Transdisciplinary-based education for sustainability leaders: Learning while Doing

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Introduction

This paper considers how transdisciplinary approaches to leadership development can help address the challenges that sustainability poses for informed community debate and problem-solving. It also suggests a new framework for leadership development, in contrast to the traditional framework that largely dominates public and private undertakings in most societies today. The perspectives for sustainability leadership education developed here are based on research conducted in organizational and community settings supplemented with topical references to leadership, communication and complexity, with current global and local challenges as the backdrop. Together, these perspectives provide a basis for understanding the complex interrelationship among human interaction, meaning-making and behavioral choices that constitute sensible and innovative leadership for sustainability.

Among the key themes of this paper, we emphasize the following:

- The mental frameworks, attitudes, assumptions, communication and problem-solving practices prevalent today increasingly hamper our ability to approach sustainability--as a representative term for today's interrelated complex environmental, economic and social challenges--as a strategic ideal or basis for life in the future.

- Current and emerging global and local challenges make it difficult for us, as modern citizens, to embrace "sustainability" and "leadership" in conventional terms. Thus, we need to determine what these terms mean for each of us in our particular circumstances.

- Re-thinking perspectives on communication and complexity can contribute to educational approaches to sustainability and leadership that support new behaviors for solving complex problems.

Modern Dilemma

Global society experiences a modern "dilemma," that endangers our ability to move forward into a sustainable future. Dilemmas, of course, are difficult and perplexing problems provoking often contradictory or unsatisfying solutions. Citizens everywhere can likely identify with many perplexing issues facing humanity today--both locally and globally--that include:

- increasingly complex conflicts that appear to resist conventional solutions
- the contradiction of living in a world dominated by science and technology, areas in which few of us are experts or even knowledgeable
- the proliferation of knowledge and expertise beyond our individual ability to understand coherently
- unequal access to knowledge and technology among people and nations (thereby contributing to

the ever-widening gaps in understanding)
- an increasingly impoverished inner identity among humans raising the risk of "spiritual and material self-destruction of the human species" (de Freitas, Morin and Nicolescu 1994)

Specific challenges range from threats of global financial crisis; widespread unrest; climate change; declining natural resources needed to sustain the growing world population; hunger and poverty; unemployment; degradation of human rights and justice; education; conflicting ideologies that inhibit sustainable social and economic development. We can all add to the list.

Let me briefly illustrate how my own community reflects our modern dilemma. Living in one of the world's great agricultural regions--the US Midwest, the location of 60 percent of the world's arable land--the challenges of sustainable food production surround us.

Agriculture has been the region's economic base since settlers arrived nearly 200 years ago. In fact, settlements often originated on the most fertile ground to be found--land since lost to urbanization to accommodate population growth. Besides farming, the region is host to university agricultural research programs, food processing, seed, herbicide, pesticide and fertilizer industries as well as other supporting enterprises.

Industrial-scale agriculture brought enormous changes to food production. From 1950 to 2000, US farms more than doubled production. Yet many of the practices that arose from farm industrialization tend to negatively impact the land, surrounding ecosystems and thus human participation upon which sustained agriculture depends. From this, we recognize many interrelated dilemmas:

- Addressing the negative impact of costly energy-inefficient and soil-degrading industrial practices that have also expanded food production

- Replenishing scarce groundwater supplies tapped to increase production, at the same time preparing for possible climate change effects

- Perpetuating unsustainable yet traditional farming practices and the family networks that pursue them

Given that the often interdependent challenges humanity faces appear too large in scope and too complex in nature for the average lay person to comprehend, it is easy to feel helpless. We wonder, "How can I help address conditions in my community and region, much less the world?" even as we try to educate ourselves. At the same time, the relevant knowledge needed to fully understand a complex issue is vast, requiring more time to understand the causes and implications for action than most can give. Further, we have learned to distrust public information given evidence of embellished claims including distortions, bias, deletions and generalizations.

