APPENDIX II (FOOTNOTES AND DIAGRAMS)

N. B. Diagrams, boxes and tables are shown under the relevant Part / Section / Subsection headings, and are numbered and cross-referenced in the main text.

PART A

1 RATIONALE

1.1 The focus and scope of the inquiry

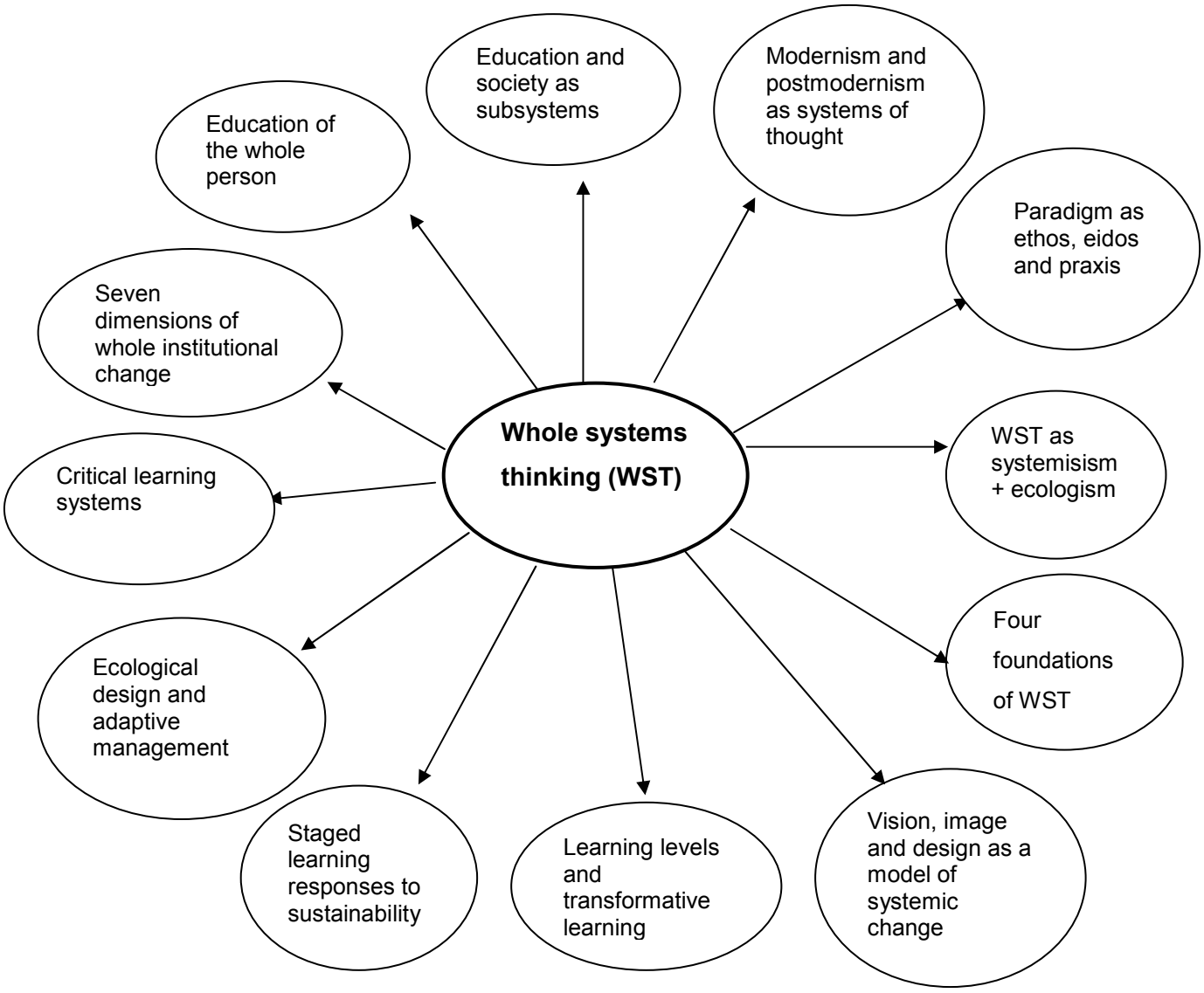


Diagram A.1 (b) The use of whole systems thinking to explore interrelated subtopics in the Thesis

PART B

1 THE EMERGENCE OF THE POSTMODERN ECOLOGICAL WORLDVIEW

1.6 The postmodern ecological worldview – looking at essential ideas

1.7 Evidence of the postmodern ecological worldview in cultural change

Table B.10 Based on Skolimowski, H. (1981) *Ecophilosophy,* Marion Boyars, London, 30-31. In Packham, R. (1993) 'Environmental Awareness and Higher Education – some perspectives from Australia particularly relating to the process of education' paper presented at 'Symposium on Challenges and Responses of Higher Education in India', Prasanthi Nilayam, India, 26th August, 1993.

