questions implies understanding something of the history of how we arrived at this historic bifurcation.

- Where have we been and where are we now?
- Are these changes indications of paradigm shift?
- In what ways will we approach the ambiguity of the future?

In the process of examining our perspectives it is sometimes helpful to explore metaphors to describe new ways of thinking. We seem to be called upon to expand our

rational, linear thinking to also include models of inter-relationship and connection. How is possible to extend our perceptions?

Play and stories are possibly the oldest forms of learning known to human systems. Chaos and order can bounce about freely in these settings as new understanding emerge. We will play with the idea of grokking new models of our relatedness. We shall explore stories of how we can come to apprehend these emerging ideas. Most fundamentally we may explore ways to help ourselves trust what we already know.

This is a participatory colloquium. There will be theory and practice, individual and group activities. Two models will be introduced as guides to the experiences. One model is focused on assisting us perceive ourselves in the context of Gaia, our Earth home. The other model offers a context for using uniquely human capacities. It focuses on our reflective and creative tendencies.

In our time together we will have the opportunity to create a miniature learning community. We will be living what we are inquiring into and with the calling forth of the human gifts of imagination and reflection we will look into the process itself as it unfolds.

Preliminary description of Mexicalli offering for organizers

Which questions are the most appropriate for your attendees?

Education is in crisis all over the world. The old context is often not working. The issues are diverse. Lack of funding, bureaucratic burdens, political polarization of issues, and the most concerning of all - violence among students- draw energy away from the essential task of education. I believe that task to be the unfolding of the capacities of each individual. How can that process be supported?

As paradigms shift, our understanding of a natural systems model may become central to our context for learning. There is new understanding about the learning process itself. We ask ourselves if we are gaining some powerful new visions for transforming our old views.

- What are some of the implications of the new visions?
- Will we change our view of what are appropriate ways that individuals come together for learning?
- Will the way in which we work together in the old setting such as institutional school building change?
- Will groups of individuals come together with the intention of learning about self and our relationships to our world?
- Will a more holistic understanding of our learning and our life's purpose emerge?
- What types of environments and atmospheres invite the greatest emergence of the individual?
- In what ways is that process in relationship to the good of the community?

- How will such educational communities house themselves that will honor their values and be in harmony with the ecological surroundings.
- Can we explore some models of educational communities that may look radically different from present setting yet will meet the needs of the next millennium?

Colloquia Handouts

All of these handouts are found in Appendix I.

1. R.M. Rilke on Questions.
2. Natural Map of Ecosystems
3. Natural Map of Learning Communities
4. Definition of Contextural
5. The Four Contexts
6. Natural Map of Contextural Relationships
7. Learning 2000
8. Key Words
9. Quotations for the New Paradigm
10. Defining and Diagnosing Living Systems
11. Special Features of Human Systems
12. Principles of Ecological Systems and Learning Communities
13. Understanding How Systems Work
14. Suggestions on the Nature of Dialogue
15. Brain-Mind Principles
16. Getting Acquainted with Chaos
17. Blank Systems Map

Music and Poetry

RIPPLE
Lyrics by Robert Hunter

If my words did glow with the gold of sunshine
and my tunes were played on the harp unstrung
Would you hear my voice come through the music?
Would you hold it near, as it were your own?

It's a hand me down, the thoughts are broken
Perhaps their better left unsung.
I don't know, don't really care
Let there be songs to fill the air.

Ripple in still water
When there is no pebble tossed, nor wind to blow.

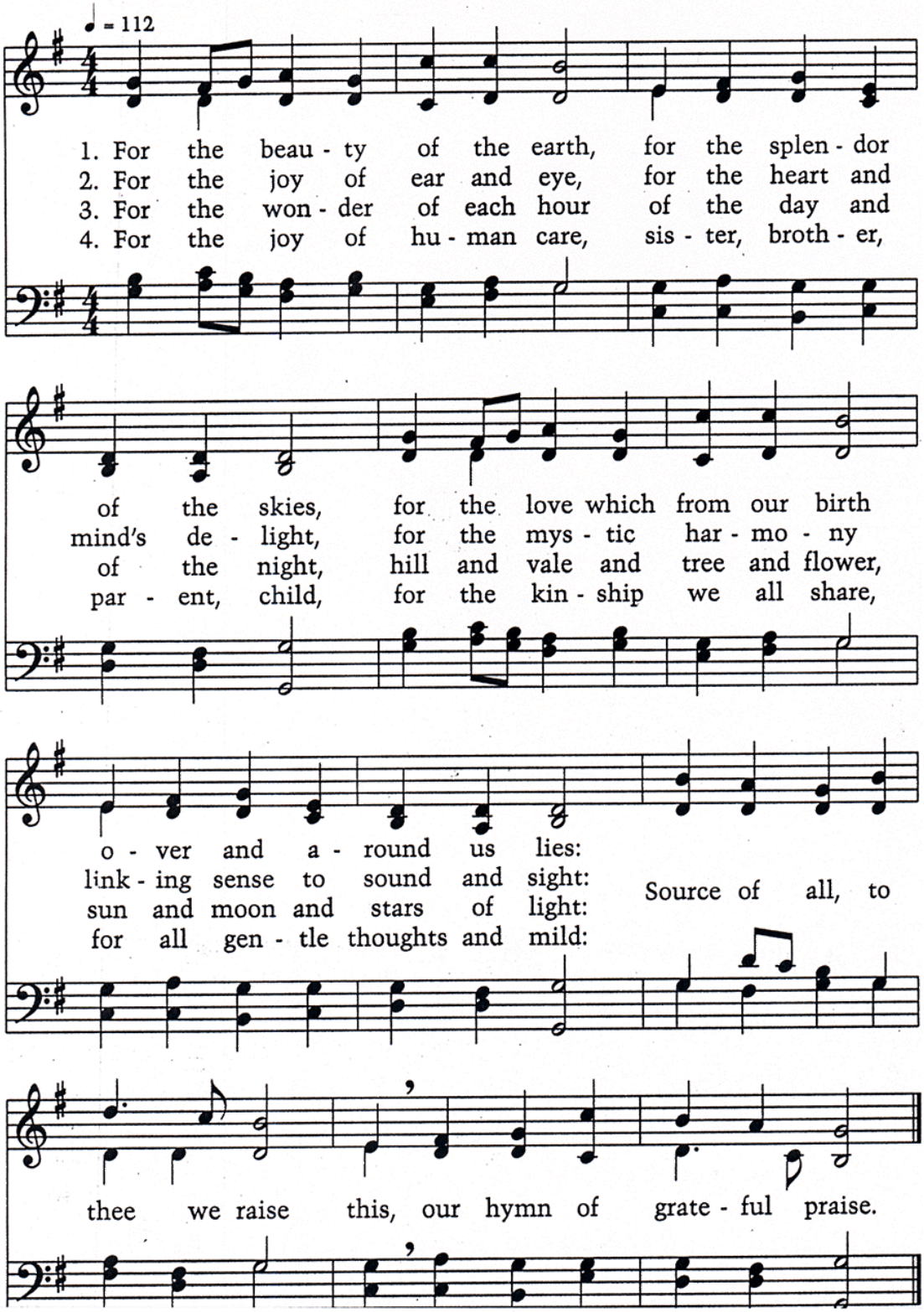
Reach out your hand, if your cup is empty.
If your cup is full, let it be again.
Let it be known, there is a fountain
that was not made, by the hands of human.

There is a road no simple highway
Between the dawn and the dark of night
and if you go, no one may follow
that path is for your steps alone.

Ripple in still water
when there is no pebble tossed, nor wind to blow.

You who choose to lead must follow
but if you fall, you fall alone.
If you should stand, then who is to guide you?
If I knew the way, I would take you home.

21 For the Beauty of the Earth



May the bird call
be my voice
the wind
be my breath
the rivers
be my blood
the soil
be my skin
the rocks
be my bones
the grasses
be my hair
the branches
be my fingers

May earth spinning
be my dance

Let no part of me
ever be separate again
Let no part of you
be unknown to me
Earth of my body
Body of the Earth

– *Karen Zeiders*

Meditation for Finding our Roots

Find a safe and quiet place. Close your eyes and breathe. Allow your breath to carry you deeper and deeper into yourself, far, far back into time. Into a time when your ancestors met in circles. Perhaps you can hear the drums, feel the warmth of the tribal fires, feel the bonds of kinship and belonging. Each of us has ancestors who sat around a fire together, drumming, singing, dancing, telling story, praying to the spirits of place, speaking from the heart, solving problems, laughing and playing. The memory of this time is in your body, in your bones, in your cells—it is your connection to the circle. It is your birth right. This is the time to remember and to bring this way back into our consciousness, into our lives, into community.

—Sedonia Cahill

CHAPTER EIGHT:
Concluding Remarks with Reflection through Self-Research

Participatory Research Rationale

From the beginning of this Master's Degree program my immediate attraction was to qualitative rather than to quantitative research. As an undergraduate in nutrition studies and in watching my daughter compete her mater's degree in botany I knew that the quantitative would not satisfy the needs of my present work. The ideas of phenomenology and action research were new to me. After learning more about these qualitative approaches I found that they suited what I wanted to do.

I could see that the movement through new paradigms indicates a need for research forms that are coherent with principles associated with the changing perspectives. Early in my review of the literature I studied the work of Ralph Abraham through his book *Chaos, Gaia, Eros* in which he presents an overview of the historical splits in the course of knowledge acquisition in a drawing of the Tree of Perennial Philosophy.

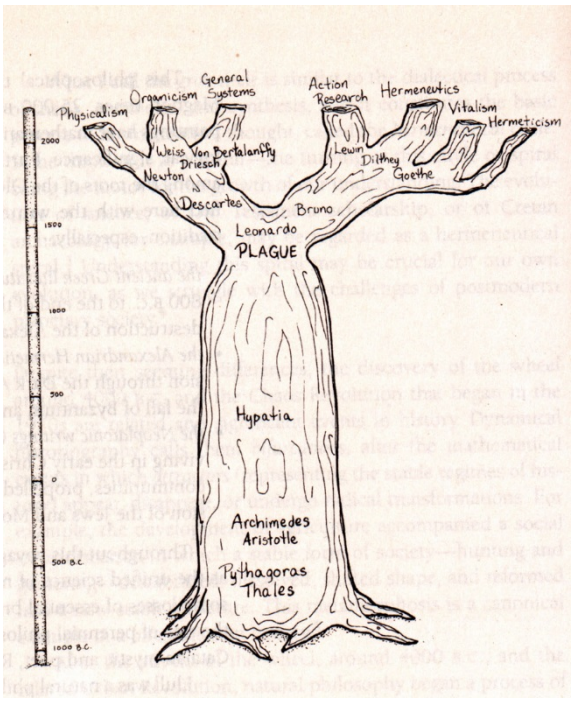


Figure 3: The Tree of Perrennial Philosophy (Abraham 1994, 16)

He points out that Kurt Lewin developed a relationship between social psychology and action research. Bertalanffy on the other side of the philosophy tree contributed the ideas central to General Systems. The comment that Abraham made that piqued my interest was his statement that "general systems theory and action research may soon rejoin in an attempt to repair the physicalist/vitalist split and they may then re-enchant the world." (1994,16-17). I would like nothing more than to be a participant in the re-enchantment of the world!

As I was investigating the implications of action research I developed a first plan that had the intention of working within a community group that is committed to educating the city of Christchurch, New Zealand to become more knowledgeable about the benefits of organic living. Since I live there most of the year and my family is there I

was enthusiastic about the project. I became a member of the board of trustees. After a few false starts at developing questionnaires and seeking interest in a cooperative inquiry approach I saw that for my own needs and the needs of the group the timing was not right.

Meanwhile, I was reading *Spell of the Sensuous: Perception and Language in a More-Than-Human World.* Ecophilosophy came into my consciousness as I read and later attend a conference in which David Abram told his stories of contact with a world that includes what exists beyond *only* the human species. He speaks of a philosophy and research mode that serves this orientation.