As a result, we tend to rely on experts and policy-makers to guide us in problem-solving. Perhaps we hope that some sort of agreed-upon "truth" will influence policy-makers and everyday citizens toward logical courses of action. Yet cognitive science tells us that people, presumably including experts as well as ourselves, tend to develop conclusions from information filtered through their "understood" views of reality. Even the most rigorous scientific methods designed to eliminate bias are subject to human error resulting from unnoticed information that lies outside of a theoretical frame of reference.

Even those among us who are committed to study and develop approaches for initiating change aimed toward sustaining life inadvertently perpetuate the status quo by participating in the dominant paradigm of thought and leadership thought necessary to function in today's society.

The accelerated pace of turbulence and disruption around the globe makes conditions ripe for a conceptual shift in understanding, perspectives and actions--a paradigmatic shift perhaps greater than has occurred before. The most challenging, exciting and profound questions facing science and society lie at the boundaries between and across traditional disciplines. To this, we respond: *We cannot effectively approach sustainability as a strategic ideal or a way of life using the mental frameworks, attitudes, assumptions, communication and problem-solving practices prevalent today. Perspectives informed by the tenets of transdisciplinarity provide the ground for sustainability leadership education.*

Transdisciplinary Perspectives

Two distinct, integrally related perspectives shed light on the modern dilemma and possible behaviors suitable to constructive responses. A *communication perspective* yields insights into processes by which human beings generate and understand meaning leading to decisions and action, consciously or not. A *complexity perspective*, informed by metaphors derived from the complexity sciences, supports an evolved understanding about how complex living systems function. Each perspective crosses disciplinary boundaries to create a holistic approach for understanding and responding to challenges that holds promise for transformative action.

Communication perspective

The field of communication studies is often considered a part of both the social sciences and the humanities, drawing on and contributing to fields including sociology, psychology, economics and business, as well as linguistics, general semantics and epistemology. Communication studies also inform and are informed by fields outside the social sciences and humanities including complexity science, biology, and mathematics.

Consider the simplest view of communication: the act of conveying meaning from one person or group to another through a particular messaging channel, as illustrated below.

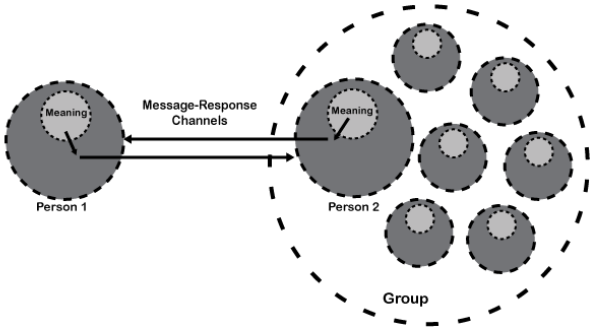

Figure 1.Simple communication.

Person one might be an agricultural scientist; *person two* might be a farmer who is part of a farmers' association. The meaning conveyed might be, "Current farming practices compromise fertile land." Speaking represents the messaging channel. The response might be, "Perhaps; however, I have a right to make a living on my land using the methods I think work best." The agricultural scientist may

continue his presentation, aware of resistance from the farmer. He distributes written material, a second messaging channel, which summarizes the points in his presentation.

Information is communicated through the obvious modes of speaking, listening and responding as well as the channels of writing and reading, in which the reader may respond to the message internally, in conversation with others, or in writing. Whether spoken or written, nuanced elements of the messaging transaction communicate meaning as well as the words used. For example, a spoken message includes speaking style reflected in voice tone, pitch, pace, volume and energy; body expression revealed through posture, eye movement and focus, breathing, energy, gestures/movement, and apparel worn by the speaker. Qualities of listening, questioning, and responding also contribute to the information available for interpretation of meaning by others in a spoken message context. A written message carries similar elements for meaning interpretation ranging from tone, quality and perspective of writing, the paper it is written on, to the method of distribution to the reader.

