Systems thinking and learning for sustainability – Stephen Sterling

1900 words

> *When we limit ourselves to fragmented approaches to dealing with systemic problems, it is not surprising that our solutions prove inadequate. If our species is to survive the predicaments we have created for ourselves, we must develop a capacity for whole-systems thought and action.*
> (David Korten 1995, 11)

This paper argues that a fundamental barrier to advancing sustainability is a mismatch between the fragmentary way in which we predominantly think and the highly connected or *systemic* world that we live in - and therefore, that the 'sustainability transition' depends on our developing the capacity to think, learn and act much more integratively than at present. Sustainability implies not only the urgent need for systemic awareness and understanding, but also systemic wisdom.

A change of mind

The postmodern world is marked by rapid economic, social and environmental change characterised by complexity, uncertainty, and urgent questions of long-term sustainability of current forms of social and economic organisation. These critical and fluid conditions require thinking and learning which is more holistic, dynamic, flexible and integrative in character. This is often referred to as 'systems thinking' and new interest in this approach reflects a growing awareness that a fundamentally interdependent and systemic world cannot be adequately understood and managed without a more systemic way of thinking. People are realising that old ways of working are insufficient. There is a growing emphasis on integrated and adaptive management, 'joined-up thinking', interdisciplinarity and participative approaches – all of which challenge education to respond integratively and imaginatively.

To move towards such thinking, it is necessary to recognise the nature, powerful influence, and limits of our 'thinking heritage'. This is predominantly reductionist, objectivist and linear, and is deeply embedded in Western culture. So for example, the writer Mary Catherine Bateson (2000, xiv) suggests fragmented thinking is evident:

> "in every newspaper or newscast; the search for short-term solutions that worsen the problem over time; the focus on individual persons or organisms or even species seen in isolation; the tendency to let technological possibility or economic indicators replace reflection…"

By contrast, sustainability requires an integrative and expanded awareness, which considers the relationships for example between present and future generations, between economy, society, and ecology and between local and global scales. Thus advancing sustainability is both difficult and exciting because it requires us to see the world differently – a change of mind, from a largely fragmentary and dissociative view and towards an holistic and systemic view. Shifting our focus and attention from things to process, from static states to dynamics, from 'parts' to 'wholes', is the fundamental challenge, and this is why systems approaches - which bring a set of ideas, tools, and

values - appear so relevant.

The nature and significance of systems thinking

Peter Senge, an influential systems writer particularly in the context of the 'learning organisation' states:

> Systems thinking is a context for seeing wholes. It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots". It is a set of general principles distilled over the course of the twentieth century...It is also a set of specific tools and techniques ...And systems thinking is a sensibility - for the subtle interconnectedness that gives living systems their unique character.
>
> Today, systems thinking is needed more than ever because we are becoming overwhelmed by complexity...All around us are examples of "systemic breakdowns" ....by seeing wholes we learn how to foster health.'
> (Senge, 1990)

In essence, systems thinking is relational thinking. Edward De Bono puts it simply by suggesting the dominant question of inquiry changes from 'what is this?' to 'what does this lead to?' or 'what does this add up to?' (De Bono 1993, 9). . Systems thinking argues that 'valid knowledge and meaningful understanding comes from building up whole pictures of phenomenon, not by breaking them into parts' (Flood 2001, 133). So systems thinking addresses complexity by increasing the level of overview, rather than the conventional reductionist route of examining detail and dividing issues into smaller unrelated parts. Fritjof Capra suggests that it marks a shift of attention from 'parts' to 'wholes', from structure to process, and that it is concerned with ~~concerned with~~ relationship, pattern and context.

> 'To understand things systemically literally means to put them into a context, to establish the nature of their relationships'. (Capra 1996, 27)

For this reason, some commentators equate 'systems thinking' and 'ecological thinking', the latter not just denoting concern with natural systems but with all process and relationship. Other descriptors commonly used are 'holistic', 'integrative', and 'epistemic', the latter indicating that systems thinking can give rise to a qualitatively different epistemology and worldview, which goes beyond reductionist, dualist and objectivist approaches which are associated with modernity - but which are still dominant in educational theory and practice.

At this deeper level, a number of writers suggest that Western society is in the midst of a transition between a culture guided by the metaphor of 'machine', towards one guided by the metaphor of 'organism' or living system. This entails a shift of emphasis from relationships based on separation, control and manipulation towards those based on participation, empowerment and self-organisation. Thus, while we might look back at the 20th century as the age of fragmentation, witnessed in everything from the splitting of the atom, to the atomisation of thought and knowledge themselves, this new century might yet be the age of relation.

Systems thinking can be thought of as having three interrelated dimensions: the philosophical, the theoretical, and the practical; or *normative*, *descriptive* and *applicative* – and these broadly equate with values, knowledge and skills. This is illustrated by Senge's allusion to systems thinking comprising a 'sensibility', 'general principles' and a 'set of tools and techniques'.