> To be sure, by disclosing the body itself as the very subject of awareness, Merleau-Ponty demolishes any hope that philosophy might eventually provide a complete picture of reality…. Yet by this same move he opens, at last, the possibility of truly authentic phenomenology, a philosophy which would strive to explain the world as if from the outside, but to give voice to the world from your experienced situation within it, recalling us to our participation in the here-and-now, rejuvenating our sense of wonder at the fathomless things, events and powers that surround us on every hand. (1996, 47)

Parallel to this I was remembering J. Krishnamurti's often quoted phrase, "To bring about a transformation in the world, which is the world of relationship, I must begin with myself" (Krishnamurti 1955, 155). David Bohm, who was often in dialogue with Krishnamurti, tells us in his grand intellectual challenge: to understand that all that is, was present in the first unfolding of the universe. The implicate order is the potential of creation and the explicate is what unfolds from that original order. He further asserts that "the known and the knower merge as the implicate order unfolds." (Bohm 1995, 197). From this I understood that to start with myself implied starting with myself in relationship with the world in which I am in relationship.

Fritjof Capra, from yet another view, encourages us to look carefully at our meaning of self. He contrasts the "Cartesian anxiety" of the independent, fixed self with the Buddhist doctrine of impermanence including the idea of no persistent subject of our varying experiences.

My questioning of this notion increased as I read his elaboration of this theme. "We are self-aware, aware of our individual identity - and yet when we look for an independent self with in our world of experience we cannot find any such entity" (Capra 1996, 295). The independent self is an illusion in this view. In my Montessori word usage catalogue, the word “independent” is often used in describing the behavior of children who are given the tools of self-care or have learned to choose wisely for themselves. I wonder if we were confusing independent with autonomous. Lynn Margulis says it this way. "Independence is a political, not a scientific term” (1995, 26).

How could I create a synthesis of these powerful ideas? It eventually became clear that my interest was in discovering myself in new ways. This was not meant to be an introspective self-centered improvement program. First, I set for myself the intention of creating a research that would be an individual rather than a collaborative project. Second, I wanted to know more about observing myself in relationship. Would an unfolding of both observer and observed be apparent if I gave mindful attention to experiences? In what ways could I prepare and reflect on such a process?

My understanding of the new sciences reveals that there is no totally objective research. Research is always influenced by the paradigm in which it is created and by the observer in the very act of observing. Would I be able to observe myself within relationship to others of my species with whom I come in contact? Even more urgent was

my need to find a way to deeper relationships with the extensive world of Gaia. I wanted to get inside the intellectual conception of the systemic, holistic view. In what ways might I increase my sensitivity, my learning in connection with this world, not as object but as active relationship with diverse subjectivity?

The form of research became more focused. The description of participatory action research refined my thinking. Participatory thinking is said to be a culmination and synthesis of systems thinking, cybernetic thinking, holistic thinking and reverential thinking (Skolimowski1994, 174). It does not deny objective thinking but transcends it. Participatory thinking calls for participatory research. This type of research includes exploring new forms that are coherent with the emerging paradigms in sciences and culture. Participatory research offers some guidelines through some suggested characteristics of this form of research.

> The participatory research is the art of *empathy* –
> Is the art of *communication* with the object of enquiry –
> Is the art of learning to use *its* language –
> Is the art of *using* its language –
> Is the art of *talking* to the object of our enquiry -
> Is the art of penetrating from *within* –
> Is the art of *in dwelling* in the other –
> Is the art of *imaginative hypothesis* which leads to the art of identification –
> Is the art of *transformation of one's consciousness* so that it becomes the consciousness of the other.
> (Skolimowski 1994,160)

In order to address these characteristics the necessary preparation for practicing participatory research the following are suggested:

> *Preparing* one's consciousness.
> *Meditating* upon the form of being of the other.
> *Reliving* its past, its present, it existential dilemmas.
> *Supplicating* to it for permission to enter it
> *Praying* to the other to let us in

In-dwelling in the other on compassionate terms.

This approach seemed to be in a foreign tongue but at the same time a challenge worth investigating. I began a keep a journal of my experiences. I especially noted my participating modes. Were their resistances? Was there enthusiasm? I looked for patterns, process, and form. These terms seemed more solid and related to what I had learned of the ecological, systemic view of life. I sought a Stability Point to balance Chaos.

Topic

> I SUGGEST THAT TOPICS FOR RESEARCH EMERGE FROM THE INQUIRER'S LIFE, AND THAT FULLY ENGAGING WITH THE RESEARCH CONTRIBUTES TO THE PERSON'S DEVELOPMENT. IT ALSO CHALLENGES THEIR HABITUAL PERCEPTUAL FILTERS, AND PROBABLY ALSO THEIR CURRENT LIFE PATTERN (MARSHALL, 1992, 5).

This suggestion concerning topics crystallized the appropriateness for pursuing this approach. I sought to formulate the question that I would follow more precisely**.**

In what ways might I come to increasing sensitivity as a participant with other members of the family of Gaia through self-other, mindful awareness?

Process

I was introduced to a model of research that comes from a psychological perspective and was developed by John Heron. Using this rather straightforward model and adapting it in a simple form for my own purposes it offered a way to conceptualize reporting on experience that I intended to enter in a journal.

The simplified Heron Model comprises four domains of consideration that constantly reflect on one another in an evolutionary, cyclical way. I will present one at the beginning of the recordings of my journal and one at the summary. The domains that

attract response in a cycle of research are Feeling, Intuition Reflection and Intention (Heron 1992, 20 Figure 2.2).

This way of conceptualizing synthesizes well with the natural mapping process that I was using at the same time as the research project was developing. If I used the model as a guide I could see that I was initially focusing on the "participant" sphere with me as the participant in a learning community of life. I would be looking at my worldview that would at least by intention be evolving and changing in perspective. The unity circle of knowing would lead me to create new epistemological understandings. I would need to communicate in a creative way in an open exchange of energy with all that with which I came in contact.

I noted my **Feelings.** Intellect has told me, and my experience has agreed that there are only two feelings: fear and love. All other feelings flow from these two. That understanding "feels" as if it has merit. In this case I feel annoyed and confused that I live entangled between the two, love and fear.

I swing from total love that brings appreciation and celebration of Earth and its inhabitants to fear, which brings anger and frustration. This fear and its anger heaps itself on those that appear to be outside myself and who are vandalizing Earth and or not providing our children and adults with the nurturing environment that I believe would correct both deficits. Cultural conditioning seems to have a strangle hold on our moving together as a human family. I become furious at that nebulous yet powerful conditioning quite regularly.

This approach to research allows a different form of feeling to emerging from the beginning. I am doubtful, surprisingly unsure but eager to see what lies ahead.

> So here we stand. If we are to build sacred lives, lives of meaning, we have to do the inner work. We have to bring our courage along with our fear. We learn to follow our images and metaphors. To trust the tender connection. (Hillman 1994, 214)
>
> This tender connection is our very being. It is the subtle meeting place between psyche and nature. (Hillman1994, 146)

Intuition

Intuition in its most elemental form comes to me unbidden, before thought. I ask myself, "What is my intuition about this project?" Immediately thought comes in and no totally clear answer emerges. In considering the question there are some indications that seem less than logical so perhaps they are tinted with intuition. This "voice" tells me that this will be a project that will often be at the edge of Chaos but worth the journey. Most of the experiences that will become significant will be "every day" and would ordinarily go unnoticed which is why it is worth paying attention to them. It would also seem that there will be no measurable outcomes and that will be a challenge to accept with my old mindset. The secrets of the heart will only be known in reconstituted perceptions. Just maybe things will happen that will increase a sense of life's mysteries and I may improve my skills in swimming in a sea of compassion.

I briefly **Reflect**: I have observed previously but mostly out of the conventions of an old mindset that is more appreciative of the "objective view". Some of that mindset will bring doubt and un-sureness to this research. I want to be more artistic, or is it an aesthetic quality that responds to the subtleties of the world?

I am feeling some opportunity lives in this work. I hope that it is an opportunity that will allow me to come closer to living inside the ideas and the diagrams that I study and present to others (as I have documented in the practicum chapter). I hope that this

participatory research will guide me away from the possibility of mistaking the symbols and metaphors for genuine life. The mindfulness and attention that is required by this work will be a welcome discipline.

I state my **Intention:** To become more aware and sensitive to the inter-relationship with the cosmos and ecos in which I am a participant. I will look in my past and my present experience for clues. I will record and articulate events that I identify as having potential for becoming significant, perception changing experiences.

I will need to continue to look at my own conditioning. I never find that easy. I understand the concept of conditioning. I want my own to be clear to me so that treasured perceptions remain and I can dispense with the burden of unacknowledged habitual prejudices and judgments. Choosing to be the one both witnessing and recording my behavior is a weakness in my plan. My own conditioned mind is unable to see itself. It is a challenge to acknowledge conditioning even when in dialogue with others that are able to shine light on it.

Yet, I am seeking to learn not just from other people but also from communication that is received outside conditioned minds. I think of a story that is told about Sigmund Freud. It seems that he had three dogs. He loved them because "The direct simplicity of their lives is free of the inner contradictions of civilization that are so hard for us to deal with." (Berkeley Bark June 1999, 5.) I learned one of the greatest lessons of my life from my dog. By not limiting my teachers in this research perhaps I make up for being the only human reporter.

My deepest secret intention yearned for expression and looked for words. It is not a quality that can be bestowed lightly or directly from intention. Perhaps in searching for truth and authenticity it can be invited. That secret longing is for integrity.

Ann Hillman describes what this word conveys to her and it resonated with my image that had no words.

> Integrity can be used to describe the unbroken quality of life in all its dimensions. This interwoven nature of reality is reflected in a sense of self that embodies all of creation: a living tapestry of creatures and cosmos, inside and outside, logic, imagination, mystery. Such an identity redefines what it means to be human. (1994, 22)

I have to believe that the words by Goethe will come true as I commit to this intention.

> Until one is committed, there is hesitancy, the chance to draw back, always ineffectiveness. Concerning all acts of initiative (and creation) there is one elementary truth and the ignorance of which kills countless ideas and splendid plans: that the moment one definitely commits oneself, the providence moves too. (www. Junojibe.com/33goethe.html)

Journaling: Self–Other Communion

I will report some of the more significant entries to my journal and will group them into areas. The first will be a current memory of some events of childhood and early adulthood that perhaps brought me to this act of research.

We begin at about age 10…

A branch with a curvy “Y” shape was chosen and cut carefully from the cedar tree out back. The bark was skinned away and the fragrant wood below was polished to an incredible smoothness. When slid into my hand each finger wrapped perfectly and the thumb hollow was for me alone. The wide stretchy rubber band swung lazily between the two extensions of the "Y". All was ready

In an instant I became the observer and guardian of the garden. My work included learning to shoot this newly gifted pea shooter in such a way that the blue jays were not hit as they attempted to feast on the ripening tomatoes, but to just miss. The other part of the job was to sit quietly and just watch in anticipation of the arrival of the thieves. Most lessons of nature were learned in such a way as this from my grandfather. Observation and do no harm were imbedded in my child consciousness.

From my grandmother I learned the names of the flowers that had been carefully selected for the garden or as we walked along the paths to the lake below the house. She taught me to sing "For the Beauty of the Earth", her favorite hymn.

My mother taught me the delight of putting ones feet in a cold, fast- running stream high in the mountains. In the city, we walked for blocks to find a singular tree under which I could play. Her piano playing stirred something within.

My father told me stories of his growing up on a farm until they were my stories and I could name all the horses and dogs and remember in which pasture the corn was planted. His mother, my grandmother, knew the hardship and the heartbreak of the final years there in times of The Great Depression. These difficult years were interspersed with the memories of growing up on a farm close to the boy who would one day be her husband. His sudden death ended their dream. And then the financial disasters.