Imagine this simplified view of communication multiplied exponentially when we see the "simple" process on multiple levels for any human being in the context of each interaction. For example, one constantly communicates intrapersonally (internally) as a matter of course. One also communicates interpersonally. People communicate within groups of which they are perceived members (intragroup), such as families or work teams. They also communicate between groups (intergroup), for example labor and management negotiations or collaboration between an innovation design center and a manufacturer to advance group objectives.

A look at the simple communication scenario above might better be represented in the diagram below. The dark line between the two small circles can represent the exchange between person one and person two. Their interaction assumes intrapersonal communication for each of them, interpersonal communication between the two as well as intragroup communication occurring verbally and nonverbally even among those not speaking. It also assumes communication with others outside of the immediate group present at the meeting. Each individual has a history informing his or her worldview and current perspectives as well as an unspoken anticipation of an unknowable future--either the next moment or well beyond. Each interacts through one or another of a myriad of "channels" with others who are examining questions related to "sustainable farming practices."

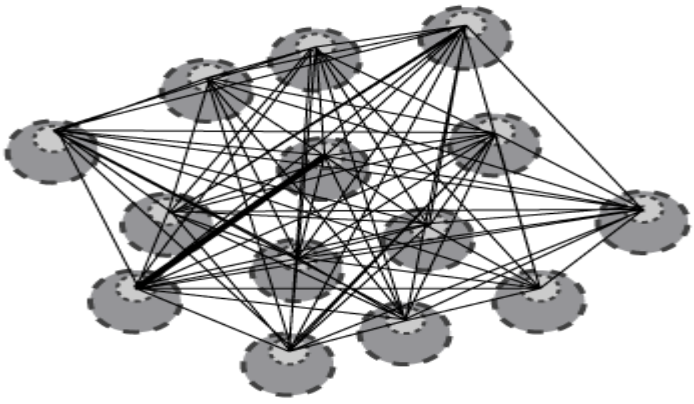

Figure 2. Complex communication.

This and other more realistic models of communication reveal the meaning-making phenomenon in the ubiquitous processes of living and working with other human beings. Through our actions and

interactions we create societies, governments, theories about how the world works, strategic plans, products, services, wealth, poverty and other problems as well as solutions to problems. These interactions are unfolding, messy and inconclusive as new patterns of thinking and behavior slowly emerge.

Complexity perspective

The multi-layered simultaneous processes of human communication in whatever form can perhaps best be understood from the perspective of complexity science.

Complexity science spans disciplines in the physical, natural and social sciences. It has helped bridge quantitative and qualitative explanations of life. The transdisciplinary complexity dialogue has included respected organizational theorists and scientists, as well as poets and theologians drawn to its implicit optimism. By examining life phenomena from a complexity perspective, we can increase our understanding of ourselves, our thinking and our actions *in relation to* the world around us. Understanding the dynamics of robust complex adaptive systems in nature provides a new way of understanding individual and collective human behavior.

While the questions complexity science raises are not new, traditional responses often appeared illogical or at least idiosyncratic when viewed in traditional frameworks. Its language, conceptual frameworks and metaphors help resolve idiosyncrasies around us. However for some, its perspective describing how systems actually behave rather than how they should behave is counter-intuitive and unappealing. It contrasts with traditional thinking about how organizations and leaders should manage (control) processes and outcomes.

Nonetheless, complexity science provides rigorous models for studying key dimensions of leadership and change in organizations and communities. It offers characteristics of healthy, complex systems including anomalies and paradox, dynamic nonlinearity, holographic fractals, diversity, interdependency, behavioral patterning, mathematical chaos, autopoesis, unpredictable and self-organizing emergence over which attempts to control have little influence. Each of these characteristics has relevance for framing a new view of sustainability leadership. For example, a new understanding of how people behave in complex self-organizing networks prompts leadership questions such as:

- How does change occur and evolve?
- What are conditions for creativity and innovation to thrive?
- What conditions contribute to continuing patterns of behavior that are no longer useful?
- What conditions contribute to adaptability and resilience in responses?
- What does the act of leading mean in a network of people where outcomes unfold within a relational power dynamic in which there is no direct control?
- How does one plan strategically in an unpredictable environment?