Table 1 - A comparison of eco-philosophy and contemporary philosophy.
(after Skolimowski, 1981)

Eco-Philosophy	*Present Philosophy*
Life-oriented	Language oriented
Committed	'Objective" (detached)
Spiritually alive	Spiritually dead
Comprehensive	Piecemeal (Analytical)
Pursuing wisdom	Pursuing Information
Environmentally and Ecologically Conscious	Environmental and Ecologically Oblivious
Related to economics of the Quality of Life	Related to the economics of material Progress
Politically aware	Politically indifferent
Socially concerned	Socially unconcerned
Vocal about individual responsibility	Mute about individual responsibility
Tolerant to trans-physical phenomena	Intolerant to trans-physical phenomena
Health mindful	Health mindless

B.2.1 Evolutionary change in systems thinking

Diagram B.4 Traditions of systems thinking

Ison, R. Maiteny, P. and Carr, S. (1997), 'Systems Methodologies for Sustainable Natural Resources Research and Development', *Agricultural Systems,* vol 55, no 2, Elsevier, 257-272.

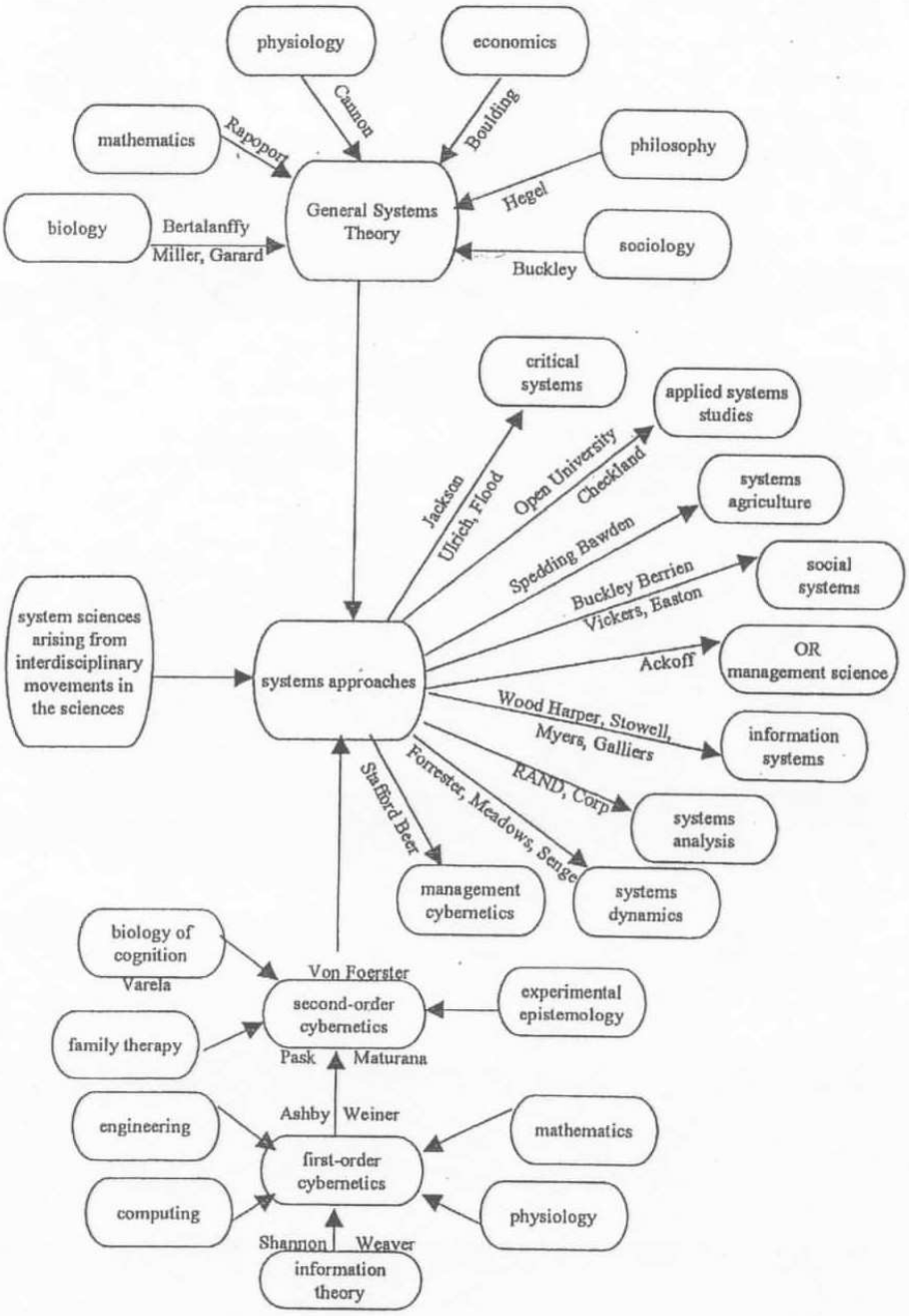


Figure 2. A spray diagram mapping some of the different influences within systems scholarship that have given rise to a range of systems approaches for managing complexity, and some key researchers associated with these influences. (Adpated from Ison, Carr & Maiteny 1997).

PART C

1 THE EDUCATION PARADIGM DISCOURSE

1.1 Educational paradigm: modelling, maintenance and movement discourse

Viable systems

A systems perspective on sustainability looks at certain qualities in a system. These checklists are based on Ravetz (2000, 17-18) and Bossel (1998, 99).

- *viability* – does it work?

Does it show self-organising behaviour?
Is it resilient to short-term change in its environment?
Does it effectively use a throughput of resources to maintain itself?

- *integrity* – is it a recognisable, integrated whole?

Does it maintain itself through feedback loops and communication?
Is it compatible with the viability of its subsystems (internal coexistence)?

- *longevity* – has it lasted? Is it likely to last? How does it relate?

Can it change, adapt and innovate in relation to a changing environment over time? (external coexistence)
Is it compatible with the viability of the larger systems within which it exists (its environment)?

OR:

- *robustness and resilience* – how far it can retain stability in the face of change
- *effectiveness* – using energy and resources effectively in maintaining itself