These early memories settle into the years of early adulthood. My first allowed interaction with the children in the Montessori school where I began my apprenticeship was in the garden. It is here that my conviction grew that the environment had a great deal to do with the development of the child's innate potential. It was in the year of teacher preparation in Italy that I begin to realize the extent of that importance.

I also learned about Cosmic Education that interconnects all subjects through a series of stories. Stories of cosmology, stories of ecology and stories of human imagination and invention formed the context for learning. Learn about the child and learn about the world. Help the child to see the vision of the whole. Learn to perceive it anew myself. Create environments that in each detail honor the principles. Maria Montessori tells us:

> If the idea of the universe be given to the child in the right way, it will do more for him than just arouse his interest, for it will create in him admiration and wonder far loftier than any interest and more satisfying. The child's mind will then no longer wander, but becomes fixed and can work. The knowledge he then acquires is organized and systematic; his intelligence becomes whole and complete because of the vision of the whole that has been presented to him, and his interest spreads to all, for all are linked and have their place in the universe on which his mind is centered. (1991, 9-10)

Years of being with my four children and students in a procession of teaching experiences helped me begin to question the ideas that had conditioned my thinking. I became convinced of the wisdom of the plan for the overall educational process that advocates becoming cosmologically and ecologically aware. These convictions made me ever more dedicated to creating learning environments where education and living were not separated, as they seemed to be in conventional schools.

Eventually, I became interested in the suitable environment and learning process for the adolescent. I wanted to work on creating an ecologically sound environment that the young people could have a role in creating. I took the first steps to studying sustainable environments. I want to take up this thread again.

Practicum Related Experiences

I survey yet once again the places that we have been, the mapping and I. Sometimes I present these experiences with my partner and we call it *Paradigma* as he adds his pieces about the things that we can learn about life from the laws of the cosmos. It makes a good balance to come from cosmos and bios to give the bigger picture.

The colloquium, as described in the practicum chapter, has never been presented in its entirety. All parts have been presented in various arrangements according to audience and circumstances.

The responses of the participants never failed to enrich the experience. There were times when the ideas were questioned brought disagreement. I learned to watch my reactions. The questioning made us all think and I learned to reassure that there was no obligation to accept my perspectives. The point was to enter in the dialogue of understanding.

In this research I will not include the notes and reflections on each presentation but instead will highlight the places and the comments that struck me as most relevant.

Christchurch
Building the Organic Community through Natural Mapping
Towards a Learning Community

(Text note: For clarity, I will change fonts when I speak colloquially.)

Arranged by Ray Wright through the Canterbury Branch of the Soil and Health Association. First large gathering. The intention is to get a number of different groups together to find if we could work together more closely to strengthen the organic community.

Went out the day before to time the trip and become familiar with the venue. Door in the building was locked and no one had a key even though the room was to be available for me. At least saw the building. Arrive early and take equipment for colloquia inside. The previous group was not finished with the room and indeed the officers of that group were having an obviously highly charged exchange. Had help setting my equipment in order and encouraging others to move on.

Scheduled meal does not arrive from caterer. Hungry and some of the group that had been there all day tired. No food. Cooked together the produce that had been brought for earlier meeting. Hour delay starting.

Trying to say calm and enthusiastic. Not easy. Breathe deeply! Materials set up in some order but with many compromises from vision. Stuffy, poorly decorated odd shaped room with little space for active work.

Finally, group is ready. I light a candle and read a poem. The energy shifts dramatically. Less time for other things but coming together in calm was essential.

I was hoping that we could at least get to look at the map and play the Chaos game before the evening stopped.

Key to the evening. As I was carefully naming the different aspects of Gaia that we could view systemically, the small voice of a rather frail looking woman whom I had not seen before or have seen since sang out, "I have not seen where the soil fits into the scheme and it is so important." Our eyes met and I could reply that she had just said something extremely important. The soil was our next point to explore. I have no idea why such a small event could touch me so deeply but I suppose it is a mixture of ego that said I was presenting something of interest to this woman and more than that it was a

moment of sharing a common understanding. The air seemed suspended for a moment and the group engaged.

Chaos game----much laughter and a request for a second round.

Relief! Could not face much worse as far as a beginning and the evening took flight anyway. Next week the second half will be pure fun. Humans can recover composure quickly and maybe it is one of my special talents.

Three groups came together and produce a newsletter. Two groups that had ill will between them for years now have combined meetings. I would like to believe that the initiative created through our Natural Mapping contributed.

One person told me that she preferred a lecture and the exercises were too hard and didn't apply to life. For some inexplicable reason I did not feel defensive. This comment lead to a dialogue which allowed me to learn a great deal about how she view learning which was important since we worked on an educational team together.

Best of all a friend told me that he was using the concept of the map to create a jazz band.

Latvia

Daugavpils University

Tears come just remembering. Not what we did but the spirit of a people who have had their freedom from Soviet occupation for only six years blazes into memory. The university is new but crumbling, a building left from the military and lovingly brought into action as a university.

My first experience with sentence by sentence translation. Tough with activities. Written handouts previously translated. The artwork and creativity with the experiences were unbelievable. Three intense days pass quickly as the chasm of language vanishes and true communication joins us. Trips to the ecology center take us to a common ground of understanding. How can these people be encouraged in their overwhelmingly difficult efforts to educate their children in new ways when they work from a basis of destruction?

Ecuador

Center of Integral Education

Many translators. Much laughter. Two comments stand out as making direct connection with my interiority.

A young man who had just learned that he and his wife were going to have a child went to find (as requested) an object that contained the whole of the systems of Gaia. He had found a walnut seed. For him it told the whole enormity of his child and their connections to the powers of creativity. We both had tears in our eyes.

A woman teacher came back after a week-end of study of the map to say that she had discovered how differently she looked at situations when she changed the position of the facets that she was considering. "Anything can go any where but everything changes when it does." Bingo, she got it!

A process initiated by the school director told us so much. He divided the sixty teachers into groups and gave them considerable time to prepare a reflection statement to communicate what they had learned. We had not known how much had been gained

from the translation or the content of what was presented. The depth of understanding and intention for implementation was a satisfying shock.

The idea from Universe Story has new meaning "…participating in a community's search for common wisdom is one of the central and satisfying activities humans engage in." (Swimme and Berry 1992, 258)

Hawaii
Montessori School of Maui

Administrative, Teaching faculty, and Board of Directors all are committed to a land based school. It has been called a living classroom inside and out. The children are the most vibrant of all.

Working with portions of the Systemic View through the Natural Mapping process and the Contextural Circles with the teachers was great pleasure. Because the Head of School had used the Map to create the explanation of curriculum and the school had a professional naturalist on the faculty it was a dialogue among people with similar outlooks. The building of school community was a high priority over the last several years. Interesting questions and dialogue emerged naturally. Warm and loving feelings abound around the beautiful school campus. Aloha! Next Year!

England

A week later and half around the planet in every way. What a contrast! I learned a great deal. We met some good people among the participants. I will leave it at saying

that the interior self-searching was not one of connection but of reflection on what not to agree to do again.

LM99

An on-line virtual community composed of 80 people from around the world came together for a three-week conference titled Learning Millennium 99. One of the conferences was Natural Mapping. Written commentary and posted Maps were the source of dialogue for one of those weeks.

While not as warm an embrace as people in a room doing work together there were deep and revealing conversations among many of the participants. I'd know how to do it better next time. The conversations about the flowers whose photos appeared as the buttons to press to go to each conference provided the most exciting thread of communion among us.

Norway and Mexico provided venues for selected portions to be presented as requested by the invitation to speak.

The TIES Virtual Campus and In Person Colloquium

This project provides constant refinement of the ideas and the expansion of possibilities as participants work together. Several students have taken the map and made creative changes that well suit their purpose and take the ideas to new evolutions.

Back to Christchurch

An ongoing group has begun to form that will go in depth with the process through a number of days of colloquia.

Personal Journeys During the Course

Wedding

We had only a few hours or maybe a day or two to spare for getting married. There was moving from southern to northern Vermont. There was Kea, my aging mother, for whom to arranged care and there was personal preparation the program that I was soon to begin at Vermont College. Elopement had become our carefully chosen mode of wedding celebration. Two friends, one of whom is a minister, accompanied us, in the rain, to our newly purchased property in the hills of Vermont.

Arrival is wet and soggy. We build a tarp shelter in the back of the blue pick-up. The wind is insistent that it will create the form of our ceremony. The plants, instruments, music, gifts and stories are arranged and soon are catching wind and rain. We proceed.

Laughter at our wetness and serious pledges to one another mingle. We consecrate holy ground. A chant rings out from my bridegroom and a bird lands perfectly on the top of a large dead tree. Both calls are echoed through the forest. The clouds part, the rain stops and the sun emerges as raindrops turn to reflective crystals. The joyful moment is celebrated with barefoot dancing in the field as all of the creation around us has come to join the festivities. We are not alone in the universe.

The Land

Maples and tall grass, cedars and streams fill our senses. Looking up at the sky between the branches allow thoughts to soar in greeting, thrills us in unison. Where would the house be placed? It and the road must follow the rolling contours of the land. And over here, would this section be where we would house the students that would one-day love this land with us?

Saying good-bye to this land and that dream were pragmatic and broken hearts lay under that surface.

Learning about Ecological Structures

Yestermorrow: Warren, Vermont. The address is on this road, I'm sure of it! Surely, we aren't staying in those abandoned gray boarded up rooms, but this sign says, let's see, the sign says "future home of…"

Oh, no, the printed directions in my hand say that for now students stay together in a motel that caters to course participants. Finally, checked-in I begin a stimulating, stretching, delightful week immersed in information, skills acquisition, and travelling to the real houses that were built on the learned principles.

I am fast absorbing the process of home design and at the same time attending to land contours, sun trajectories, wind patterns and microclimates through experiments models and drawing. The plethora of building materials that satisfy ecological values is comforting. Most amazing is the talent and generosity of the teachers and fellow students. The expertise and naivete melded into an eighteen hour- a-day community that for 6 days worked together non-stop. I leave with long hugs and good-byes, and a contour model

and completed drawings of rooms designed according to family activities and ecological demands. Pure excitement fills my eagerness for next steps.

Permaculture and Appropriate Technology

Back in Christchurch just in time to register for a permaculture course at Christchurch Polytechnic Institute. Finally find the campus. It is called Seven Oaks and has no relationship to the other two campuses. I wonder why I have not known of this place before. Serendipity. I sign up to undertake a Master's Degree at Vermont College and end up at a Polytech in New Zealand taking a course that exactly matches my intended study and the form and arena of this permaculture is real life. Thinking in systemic terms is practical as well as theoretical. My weekly class is the high point of my busy schedule.

I am very upset with the academic input that I have gotten with my work to this time. I find delight in the depth of understanding that is shown here at Seven Oaks. The teachers are genuine interested in what I am doing. I suddenly distrusted all academics that do not have dirt under their fingernails. I am learning so much here from direct action that had only been theoretic in my devouring of reading materials. I am paying direct attention to the systems of Gaia. They are touchable as well as being exciting intellectual exercises.

In my learning plan it states that I want to make a connection between community, schools, permaculture and sustainable living practices. I find a permaculture group that has informal meetings and projects to help one another establish permaculture properties. This leads me to Organic Garden City Trust. I become a trustee. One of the groups that the trust supports is called Kids Edible Gardens. Bingo, another direct hit.

Connections unfold. I have work and it all fits some grand pattern that remains unknowable to me.

Life is good except that my mother is dying and I can only watch and take care of her as best I can. Somehow accepting this process as part of the tapestry of life is hard to accept. This is my MOTHER.

Ecopsychology

Boulder, Colorado. A Course for Educators. A concept that fascinates me. The city of my teen years and a favorite still.

What is it? A Field that combines ecology and psychology seems superficial and not at all adequate. After four days of exploration the concept is more clear and at the same time even more illusive. I am totally involved in each minute of this work. Perception makes all the difference I learned through many exercises that demonstrated this viewpoint. How will we re-vision human-Earth relationship?