Traditional management practices tend to focus on predictable, controllable, quantifiably measurable dimensions of strategic management and change. These provide only a partial explanation of human organizing processes. An understanding of complexity invites us to examine the unpredictable, disorderly and unstable aspects of self-organizing activities to optimize potentiality (Stacey, 2010).

Communication processes themselves are examples of complexity processes, just as complex adaptive systems--living or inanimate--require a dynamic “exchange” of information. For example, information

is exchanged in genetic interaction among subatomic particles in a cancer cell, not altogether unlike information exchanged in a colony of ants or in a complex multinational corporation. Understanding the integral relationship of communication and complexity perspectives yields a new mental frame of reference from which to practice sustainability leadership. One can visualize an enlightened view of communication as a complex network of human interaction among scientists, scholars and practitioners at a transdisciplinary summit hosted by Leuphana University as illustrated below.

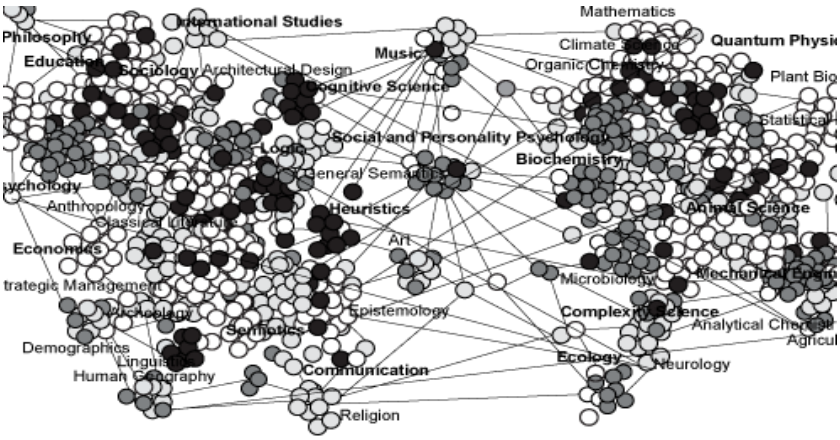

Figure 3. Complex transdisciplinary communication.

The combined perspectives of communication and complexity can shed new light on the Modern Dilemma. We can begin to understand how the challenges we face have evolved over time, how we are influenced consciously and subconsciously by long-standing, dominant patterns of thinking and behaving that perpetuate the status quo. We tend to cling to whatever makes us feel certain, including antiquated belief systems that no longer hold up under scrutiny. Communication and complexity perspectives introduce a note of optimism, a belief in potential possibilities, the recognition that each of us is an integral part of an interdependent whole and that our individual interests are encompassed in the collective interests of humanity today and in the future.

“New” Leadership Behaviors

Engaging with the natural processes of change represents a shift from thinking in the dominant leadership and management literature that tends to focus on practices for affecting change as if one were outside the phenomenon itself. New-thinking leaders operate within the natural processes of evolution and change. They seek to understand the emerging patterns of change in their internal and external environments while recognizing the experience of change at individual, organizational and societal levels. The cyclical rhythms of change can be described thus: flow (Csikszentmihalyi 1997), staccato (perturbations), chaos (turbulence), lyric (an emerging sense of order), and finally stillness in the discovery of meaning, purpose and potential (Moore 2002). This cycle, described in linear order, occurs in nonlinear patterns subject to unlimited variables continually moving from one perturbation to the next. Some disruptions are small, for example a schedule delay. Others are enormous, for example, converging science that insists on a radical new view of the global climate paradigm. An understanding of the natural processes of change suggests a different way of thinking about, and responding to, the widely-assumed notions of “planned change,” “strategic management” and “resistance to change” common in the dominant understanding of leadership and change.