While systems thinking is often perceived to be about methods, skills and competencies, arguably a systems sensibility or *ethos* is the key dimension, as a sense of our interconnection with others and the living world also gives rise to a sense of transpersonal ethics and responsibility – what systems thinkers call an extended 'system of concern'.

Systems thinking as a recognisable discipline emerged from around the 1940s as a response to and critique of the prevailing reductionism (Flood 2001). Most writers in the field point to modern systems thinking as developing from two main directions and sources, being engineering and biology. The former is associated with 'hard systems' problem solving approaches where the problem is contained and definable; the latter with 'soft system' approaches used with problems which are complex, messy and ill-defined and where 'simple' problem solving approaches are inappropriate. Environmental and sustainability issues are predominantly of this latter kind, requiring approaches which go beyond simple 'problem-solution' and 'cause-effect' thinking, and rather, emphasise multi-dimensionality, dynamic change, adaptive management and continuous learning.

Key concepts and principles

Systems thinking has given rise to a 'systems language' and some of the key words are shown below.

System; subsystem; system of interest; feedback; boundaries; environment; nesting systems; system levels; purpose; context; whole/part; pattern; synergy; emergence; coherence, connectivity, transformation.

As well as giving us useful concepts, the study of systems over recent decades has led to the development of a number of principles which are widely applicable in different situations and which help us think, anticipate and act in a more mindful way. These include:

- *the whole is greater than the sum of its parts (emergence)*
- *you often can't discover or predict emergent properties of the whole by looking at the properties of the parts (more complexity means less predictability, and more emergence)*
- *you can never only do one thing (there are always 'knock on' consequences)*
- *everything is connected, but not equally strongly. (So while it is often safe to draw conceptual boundaries, we need to be aware of where and how we are drawing them)*
- *the health of the bigger system and the health of its subsystems are intimately connected*
- *a change in the part affects the whole (and vice-versa)*
- *stability and resistance to change are two sides of the same coin*
- *complex systems show delayed response*

Systems thinking and learning

While there is recent and growing interest in 'thinking skills' and competencies in education, it is almost impossible to find mention of relational or systemic thinking skills in policy documents. Rather, the emphasis is often on rationalistic, analytical, and scientific skills. Whilst these are of value, they do not challenge the techno-scientific worldview that we now need to go beyond. The logical-analytic approach to thinking is inadequate to deal with the complexity that young people and adults now face and will have to grapple with as this new century progresses. Whilst systems thinking is valued in parts of the business community - which increasingly seeks graduates able to cope with complexity and uncertainty – oddly it receives virtually no recognition in educational policy and curriculum.

Yet, as the systems thinker Bela Banathy (1991, 77/79) suggests

> '….a major shift toward attaining more understanding and human wisdom is required. We should create learning that enhances critical thinking, the understanding of the self, the systems and environments in which we live, and the situations we experience….. The ever-increasing complexity and changing dynamics of our systems call for competence by which we can understand and manage complexity, cope with ambiguity and uncertainty, and grasp the connectedness and interdependence of the systems of which we are a part.'

At present, the education mainstream is graduating thousands of unsystemic thinkers ill-equipped for a deeply systemic and rapidly changing world. Systems thinking leads to an enhanced ability to work more effectively and creatively in these conditions and to a changed perspective. Some of the qualities and competencies of the systems thinker are outlined below.

Some qualities of the systems thinker

Systems thinkers tend to:

- ask different questions (deeper, more inclusive)

- look for connections and patterns

- have a keen sense of emergence and relationship

- value multiple perspectives

- be critical and synthesising

- look for multiple influences rather than linear 'cause-effect' relations

- often look at the big picture (spatially, temporally, culturally)

- be wary of narrow, simplistic, 'obvious' or majority explanations in the face of complexity

- suspend judgement

- **look at 'relationships' and 'purpose' first rather than blame components of a system**
- **recognise and can work with uncertainty, ambiguity and 'mess'**
- **be concerned with systems health (whole systems)**
- **try to recognise their own assumptions**
- **be open minded: their thinking is an 'open system'**

Environmental and sustainability education often claim to be holistic. While critical thinking is valued, both discourse and practice make little explicit reference systems theory, concepts or methods, and this seems a major omission.

Systems approaches are also relevant to education and learning as a whole, not just the environmental dimension. System theorists talk about meta-learning, that is, going beyond basic learning such as simple problem-solving in order to reflect critically on the assumptions and values that inform it. This meta-learning or 'second order' learning involves critical reflection about one's learning; it involves 'thinking about thinking'. Beyond this, more higher order learning involves questioning one's frame of reference - a shift of comprehension and consciousness about values and practice. Thus, systemic thinking will often involve people in looking at and questioning both socially dominant and their own paradigms or belief systems. Indeed, unless there is some real change of perspective, it is questionable whether significant learning has occurred.

If, as many commentators suggest, sustainability requires a significant shift in values, thinking and behaviour, then systems approaches to learning represent a highly relevant perspective and resource which urgently need to become a central part of policy and practice at all levels.

References

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