A field trip is arranged. By chance it is to my favorite mountain, the one that I grew up looking at through my bedroom window. Again one of those synchronicities that I love to experience. We are told to go on our own. I find the perfect spot to sit down. I can't settle yet. I want to see my old house below. I want to take pictures. I want to look around and be flooded with memories.

After a long time of restlessness and moving from spot to spot I finally settle. Looking back into the mountain pass where I often hiked forty years ago I grow drowsy in the warm Spring sun. Startled, I sit upright. A noise that I can't identify comes from behind. Only an instant passes but fear finds it way in that flash. Then a whoosh just over

my head and there it is! An eagle circles and takes position on a tree just in front of me. The fiercely penetrating eyes look right at me.

Have I interfered with a hunting spree? Have I invaded territory where I shouldn't be? The eagle remains motionless, staring, unhurried. I now feel no urgency to move. I feel only fascination with the magnificence before me.

I had been sent with a self-composed phrase that was meant to take us to what we needed to know. My phrase was "What kins me?" Is it this easy? Can we open our heart and attract just what we need with such a light intention? If this is it, I don't want to miss it. What do you have to teach me brother…. or sister bird? I admonish myself for not even know the clues that would help me know brother or sister. But maybe the lesson does not have to do with that anyway.

I don't know that I have the lesson even now. I do know that all I have to do is recall the details of that meeting and the eagle's silent power becomes present in my memory.

Coming home

Greeting the New

I now have four grandsons. One is of the lineage of my new husband. The other three are sons of my daughter and son-in-law. The urgency to do or say or write anything that could in any small way make a perturbation in the status quo intensifies. The joy of being with them and connecting with the world with them is a pleasure beyond belief. Each time I am with them I learn new things about them and myself. I watch my intense connect through and with them. I remember such connections with my grandparents. I

relish seeing my daughter with them. She seems to be naturally endowed with astonishing mothering skills. I don't know how she does it with them so close in age.

Saying Good Bye

My mother, Kea, had a major illness in a series of failing health when I was attending my second summer meeting of this Master's Program. I drove to the hospital and back between sessions. She never really recovered though we managed to see her brother in Texas and back to the beloved great-grandsons in New Zealand.

Embracing the contradiction of being elated at her release and the terrible sense of loss was an unexpected process. Phil sang and read to her long after it seemed that there was no need. Hours of agony and of peace alternated. The greatest of human cycles has ended for the woman who passed life to me. I am too tired to question meaning.

The Tender Connection In the Forest

I have anticipated this walk into the lush green forest yet I stay at the trailhead, alone. I looked closely at a marker sign that says, "center" and wondered, "At the center of what?". I begin to think of being at the center of an island. Two islands and then drifted in rather non-thought to imagining that could as easily be the center of the ocean, the center of the planet, the center of space.

I felt surrounded by the green of the forest and completely embedded in the texture of life around me. This next part is not in my descriptive power but I will make the attempt. It was something on the order of the trees emerging and communicating with the essence of me. I apprehended rather than thought the connection with no separation. After a time the trees receded to their position but the atmosphere was still infused with a feeling of love and generosity.

In time that I did not try to measure, a feeling of "normal" reality returned. I thought of the Maori word Marihau that means the lingering scent of the flower after passing.

On top of the Dune and by the Sea

I cannot with precision define spiritual or even know what conditions will ensure its emergence in a teaching/learning setting.

That entry was followed the next day with……

I *can* talk about a magical moment. The day had been muggy and overcast. The car had broken down for the second time in as many days. Traffic, Rory growing impatient, Kea needing to be fed. Traffic again.... Tiredness.... Finally home..... Meal and tidying up.

Eight o'clock. I had to go to the beach. A pre-conscious insistence had my shoes on, and me, walking out the door. I was almost shocked to find myself on top of the viewing platform that rests atop one of the highest sand dunes. It is a favorite spot of ours. A place where we did the final check-in for our ceremony only one week ago.....

Halfway up I catch a glimpse of the full moon rising through the clouds. Could it be? Rory must see this. His passion with the moon knows no bounds. There is no time to go into town for him.

Disappointment rises as I discover three other people are sharing "our special place." It seems to be a friendly group so I join them. We all sit down in awe. We notice that there is a break in the clouds to the west. The sun is setting across the Canterbury plains. The sky turns to gold, to flame. Bursts of light shoot in every direction. The sky is ablaze. We turn in circle. To the south the port hills reflect the

colors as the house lights begin to twinkle from the hills. The mouth of the volcanic crater and the high cliffs reflect the light and subdue it with their grays and mauve reflections. To the north the Southern Alps are misty outlines on the horizon.

Then the clouds break again over the water. The full moon is once again visible. The shimmer of the sea reflects the clear silver light. The turquoise green of the water is edged in indigo and the waves crash at unusual height as the wind is from the west.

The wind is always from the east at this time, from the water to the land. The naturally bent trees and dune grasses look turned inside out from this change of direction. I think how silly of me it is that I would wish for a camera, as if the lens could capture these 360 degrees of wonder. I want in some way to share, capture some evidence of the grandeur. Then for some period all thought seems to vanish.

Gradually, I hear the voices of my friendly companions and realize that I am still on the platform atop the dune. We laugh together when we realized----one Japanese, one German, one American, one Kiwi. The Kiwi cracked, "Will the real Kiwi please stand up?" and pretends to look behind himself. We go back to our private reveries. Quietly the Japanese woman speaks. "I think there should be no more wars. We have come so far and are such friends……and look around us."

After exchanging names and pointing to our respective houses we depart. I head for the water's edge as the moon continues its climb. I wish for Phil to share this moment. Jonathan fills my thoughts with the challenges that are his. I remember Kea playing Claire du Lune at my father's funeral: his favorite. You, my far scattered friends-of-the-question, I wish to include in this event. Although others are with me in my

thoughts I am solitary even as I walk among the other figures on the beach. Are they too caught up in this wonder?

My intense desire for this magic to be describable to others evaporates with the feel of the sand underfoot, the color, the smells, the light, the powerful sound of the sea. Lost in the "spell of the sensuous," I believe it is called.

I come out of the state long enough to consider breaking my usual mantra. *Leave the shells alone.* "Acquisitiveness is a great enemy of beauty," Anne Morrow Lindbergh's words in her book Gift from the Sea, read long years ago when it was my mother's favorite. Just this once, I must. I pick up a shell that sits alone in the sand as the sea washes over it. It looks like the thousands that I have seen on this beach through the years. Round, banded, sandy-brown-gold with white. The underside is white or gray. I know that without even looking. This one is nicely shaped and will surely bring back this moment of mystery when I see it tomorrow. I draw it out from under the shallow water. I slowly feel it and turn it to its underside. I hold it in a variety of angles believing that I am seeing a reflection from the moonlight. I hold it up as if to place it beside the moon. Astonishment! The moon itself is encircled in a purple aura. The underside of the shell, unlike any I have ever seen, is white encircled with purple iridescence. I walk to somewhere and back clutching the magic in my hand and wink at the now brilliant disk that lights my way home.

Taking a Break on the Beach

It is evening. I am tired of study, activity, even tired of the long rounds of Kea care. Too

tired to garden and besides the light will soon grow dim. Always the beach beacons and unstintingly gives of it intensity and calm. A strange mixture, but comforting.

I walk facing the Alps tonight. Here I can see what I have been studying about. There is the lithosphere boldly and dramatically taking shape in mountains and underfoot as sand; the atmosphere apparent in the gentle breeze and the clouds of twilight; the water doesn't let me forget it with its crashing and movement up the shoreline; the nutrient cycle over to my left quietly and unseen making the dunes more covered in life with each season, slowly, slowly sand becomes soil ready to nurture. I can't see their communication between one another but know from study that it must be there. The sun, energizer of all life, ebbs its light from the beach. How do I name the stability and the creativity?

The waves once again erase my thoughts with their pulse and pound and the day's efforts fade and I begin to feel my body in contact with the sand beneath my feet. How long I walked this way I do not know.

As the light is fading and the last of the path before the marker to my Tovey Street home is in sight, I find myself looking down. Water spills over my bare feet and forms blend in distorted image. Deeper into watching, not distinguishing my form from the wetness. We are one. The sea and my blood pulse in rhythm and pattern and in the same chemical concentration. I share minerals with the sand and sea.

Laughter: instant, before thought. I am just DNA card carrying life form unique only in the particular pattern I carry but in all important ways just re-combinations of all that I see before me. We all have just organized the chemical supply of that first burst of creation with a touch of magic called light.

I think with gratitude to the archea bacteria that lives in my gut and probably in the goo of the fine sand as it burrows to protect itself from oxygen. The archea's kin once invaded my distant ancestor and stayed. Thanks to that amazing move I have mitochondria powering my cells. My gratitude emerges naturally. The connections are spontaneous and intuitive, which I know means protective. I feel that I am *meant* to feel this way all the time but have a terrible habit of forgetting.

I have an answer to my question about stability and creativity. They are sometimes one when I see them displayed before me. I am comforted and overcome by the grandeur and raw creativity in the same moment. It is the assurance of continuity in its temporary state.

Serendipity

Went to an end of summer extravaganza at the park last night. It is called Classical Sparks. Sitting on the earth in the warm air outside was magic. The Christchurch Symphony Orchestra played a two-hour concert while all ages ate and made merry in the park. A nine-year-old cellist was the darling of the evening.

When it was fully dark the firework began. The music was Tchaikovsky's Capriccio Italien Op 45. The fireworks must have been computerized as the display was in perfect timing with the music. I had before never been so moved by a display (perhaps because I have been grounded in July 4 militant associations).

I laughed and cried and realized how deeply in our brain and ancestral consciousness the creation of the universe must reside. The universe was re-created last night with bursts of color and form and then in one passage I could swear I saw life being created.

Little swirling squiggly things began to weave amongst the explosions. Then all the little holarchies of beings cascaded into one giant light of diverse color, direction and intensity.

And then all was dark…..and silent. Wow! Is that the way it is?

Spiraling the Model

Feelings

Is it possible to feel like an irrational number that has been reiterated into a fractal that has no ending? The fragment of what was not touched, or said, is felt. There is missing the reflection on profound shifts that involved others but are too personal to record here. Too, I feel incomplete about what I am not able to transform into words. In fecund silence or drawing or perhaps a dance they remain internal and not yet touchable. They, like the other experiences, still become significant in this process of change. I suddenly feel calm and happy about the appropriateness of this work remaining in fractal form.

Intuition

With certainty, I know that I have just opened a process that will carry me on adventures for the rest of my life. This will occur as the "implicateness" of my life and in all that surrounds me as we unfold in tandem. It does not have the mechanical form of evolution but instead unfolds creatively so long as I remember attentiveness. Preparation and reflection both are to be cultivated in order to awaken attentiveness.

Reflection

I came to this program with a cynical view of the value of research. I knew so little. My appreciation for the process is radically modified. I have so much more to learn.

The above statement of appreciation does not imply that I have some clear statement that I can present here in answer to my original question. Have I changed, grown more sensitive and involved with all of the life around me? If so, is it partly determined by the nature of research into my experience? Did I change more than I would have in any other period of time? I cannot answer.

I know that there have been enlarged perceptions in my world-view and my consciousness has taken a new form. Will this have impact on my actions? My enjoyment of working with other people has increased dramatically. The possibility of close community through the medium of computer technology has altered from doubtful to totally affirmative. My best friends are not next door. They are often thousands of miles away. Community involvement has, in contradiction to the previous statement, increased immensely. I live up close and far away. I define my community to include those beyond the human. That is another expansiveness that has changed everything.