The combined communication and complexity perspectives outlined above support a “new” leadership orientation leading to “new” every day behaviors. The notion of leadership itself shifts from the dominant view which assumes that particular individuals, whether elected, appointed, hired, or emerging from within a group, carry the designated responsibility of leading, and otherwise “helping” others to take action to support a “shared” vision or set of goals. Instead, living phenomena viewed through the lens of complexity science reveal that leaders' assumed direct or even indirect control is an unsustainable illusion.

Recalling the characteristics of complex adaptive networks of interaction above, we cannot describe the phenomenon of leadership from a dualistic either/or point of view, for example, “a leader is either ‘in control’ or is not.” The question to be examined every day by a new-thinking leader is: “How do I manage myself, in the role to which I’ve been assigned, to create an authentic context for self-organizing leadership to emerge among the people around me?” As we explore the control paradox of leadership, we recognize the value of the traditional leadership practices of goal-setting and accountability from a new-thinking perspective. Traditional leaders are now compelled to reexamine old assumptions and world views, just as new leaders emerging today (and those who educate them) are grappling with the juxtaposition of traditional and emerging paradigms for understanding and engaging with modern challenges. Many leaders steeped in the old paradigm require courage and conscious practice to let go of the inherent presumption of certainty and control in its many forms ranging from clever influence and manipulation to coercion and force.

The behaviors described here are both ancient and new, from the standpoint of rethinking and recombining transdisciplinary perspectives informing effective leadership practice. We have no doubt experienced and observed these behaviors to varying degrees. However, we may be unaccustomed to practicing them as we attempt to navigate today’s increasingly complex challenges and the profusion of relevant new information, often relying on so-called “experts” to think for us.

Self-observation, self-reflection, self-management

The study of multi-ordinal structures and self-reflexivity introduced by Korzybski (1959), informs a simple structure for visualizing the leadership practice of observing and managing oneself in action.

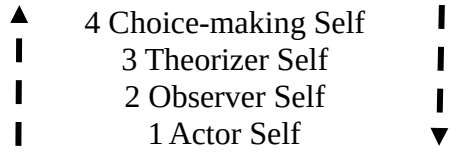

Figure 4. Multi-ordinal selves.

Becoming skilled in 1) the art of observing oneself in the context of one’s behaviors within current dynamics can lead to 2) observation and reflection of what just occurred leading to 3) a “theory” of what was/may have been conveyed (conscious and unconsciously) compared to what was desired, thereby 4) informing choices (adaptations/corrections) for future interaction in order to achieve intended results. While most conscious people engage in reflexive thinking and behaving quite naturally, specific attention to self-management in life’s interactions can contribute to more meaningful relationships intended to achieve mutually desired outcomes.
Reflection on one’s own cognitive biases, ideology, personal values, preferred patterns of cognition and emotion, as well as elements of authenticity, ethical action and self-interest (sometimes at the expense

of, or in the manipulation of, others) influence one's ability to manage personal behaviors. Each aspect of self forms the bases for internal conversation in assuming responsibility for leading change, beginning with oneself, and then with others in moving toward a sustainable society.

Navigating complexity

Navigating complexity, that is, functioning effectively within the nonlinear, dynamic, relatively unpredictable characteristics of today's world and the organizations of which we are a part becomes possible when we understand the implications of complexity science in our everyday lives. Our behaviors, personal and organizational, become a series of experiments calling on our best intuitive guesswork and calculated risk-taking approaches. Experiments test "hypotheses." For example, the agricultural scientist in the simple communication scenario above may have hypothesized as he constructed his presentation that, given his farming background in the region of farmers to whom he was speaking, they may respond best, like he, to a direct approach. To that end, he spoke frankly, describing the long term effects of current farming practices, as well as immediate harm impacting ground water, needed biodiversity in wetlands, and soil erosion. Traditional strategic planning approaches can be similarly adapted to both short and long term uncertainly in the marketplace by structuring intentional frameworks of internal functions and developing experimental actions and progress indicators that can be easily adjusted as emerging circumstances dictate.