There is still the anger at the particularly damaging conditioning that seems woven through my life and others. How will the changes come about? Will it be in time? Perhaps the anger is tempered with hope and patience with the process. Or do I embrace that anger and confront the unseen enemy and creatively confront it. There are so many fellow travelers. My focus changes to the knowledge that closed systems cannot survive and what we need to create are open ones that we are only beginning to in-vision. Self-knowledge and connections seem essential ingredients.

And the ultimate question of this research, does this research have any relevance to the overall question of this inquiry. I now will say that one is not possible without the other. The evidence is not documented in hard statistics but it is deep and powerful like the eyes of that eagle.

Intention

Two definite directions come into clear view. I want to extend this work and experiment with research that is co-creative with others. I intend that to have form within the structure of a doctorate degree. This is coupled with the intention to continue to work with adults in learning communities.

My lifestyle must continue to change to become more in accordance with the concept of integrity. Integrity is not to be given or strive for but there are ways to live it that I have not adopted. Permaculture seems the synthesis of theory and practice and it is such great fun.

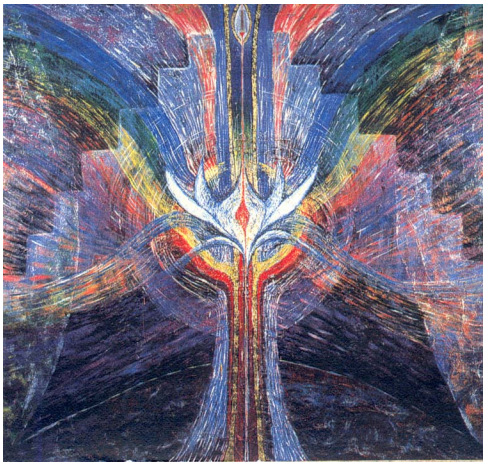
What I have presented is an adventure in seeking understanding of relationships from the perspective of the characteristics of life - pattern, form, and process. This document is "final" only in the sense that there is be a beginning, middle and end to a written description. Each part of which will be deepened on a life long quest. The big picture is the one that I have attempted to portray here. How do the questions relate to one another? Why should we as teachers and learners find it important to follow these questions as we seek to co-create environments and atmospheres? Is it possible to have an ecogenesis of education by learning to see systemic patterns as we co-design and co-create learning communities? There is no answer to that question as yet.

What has become clear to me is the great movement toward change. Small groups, magazines, grass-root movements, books, personal conversations and the great web of electronic information indicate that new values are emerging. Educational priorities are changing in two directions. There are those who will fix what ails the system by increasing accountability to outer authority. Others will have us looking to inner person and community guides for accountability.

I appreciate that I have gained exactly what I had hoped from this inquiry. I have an index, an album, from which to draw information and to navigate future study. It still seems a paradox that I will submit a paper on *Ecogenesis in Education* to Norwich University, an educational institution associated with the military. The United States military is the single greatest polluter on the planet. However, in a way, I look at the possibility of change and revision occurring on all levels and in all sectors of our society.

I end with thanks:

- To my ancestors who made this inquiry inevitable,
- My progeny who make it essential,
- My companions who make it exciting,
- My partner who makes it possible.



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Appendices

HANDOUTS USED DURING THE PRACTICUM EXPERIENCE

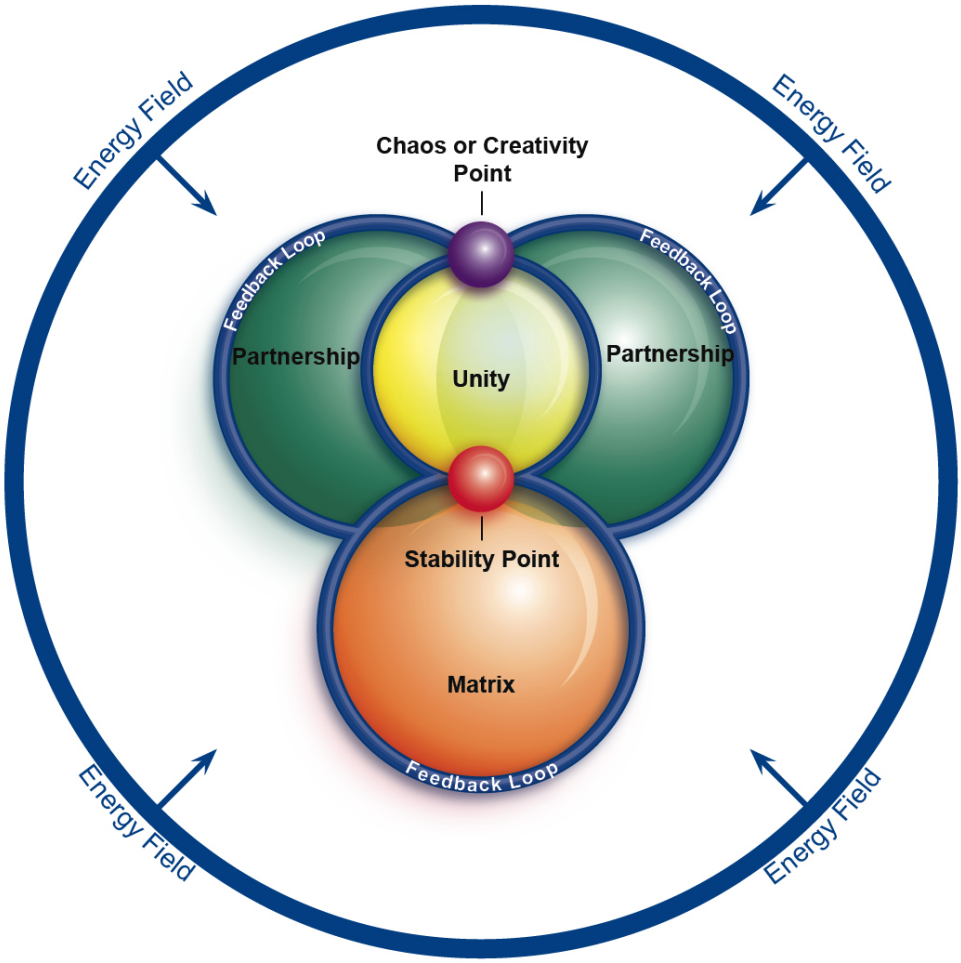
Appendix 1

Be patient toward all that is unsolved in your heart and ... try to love the questions themselves like locked rooms and like books that are written in a foreign tongue. Do not seek the answers, which cannot be given you because you would not be able to live them. And the point is, to live everything. Live the questions now. Perhaps you will then gradually, without noticing it, live along some distant day into the answer.

R.M. Rilke

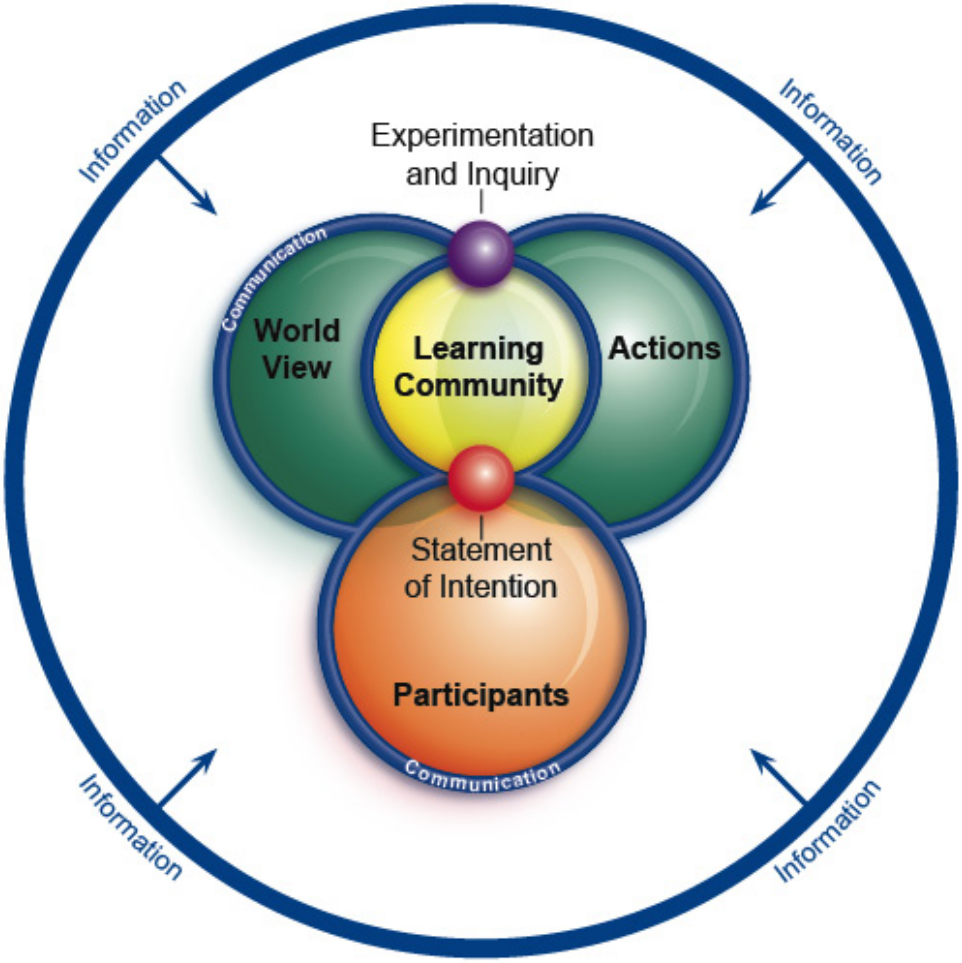
Appendix 2

NATURAL MAP OF ECOSYSTEMS



Appendix 3

NATURAL MAP OF LEARNING COMMUNITIES



Appendix 4

Contexture — Contextural

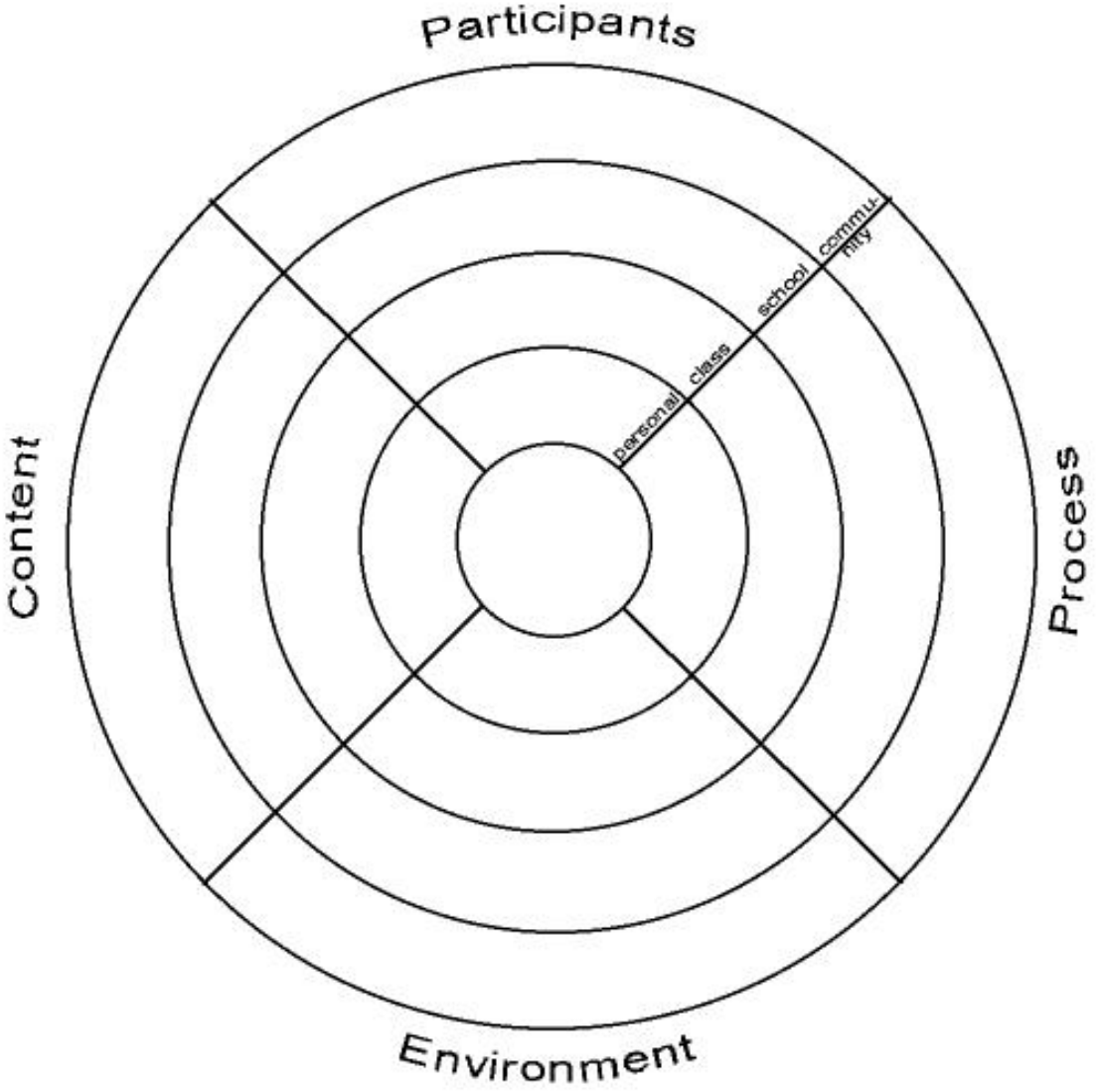
A Working Definition

- ***Con* + *Terare* -- meaning moving through**
  - **con is *with, together***
  - **terare is *interweave, plait***