Holistic thinking

While the term "holistic thinking" is not new, the practice of thinking holistically can be broadly expanded to include mapping the relational interconnections and interdependencies of current actions on one another and the long and short term impacts on economic, social and environmental sustainability. Similarly, recognizing and mapping the relationship of dynamic systems within systems, including the individual and organizational patterns of deeply entrenched behaviors grounded in traditional assumptions of what works can not only make current behaviors more visible, but also reveal possibilities for creating new patterns that better serve the goals of an organization. Sound approaches for questioning assumptions and interrupting patterns with new ideas for experimental actions leading to successive approximations to desired, measurable outcomes are examples of ways in which holistic thinking is critical for new-thinking leaders.

Embracing conflict

Conflicts, large and small, are a natural phenomenon of healthy relationships between people, organizations, communities and nations. While dominant worldviews, informed by traditional patterns of self-interested competition for control motivated by profit, ideological beliefs, theoretical perspectives, and public attention are embedded in current behaviors among "leaders" of organizations, communities and nations, an emerging point of view informed by complexity and communication perspectives can result in new ways of understanding conflict leading to more constructive ways of engaging with conflict. Using a metaphor from the complexity sciences, conflict creates the "heat" needed for a radical shift in seeing the world, not unlike Prigogine's experiments in chemistry that yielded a new structure of molecular composition. Leadership practices intended to hold the heat, the messiness of differing points of view, in an interactive exchange designed to explore and learn from differences can result in new perspectives resulting in new innovative solutions not previously thought possible. The long-held practice of ignoring conflict, resulting in simmering discontent and eventual forms of aggressive behavior, can be replaced with practices that openly acknowledge conflict in ways

that suggest mutually desirable outcomes that address underlying experiences and concerns of parties involved. Leaders who recognize the potential frame-breaking value of understood conflict can create a context for bringing together diverse-thinking people for such exploration and resolution.

Communication practices

While broadly understood communication informed by complexity sciences is a perspective underlying the leadership behaviors outlined in this paper, there are specific communication processes that new-thinking leaders can practice. One example is to convene an exploratory conversation. The Sustainability Leadership Institute uses "exploratory conversations" as a general term to include a broad range of interactive approaches including "dialogue," "deliberation," "discussion" and "debate." While each practice is described by scholars according to particular characteristics that distinguish it from other forms of interaction, all focus on new approaches to problem-solving.

On the process level, participants have the opportunity to practice self- and group-dynamic awareness as they expand their capacity for interacting with others meaningfully, deliberately and transformatively. Instead of behaviors such as speaking past one another, groupthink, self-promotion, or avoidance of questions about assumptions, leaders learn to experience themselves as a self-organizing relational leadership collective in action. They practice jointly identifying their intentions, objectives and rules of engagement. They practice observing themselves in the interactive process, making adjustments as needed to get to an open, authentic exchange. They practice experiencing the uneasiness of grappling with conflicting viewpoints, opting to speak openly and maintaining an openness to challenge.

On a content level, participants have the opportunity to expand their understanding of issues and challenges at hand. They stretch their thinking about what they know given their personal biases and understandings, seeking to include perspectives of others in the interaction.

Relational power dynamics

Concepts of power, "the ability of one person or group to influence the behaviors and/or attitudes of others," and the bases power sources (i.e. positional, personal, expert, referent, coercive, etc.) described in the dominant leadership and management literature, are better understood within the context of communication and complexity perspectives as a relational dynamic. Power-relating is understood as a feature of the naturally occurring complex responsive dynamic of people interacting with one another in their everyday experiences (Elias and Scotson 1994).