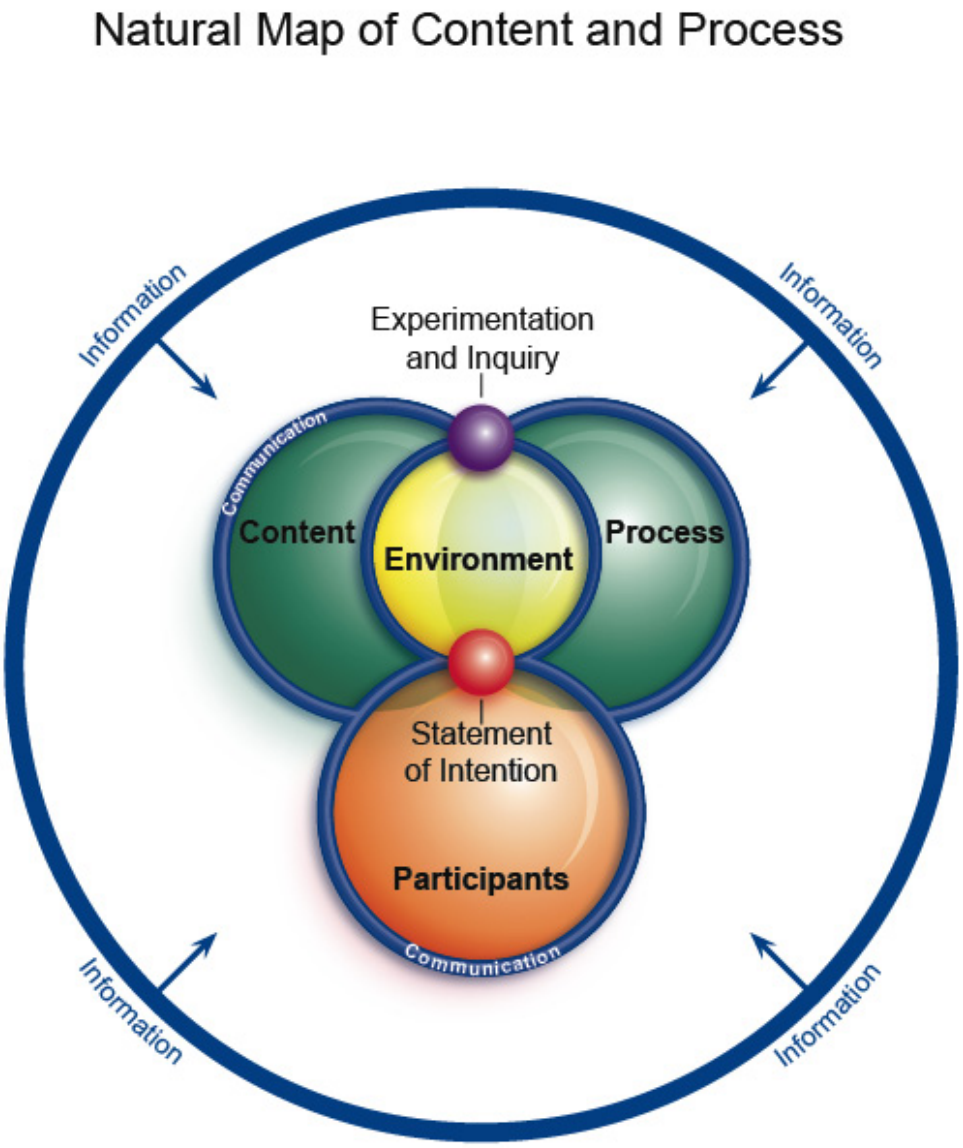
The arrangement and union of the constituent parts of anything; constitution, structure. An interwoven structure; fabric. The act of weaving together. The process or manner of being woven together.

Appendix 5

Contextural Map



Appendix 6


Natural Map of Content and Process
Information
Information
Experimentation
and Inquiry
Communication
Content
Environment
Process
Statement
of Intention
Participants
Communication
Information
Information

Appendix 7

Learning 2000*

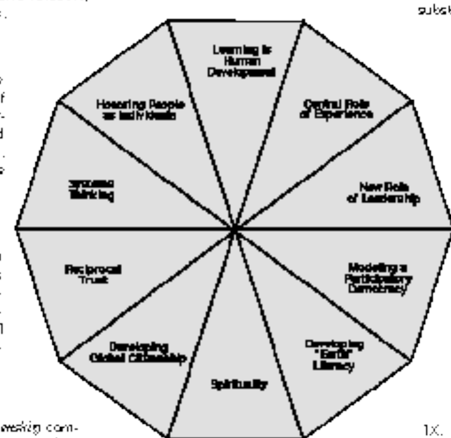
Communities of Meaning

I. The fundamental purpose of *learning is human growth and development*. Learning involves the enrichment and deepening of relationships to one's inner self, to family and colleagues, to the global community, and to the Earth.

II. Each individual is inherently creative, has unique physical, emotional, intellectual and spiritual needs and abilities, and possesses an unlimited capacity to learn. Communities that recognize each person as unique and valuable, *are honoring people as individuals*.

III. Learning is an active multisensory engagement between person and world. The *central role of experience* is to engage and immerse people in the natural and social world as well as their inner world. Policies and procedures support but do not substitute for these vital human relationships.

IV. *Systemic thinking* celebrates the full range of human potentials and multiple ways of knowing. It is "whole" thinking which carries significant implications for human and planetary ecology and evolution. Sustainability has emerged as the keynote for survival in this century.



V. The *new role of leaders* includes the facilitation of learning, which is a mentoring and natural process. When leaders are open to their own inner being, they invite a co-learning, co-creating process with the learner. In this process, the teacher is learner, the learner is teacher.

VI. Genuine learning can only take place in an climate of trust. In *reciprocal trust* there is an atmosphere of innovation, care and commitment. This includes freedom of expression and inquiry. Groups have the potential to nurture the development of compassionate learning communities.

VII. To model a *participatory democracy* means that the environment must itself revolve around empathy, shared human needs, justice, and the encouragement of original thinking. Indeed, this is the essence of true learning. There needs to be congruence between what we know and how we act.

VIII. In developing *global citizenship* communities facilitate the awareness of an individual's role in the global ecology, which includes the human family and all other systems of the earth and universe.
Human experience is vastly wider than any single culture's values or ways of thinking. The global perspective engenders respect for diversity.

IX. *Earth literacy* implies an awareness of planetary interdependence, the congruence of personal and global well-being, and humanity's responsibility for recognizing the systemic nature of world and universe.

X. *Spirituality* implies an openness to the world, a sense of meaning and purpose in daily life, an experience of the wholeness and interdependence of life. Such awareness may offer a respite from the activity, pressure and over-stimulation of contemporary living.

*Adapted from "Education 2000: A Holistic Perspective"

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Appendix 8
Some Key Words

Learning - may be described as increasing sensitivities and expanded perceptions with the ability to integrate them into behaviors. In more complex organisms, such as human beings, a self-reflective consciousness make it possible to be aware of the process. We know that we know.

Communities - the binding and integrating of organisms into wholeness is implied. In the case of humans, meaning and intention may be attached to the formation of community.

Ecology - from the Greek *Oikos* ("household") - is the study of the Earth Household. More precisely, it is the study of the relationships that inter link all members of the Earth Household. The term was coined in 1866 by the German biologist Earnest Haeckel.

Ecosystem - A word coined by British plant ecologist A.G. Tansley to characterize animal and plant communities. The ecosystem concept now is defined as "a community of organisms and their physical environment interacting as an ecological unit." By its very name it fosters a systemic approach to ecology.

Systemic View - describes the perception of integrated patterns between "parts" of a living system. The "whole is greater than the sum" of its parts is a rather misleading concept unless it is realized that the whole ceases to exist if the parts are elisioned. Systems can become very complex in both internal relationship and as extended relationships are considered.

General Systems Theory - points to the belief that all self-perpetuating systems whether natural or cultural mirror one another although they come from different ancestry (isomorphism).

Holarchies - Social systems, like systems in nature, form "holarchies." The are multi-level flexibly coordinated structures that act as wholes despite their complexity. There are many levels, and yet there is integration.

Each level is a whole within itself yet is in relationship to all that is external to it. For example a bicycle is a functioning whole with many parts contributing to make it a bicycle (holistic). It is also in relationship with its environment through such things as the materials it was made from where they came from, the people who might ride it, the social accommodations that make its riding possible or not.

Autopoiesis is a general *pattern* of organization, common to all living systems. It is a network of production processes, in which the function of each component is to participate in the production or transformation of other components in the network. In this way, the entire network continually "makes itself". Auto means "self" and poiesis

(same root as the Greek word poetry) means "making". This concept is associated with the work of Maturana and Varela ant the University of Santiago.

Dissipative structure – a concept first presented by Ilya Prigogine in 1967. Dissipative structures are open systems that not only maintain themselves in a stable state far from equilibrium, but may even evolve. When the flow of energy and matter through them increases, they may go through new instabilities and transform themselves into new structures of increased complexity. It is the *structure* of living systems. All living systems are dissipative structures, however not all dissipative systems are living systems.

Cognition – as defined by Bateson and elaborated by Maturana and Varela is the process of life and is closely linked with autopoiesis. All living systems are cognitive systems and by this imply being autopoietic.

Key Criteria of a Living System - as synthesized by Fritjof Capra. Pattern of organization (the configuration of relationships that determines the system's essential characteristics); Structure (the physical embodiment of the system's pattern of organization); Life Process (the activity involved in the continual embodiment of the system's pattern of organization).

Sixth Extinction - a hypothesis that some biologists believe is too little noted. Richard Leakey draws our attention to this information in a book by the same name. There have been five previous extinctions. Their causes are not clearly understood but were perhaps related to meteoric crashes with Earth or climate changes from other sources. Each extinction brought more complex life forms as the systems recovered. The sixth extinction is the one now in progress, or so it is believed by many biologists. Humans who have lost their connections with the universal laws natural wisdom generate this one. It is not known how great the damage will be if this occurs.

Reweaving the Rainbow – The work of Sir Isaac Newton and Rene Descartes helped unweave the rainbow. Unweaving the rainbow was a process of displaying the colors of the rainbow in its colors through the use of prisms. Many discoveries were made from advances directly related to that accomplishment. Moreover the mindset of studying more and more detailed parts has been dominant in the study of nature in the last 300 years. This process is called reductionist science. Great technological progress has been made from this approach. The urge now is to "reweave the rainbow" by seeing holistically or ecologically and directing focus to relationships and wholes rather than singular parts.

Appendix 9
Quotations for The New Paradigm

A paradigm is a window of perception, defining not only how we perceive our world, but also how we choose to interact with it.

In the old mechanistic paradigm, Nature was viewed as something to be dominated and exploited.

In the New Paradigm the key word is "kinship". Each species of life is a vital strand in the overall tapestry.

The question we must ask ourselves is "How can we live and prosper in a way that benefits all our relations?"

A quote from a Box of Chai tea

If I am right the whole of our thinking of what we are and what other people are has to be restructured. The most important task today is to learn to think in a new way.

The major problems in the world are the result of the difference between the way nature works and the way man (humans) thinks.

Gregory Bateson

…. participating in a community's search for common wisdom is one of the central and satisfying activities humans engage in.

We are deciding what species will live or perish, we are determining the chemical structure of the soil and the air, and the water, we are mapping out the areas of wilderness that will be allowed to function in their own natural modalities.

If there is any way of guiding our course in such difficult decisions, it will be discovered only through an understanding of the most intimate aspects of the natural world.

Brian Swimme and Thomas Berry

Integrity can be used to describe the unbroken quality of life in all its dimensions. This interwoven nature of reality is reflected in a sense of self, which embodies all of creation: a living tapestry of creatures and cosmos, inside and outside, logic, imagination, and mystery. Such an identity redefines what it means to be human.

Anne Hillman

To bring about a transformation in the world, which is the world of relationship, I must begin with myself.

J. Krishnamurti

Appendix 10

Several colloquia have lasted over a several day period. This paper can be a study text that extends individual time to see the connections of human and natural systems. Conversation about the paper is invited the next day.

Defining And Diagnosing Living Systems

The following thought evoking questions are adapted from the book
Earth Dance: Living Systems in Evolution Appendix A by Elisabet Sahtouris

The thesis of this book has been that we must reorganize our human systems to conform to the principles of healthy living systems as we self-organize a worldwide body of humanity. Let us look, then, at the basic features common to complex living systems at all levels from single cells to bodies, families, communities, ecosystems, nations, etc. By understanding these characteristics we can assess the health of any particular living system and see where it may be dysfunctional. This is turn will give us clues to making the system healthier. Try translating the examples given for your body or your family into similar functions in your organizations or schools, your town or city, your bioregion, nation or the world. Dialogue with your family, in groups from your school or community. This will help you see where your own living systems are healthy and where they may need change.

Self-creation

Nature's self-creation is endless. We can see that all living systems are continually building and renewing themselves. In your body, for example, the molecules and cells of different parts renew themselves at different rates (your stomach lining and the molecules in your brain cells renew themselves in hours or days; other kinds of cells are replaced more slowly, but about every seven years you are made entirely of new materials. Your family, as a larger living system, shows renewal not only within its individual members, but also in the way their material extensions (possessions such as home, clothing, car, etc.) are exchanged over time. The members, and so the system as a whole, also exchange knowledge, thoughts, moods and actions.

Have you ever heard people talk about "R and R" as psychological restoration or of "spiritual renewal?" The home you live in probably always needs some repairs or

additions so your family can function well in it. How else does your family recreate itself? What about your community's re-creating? Your ecosystem?

Embeddedness

Self-creation requires an environmental source of matter and energy. Even the tiniest atoms are constantly self-creating whirlpool forms that draw zero-point energy and release spent energy into this background. Even such protolife forms are always embedded in some matrix. Complex living systems are embedded in larger living systems: cells within bodies, bodies within families, organization, communities, bioregions, human world, planet Earth, and cosmos. Notice that any individual person is very deeply embedded and can have only an illusion of separateness.

Transformation

Living systems take in matter, energy and information; they use and change them, then put out transformed matter, energy and information. You as an individual living system, for example, take in food, water, and air, as well as sound, light and other energies. You also take in information from many sources (other people, radio and TV, printed matter, computer programs, everywhere you look, listen, and touch. All this input is transformed within and by your mind/body. Have you recently transformed matter by cooking, fixing things, or creating new ones? Have you ever transformed anger into strength or love? In how many forms and ways do you take in and put out matter, energy and information? Adapt this exercise for living systems at other levels.

Complexity

Living systems always have multiple parts and diverse aspects. Think of how many kinds of cells and organs the harmonious function of your body requires. Creativity can only come out of diversity. How does diversity in membership of your family and of the organizations to which you belong contribute to their healthy function? How does creativity manifest in mixed ethnic group discussions?

Good organizations need visionary entrepreneurs, implementers, administrators, and integrators. In what ways could these talents and skills be shared among the members? Sometimes organizations fail because they are not sufficiently diverse to accomplish the tasks they set out to do.

Communications

The parts of a healthy living system "know" each other by sharing and exchanging information and materials with each other. Every cell in your body contains information about every other cell through the DNA that it contains. Cells and organs constantly exchange messages and materials delivered to and collected from receptor and emitter sites. The members of your family know each other and all the material extensions of themselves. How many ways can you think of in which your family shares and exchanges information and things? What about larger systems?

Win/Win Economics

Use the body to make an analogy of the way we humans do world economics. Here is what might happen. Raw material blood cells formed in bones all over the body are swept up to the "northern industrial organs"----the heart/lung system. Here the blood is purified and oxygen is added. Now the finished blood is a useful product. The heart distribution center announces: "The body price for blood today is so much. Who wants?" Blood is shipped to the organs that can afford the price; the remaining blood is chucked out as surplus--or bottled until the price can be paid. Can a living body survive such economics? Of course not. It is a win/lose system. Only a win/win system can make and keep a living body healthy. Mature ecosystems practice win/win economics. Dialogue about win/win economics for families, communities, nations and all nations together.

Mutual Assistance

The parts of a healthy living system do things for each other. In your body, all the organs constantly contribute to each other's welfare. Every cell looks out for itself and for its organ. Do all members of your family contribute as willingly to each other? What are your special contributions? In what ways is your community like a living system within itself and in what way is it like an organ in a larger body?

Non-discrimination

The parts of the system are honest and impartial with each other. In your body there is implicit recognition that every part is essential to the whole. There is no competition among parts about being better or more important, no argument if one part needs extra resources to heal or re-balance it. The parts do not look down on each other, nor do they deceive each other to get a bigger share of the resources of the body or other

favorable treatment. You can see from this that non-discrimination in a healthy society goes far beyond racial and religious tolerance. Explore these ideas.

Service Government

Healthy living systems have governments that operate in service to the whole. Cells are governed by their nucleus, bodies by the nervous system. Such natural governments are not authoritarian and do not enforce rules by threat of punishment. Rather, they seek information from all parts of the system, analyze what needs to be done, and give out the information and instructions enabling parts to assist each other. They are truly democratic governments, giving each part of the whole system's equal rights to resources and equal responsibilities of participation. Such governments seem to be the hardest thing for humans to create. What do you see as the obstacles to service government, in your family, community, and world? How would you propose to overcome them?

Balance of Interests

Each part of a healthy living system balances its self-interest with the interest of the whole. Every cell in your body, for example, looks out for itself, for its organ and for the whole body. Nothing in the body tries to make it decide between self-interest and community interest, so it pursues both. Are there conflicts in your family between your personal interests and the well-being of your family? In what ways are they resolved. How do we address the conflicts between humans and the other species?

Conservation

Healthy living systems conserve what works well. Your body does not change to the point where you would not recognize yourself. It conserves all its parts and their relationship to each other because they have been tried and tested by the creative process of evolution over a very long time and work well. What would you want to protect and conserve in your family? Your community? Your world?

Change

Healthy living systems explore and negotiate changes in whatever is not working well. How are such changes explored and negotiated in your family? Is there a process in your community for exploring change? How could you implement one? Human social systems have far more flexibility in changing their organizations than do our

bodies (which changed slowly over many, many generations). What changes do you see as needed in your family? Your community? Your world? Can you think of ways to work on them?

Contribution

A healthy living system has only quality output: all the matter, energy and information it puts out are useful to other living systems. No species other than humans create waste materials that cannot be used as food by some other species. All species recycle, while it is a new concept to us! Discuss the idea of eliminating the concept of "waste" altogether. Is it possible to recycle everything and become true consumers instead of wasters? What a fascinating challenge to figure out ways to do it! How has your family, your community begun this process?

Appendix 11

Human systems have some special features

Conscious Awareness: The system is consciously aware of other living systems around it and knows it depends on them for its own welfare. While still a baby, you began to learn of your dependence on family members. As you grew older you learned how your family depends on your community. Now, all of humanity is learning its dependence on the very ecosystems we are destroying. Are you aware of the bioregion in which you live? Is it a river valley, a mountain, a prairie, a coastal plain?
What was it like before humans and how did it change through waves of immigration? How much do you know about its carrying capacity----the limits for supporting humans and other species in healthy balance?

Ethics and Law: A healthy social system creates its own guidelines for behavior. Other species have innate knowledge of how to live their lives, but humans have a vast and unique freedom of choice. Ethics and law are the guidance systems we develop to limit our negative behavior and inspire our positive behavior. What is your family's ethical system? How would you set up an ethical system for world economics and commerce? What role would environmental considerations play?

Spirituality: Most of Humanity acknowledges, pays tribute to and is guided by spiritual concepts. Even a simple concept of the Oneness of all things seen and unseen inspires awe and reverence.

Appendix 12

These principles are given to the participants as a handout after they have worked with the principles in the context of a matching game or with the "piggy back" exercise. When they are used in activities each principle for an ecosystem and each principle for a learning community is printed on separate pages.

PRINCIPLES OF ECOLOGICAL SYSTEMS

PRINCIPLES OF LEARNING COMMUNITIES

As our century comes to a close and we go toward the beginning of a new millennium, the survival of humanity will depend on our ecological literacy, on our ability to understand these principles of ecology and live accordingly.

Fritjof Capra

The first eight principles are adapted from "Guide to Ecoliteracy" The Elmwood Institute, 1993, p.24-25. Edges, the ninth principle, is a concept that has been added.

Interdependence

All members of an ecosystem are interconnected in a web of relationships in which all life processes depend on one another. The success of each member depends upon to success of the system as a whole.

In a learning community all participants are inter-linked in a network of relationships that work together to facilitate learning.

Sustainability

The long-term survival (sustainability) of each species in an ecosystem depends on a limited resource base.

Building learning communities around the values of sustainability means that participants consider the long-term impact they have on one another and on both the created and the natural environment.

Ecological Cycles

The interdependence among members of an ecosystem involves the exchange of matter and energy in continuous cycles. These ecological cycles act as feedback loops.

The teaching does not flow from the top down, but there is a cyclical exchange of information. The focus is on learning and everyone in the system is both a teacher and a learner.

Energy Flow

Solar energy, transformed into chemical energy by the photosynthesis of green plants, drives all ecological cycles.

Learning communities are open systems where information, ideas, and wisdom are communicated through networking as people move in and out as they find their own niches in the system.

Partnership

All living members of an ecosystem are engaged in a subtle interplay of competition and cooperation, involving countless forms of partnership.

All members of the learning community develop individual competency as they cooperate and work with one another. Democracy and empowerment are possible because each part plays a crucial role.

Flexibility

In their function as feedback loops, ecological cycles have the tendency to maintain themselves in a flexible state, characterized by interdependent fluctuations of their variables.

In a learning community there is dynamic change and fluidity. New projects and themes challenge the community to recreate its environment.

Diversity

The stability of an ecosystem depends crucially on the degree of complexity of its network of relationships, in other words, on the diversity of the ecosystem.