New-thinking leaders focus less on "using" his or her power to gain and hold influence and control over others. Instead, a leader practices noticing perceived power in the space of relating with another in an effort to make sense of, and participate wisely in, the immediate interaction. He practices conscious awareness of his experience of himself in relation to others, and takes personal responsibility for co-creating the unfolding dynamic, whatever forms it takes. She practices recognizing the legitimacy and autonomy of others, and choosing the most prudent, ethical and responsible ways to participate, without knowing ahead of time--or being able to control or influence directly--what the outcomes will be (Stacey 2010).

Relational initiatives

Traditional strategic action and problem-solving approaches are also viewed within a relational dynamic encompassing the practices of discovery, invention, experimentation, reflection and adaptation. Rather than a linear sequence, the practices of relational initiatives are simultaneous, random, interrelated loops of ongoing learning, adaptation and action.

Discovery
Discovery includes gathering and evaluating relevant information. This may involve inviting reliable experts into the process of understanding elements of a problem as well as the stakeholders impacting, or impacted by, the problem. Inherent in the practice of discovery is the practice of identifying and challenging individual and societal assumptions related to the problem with special attention given to probing hidden assumptions, for example assumptions about effective agricultural practices. Discovery focuses on asking open and probing questions, and framing questions that invite exploration outside of conventional ways of thinking. Discovery includes mapping the holistic interconnections that relate particular challenges to other challenges impacting, and impacted by, the particular exploration at hand. Critical thinking is central to the discovery process (Campbell and Schultz 2008).

Invention
Invention draws on the creative thinking capabilities of thoughtful, energized people answering the question, ”What is possible?” or “What is seemingly impossible that might work?” Leaders explore anti-conventional thinking that may lead to anti-conventional solutions. They draw on new logic and practice heuristic problem-solving techniques, perhaps beginning with the question, “Where have we seen a similar challenge and how was it resolved?” The practices of creativity and innovation take many forms resulting in variously plausible solutions to consider, analyze, prioritize and test through experimentation.

Experimentation
Experimentation includes rethinking decision-making processes for implementing trial actions to resolve related challenges. Again, the perspectives of complexity and communication form the bases for this practice. While action is clearly called for, decisions for how to proceed are viewed as provisional. Instead of seeing actions as concrete steps toward “the” solution with targeted, measureable outcomes that are either achieved or not, implying a rational, linear sequence from planning to action to resolution, the notion of experimental action follows a different logic. Plausible reasoning generates actions that are simultaneously concrete and dynamic. Once a decision is made and resources committed, well-studied and committed steps are taken to manifest the action according to clearly understood objectives and goals, with indicators of progress identified and monitored. However, rather than presupposing that the action is a failure if desired progress indicators fall short, the presumption is that the action may or may not be the best way to proceed while learning occurred in the process. The decision to act is made in the context of “what we think now” informed by a forecast of future circumstances. Given the accelerated changes occurring in today’s internal and external environments, new-thinking leaders presume adjustments, mid-course corrections, and potential changes in direction as implementation evolves. The goal, instead of certain outcomes, is characterized as successive approximations toward desired outcomes.

Reflection and adaptation
Reflection and adaptation occur throughout discovery, invention and experimentation. Reflection on the original intent compared with measured progress indicators, formulated during discovery and invention, and established more concretely during the action experimentation stage, provide leaders (as in everyone involved) with information upon which to determine appropriate adaptations to the

experimental actions enacted. Tools to aid in this practice can range from the simple to the highly sophisticated depending on resources and the relative complexity of challenges and action initiatives.

Conclusion

Sustainability poses enormous challenges to our ability--at the individual, community, national and global levels--to engage in meaningful private and public conversations that can form the basis for complex problem-solving. It also illustrates the limitations of conventional approaches to leadership. Given the increasingly complex issues underlying the sustainability debate, transdisciplinary thinking holds great potential for overcoming the compartmentalizing barriers that impede forward movement. The Modern Dilemma calls on us to understand "sustainability" as a fundamental sensibility and a participatory leadership paradigm that can move us to conserve and protect what we deem essential for life today and in the future.

For this, transdisciplinary perspectives of communication and complexity can help foster important new approaches to leadership development.

Notes:
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