Experiences that encourage participants to use multiple strategies for learning are essential. Cultural diversity is critical in establishing true community. Such diversity is appreciated for the richness it brings to the learning environment.

Co-Evolution

Most species in an ecosystem co-evolve through interplay of creation and mutual adaptation. The creative reaching out into novelty is a fundamental property of life. It manifests also in the processes of development and learning.

As business, governments, community groups, and schools work in partnership each better understands the needs of the other. In true, committed partnerships all participants change - they co-evolve.

Edges

When two ecosystems meet - as a forest and prairie - a border of rich diversity and fertility precipitates between them, a place of increased imagination. They create a verge of opportunity and peril.

When learning communities come together in cooperative projects there can be challenges to identity as well as opportunities for creativity and co-evolution.

Appendix 13

Understanding How Systems Work

There are seven functions that characterize all living systems:

1. **The Resource Base Function.** All Systems require a resource base to provide the necessary raw materials for survival.

2. **The Unity Function.** All systems must have an integrative force that unifies the system and holds it together.

3. **The Duality Function.** A basic duality principle in the universe is present in all living systems as an "explicit duality expressing a unity".

4. **The Maintenance Function.** All living systems must maintain themselves to insure the stability and continuity of the system. Also known as STABILITY POINT

5. **The Growth Function.** All systems must grow or die! Growth as in change, provides the creativity and direction to the system. Also known as CHAOS POINT

6. **The Feedback Function.** All living systems contain complex feed back loops which enable them to utilize the matter, energy and information for the purpose of balancing stability and growth.

7. **The Energy Function.** All living systems are powered by an external source of energy; solar energy for natural systems, information for cultural systems.

Each function is characterized by a fundamental ecological principle.

1. **Resource Base -** Sustainability/Carrying Capacity: Defines the limits required for a system to maintain itself indefinitely.

2. **Unity** - Interdependency: Defines the integrative relationship that exists between the parts of a system, illustrated by the community/niche relationship.

3. **Duality** - Partnership: Cooperation/Competition: Provides the dynamic tension and quality internal to all systems.

4. **Maintenance -** Diversity: Defines a fundamental requirement for the stability of all living systems.

5. **Growth -** Co-Evolution: Systems change through an interplay of creation and mutual adaptation resulting in novelty and, over time, in system transformation.

6. **Feedback** - Flexibility/ Fluctuating Cycles: In their function as feedback loops, ecological cycles are flexible and fluctuating thus allowing tolerances between system maintenance and growth.

7. **Energy Flow** - Energy Flow: Describes the entropic nature of all systems.

Appendix 14

Some Suggestions On The Nature Of Dialogue

Dialogue starts from willingness to be tentative about what you know.

The focus of dialogue is on “what is” rather than on ideas and opinions.

Dialogue is letting the issue unfold in affection and mutual respect.

When a reaction arises, neither suppress it nor defend it, but stay with it and let it unfold in the mind and in the group, keeping it constantly available for observation and questioning.

Dialogue is “being together” and “seeing together” in an unfolding relationship.

Dialogue is not "agreeing or disagreeing" nor is it convincing or arguing.

Dialogue Process

Dialogue is a way to create a new culture of meaning. It involves new habits of being with a group, and of being with yourself.

The purpose of dialogue is to pursue collective learning and shared meaning.

A dialogue can be leaderless.

Below are some principles to be considered when engaging in dialogue. It is important to realize that all these principles, though listed separately, are simultaneously interactive parts of the whole.

1. Commitment
Commitment to the process from beginning to end is essential.

2. Listening and speaking without judgment
Withhold agreement and disagreement with a point of view. Withhold your own ideas until you have listened carefully and mindfully to the others with the intent of learning something new from them.

- **If resistance arises, observe its effect and engage it.** Thoughts associated with resistance have a certain quality and registration on the body. Observe these thoughts arise and pass away.

- **Observe your own thoughts and reactions.** Notice how other´s thoughts and ideas affect your own thoughts and how your reactions/responses register in your mind and body.

- **Observe your ideas and motivations as they form.** As an idea or feeling that you want to share emerges, notice how it forms, why you may want to say it, and how you feel after you have said it.

3. Identify your own and others' assumptions.
See if you can determine beliefs or assumptions (yours and others) upon which behavior is predicated.

4. Acknowledge the speaker
P A U S E to appreciate and reflect what the other person says. Reflect upon what they say before you think about your own perspective.

5. Respect each person and value them and their opinions
Respect and value the differences in people and opinions that emerge within the group.

6. Balance inquiry and advocacy
Interchanges usually involve advocacy of our own ideas. In a dialogue, continuous inquiry into the ideas of others for the purpose of learning is as important as putting forth your own ideas. It is important to really listen to others.

7. Release needs for specific outcomes
When you look for outcomes, you see everything in the context of what you are looking for. You may not be able to see other important things that are happening outside the context of the outcomes you hold.

8. Speak when moved
Speak when moved by a deeper meaning that comes out of silence from within, not as a "*reaction"* to something else that has been said. This "*movement* " comes from something that is deeper and generative. To do this, proficiency at listening to oneself is needed ...something more in yourself wants to come forth. Often this comes from holding the whole and its parts simultaneously. ***Response replaces reaction.***

9. **Go easy on yourself.**
These practices are unfamiliar to many of us. Try to be patient with yourself and others as we learn.

Appendix 15

Principles excerpted from Making Connections by Renate and Geoffrey Caine:

- **Body, mind and brain are a dynamic unity.**

Although it is appropriate to separate body, mind and brain for some purposes, there is a level at which they work together as a dynamic unity. Thoughts, emotions, imagination, predisposition and physiology operate concurrently and interactively as the entire system interacts with and exchanges information with its environment.

- **The brain is a social brain.**

It is now clear that throughout our lives, our brain/minds change in response to their engagement with others - so much so that individuals must always be seen to be integral parts of larger social systems. Indeed, part of our identity depends on establishing community and finding ways to belong. Learning, therefore, is profoundly influenced by the nature of the social relationships within which people find themselves.

- **The search for meaning is innate.**

In general terms the search for meaning refers to making sense of our experiences. This is survival oriented and basic to the human brain/mind. While the ways in which we make sense of our experiences change over time, the central drive to find meaning is life long. Included are such basic questions as “who am I?” and "why am I here?" Thus the search for meaning ranges from the need to eat and find safety, through the development of relationships and a sense of identity, to an exploration of our potential and the quest for transcendence.

- **The search for meaning occurs through “patterning”.**

The brain/mind needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli. In a way, therefore, the brain/mind is both

scientist and artist, attempting to discern and understand patterns as they occur and giving expression to unique and creative patterns of its own. It resists having meaninglessness imposed on it. By meaninglessness we mean isolated pieces of information unrelated to what makes sense to a particular learner.

- **Emotions are critical to patterning.**

What we learn is influenced and organized by emotions and mind-sets involving expectancy, personal biases and prejudices, self-esteem and the need for social interaction. Emotions and thought literally shape each other and cannot be separated. Moreover, the emotional impact of any lesson or life experience may continue to reverberate long after the specific event that triggers it.

- **Every brain simultaneously perceives and creates parts and wholes.**

Although there is some truth to the "left-brain right-brain" distinction, that is not the whole story. In a healthy person, both hemispheres interact in every activity, from art and computing to sales and accounting. The "two brain" doctrine is most useful for reminding us that the brain reduces information into parts and perceives holistically at the same time.

- **Learning involves both focused attention and peripheral perception.**

The brain absorbs information of which it is directly aware, but it also directly absorbs information that lies beyond the immediate focus of attention. It responds to the entire sensory context in which teaching and communication occur. These "peripheral signals" are extremely potent. Even the unconscious signals that reveal our own inner attitudes and beliefs have a powerful impact.

- **Learning involves conscious and unconscious processes.**

One aspect of consciousness is awareness. Much of our learning is unconscious in that experience and sensory input is processed below the level of awareness. That means that much understanding may not occur during the immediate event but may occur hours, weeks or months later. In practice this includes proper design of the context, the incorporation of reflection and metacognitive activities and ways to help learners creatively elaborate on the ideas, skill and experiences.

- **We have at least two ways of organizing memory.**

We have a set of systems for recalling unrelated information that is referred to as a taxon system. This system is heavily used in many formal educational settings. We also have a spatial/autographical memory that does not need rehearsal and allows for "instant" recall of experiences.

This is the system that registers the details of your meal last night. It is always engaged, is inexhaustible and is motivated by novelty.

- **Learning is developmental.**

Much of our learning is shaped by experiences. Our brain structure itself can be molded by our environment. There are predetermined sequences of development in childhood. There are opportunities for laying down the paths of learning for later in life. In many respects these is no limit to growth and to the capacities of humans to learn more. Neurons continue to be capable of making new connections thoughout life.

- **Complex learning is enhanced by challenge and inhibited by threat.**

The brain/mind learns optimally- it makes maximum connections-when appropriately challenged in an environment, which encourages taking risks. However, the brain/mind "downshifts" under perceived threat. It then becomes less flexible and reverts to

primitive attitudes and procedures. That is why we must create and maintain an atmosphere of relaxed alertness, involving low threat and high challenge. Threat creates a feeling of helplessness or fatigue. Occasional stress and anxiety may be involved when genuine learning involves a deep change in perspective.

- **Each brain is uniquely organized.**

We all have the same set of systems and yet are all different. Some of this difference is a consequence of our genetic endowment. Some of it is a consequence of differing experiences and differing environments. The differences express themselves in terms of learning and intelligence styles. An important corollary is both to appreciate that learners are different and need choice, while ensuring that they are exposed to a multiplicity of inputs.

Appendix 16
Getting Acquainted with Chaos

CHAOS IS EVOLVING FROM A SCIENTIFIC THEORY INTO A NEW CULTURAL METAPHOR. AS A METAPHOR, CHAOS ALLOWS US TO QUERY SOME OF OUR MOST CHERISHED ASSUMPTIONS AND ENCOURAGES US TO ASK FRESH QUESTIONS ABOUT REALITY (BRIGGS AND PEAT 1998, 6).

THE SCIENTIFIC TERM "CHAOS" REFERS TO AN UNDERLYING INTERCONNECTEDNESS THAT EXISTS IN APPARENTLY RANDOM EFFECTS. CHAOS SCIENCE FOCUSES ON HIDDEN PATTERNS, NUANCE, THE "SENSITIVITY" OF THINGS, AND THE "RULES" FOR HOW THE UNPREDICTABLE LEADS TO THE NEW. IT IS AN ATTEMPT TO UNDERSTAND THE MOVEMENTS THAT CREATE THUNDERSTORMS, RAGING RIVERS, HURRICANES, JAGGED PEAKS, GNARLED COASTLINES, AND COMPLEX PATTERNS OF ALL SORTS, FROM RIVER DELTAS TO THE NERVES AND BLOOD VESSELS IN OUR BODIES (1998, 2).

IN ANCIENT MYTHS THROUGHOUT HISTORY, CHAOS IS CENTRAL TO THE CREATION OF THE UNIVERSE. I EGYPTIAN COSMOLOGY, THE SUN GOD, RA, AROSE FROM THE CHAOTIC WASTE OF FLOOD WATERS CALLED NUN, WHILE IN A CHINESE CREATION STORY LIGHT JUMPS OUT OF CHAOS TO BUILD THE SKY. ACCORDING TO THE GREEK PHILOSOPHER HESIOD "FIRST OF ALL THINGS WAS CHAOS." (1998, 9).

TO THE ANCIENT GREEKS ORDER AND CHAOS WERE MIRROR IMAGES OF ONE ANOTHER. THEIR GODDESS GAIA WAS THE MOTHER EARTH WHO BROUGHT FORTH STABILITY. CHAOS WAS THE CREATIVE POWER OF DISORDER. THEY WERE TWO IN THE PRIMORDIAL DUET OF OPPOSITION AND RESONANCE, CREATING EVERYTHING WE KNOW (WHEATLEY 1994, 121).

Appendix 17