- *adaptability and innovation* – how far it can adapt to long-term changes in its environment
- *co-existence* – with its subsystems and with its larger environment

2 EVIDENCE OF AND ARGUMENTS FOR A MORE SYSTEMIC EDUCATIONAL PARADIGM

2.3 The ecological education paradigm

Box C.3: One image of sustainable education

Here is my image of 'sustainable education', drawn at very general level. It is an elaboration of the three-part model discussed in Part D in relation to education.

Sustainable education is:

Extended…
Appreciative – aware of the uniqueness and potential of each individual and group, of the qualities of any locality and environment, and sees personal and local knowledge as foundational to learning.
Ethical – extends the boundaries of care and concern from the personal and the present, to the social, environmental, non-human, and future dimensions.
Innovative – draws inspiration from new thinking and practice in a variety of fields, relating to education, learning and aspects of sustainable development.
Holistic – relates to the learning needs of the 'whole person' (including spiritual and emotional), of differentiated individuals and groups, and to the range of human intelligence.
Epistemic – aware of its own worldview and value bases, which are critically examined and reviewed. Second, and even third, order learning is facilitated.
Future oriented – concerned with creating a better future, from now on.
Purposeful – critically nurtures sustainability values with the intention to assist healthy change.

Connective…
Contextual – in touch with the real world, particularly sustainability issues, and grounded in the locality.
Re-focused – particularly on social development, human and natural ecology, equity, futures, and practical skills for sustainable living.
Critical – ideologically aware, deconstructive and constructive.
Systemic – pays attention to systemic awareness of relationships, flows, feedbacks, and pattern in the world.
Relational – connects patterns of change: local-global, past-present-future, personal-social, environmental-economic, human-natural, micro-macro etc.

Pluralistic – values different ways of knowing, and multiple perspectives.
Multi and transdisciplinary – regards disciplinary borders as fuzzy and puts greater emphasis on new ways of seeing complex issues.

Integrative…

Process oriented – constructs meaning through an engaged and participative learning process, reflecting different learning styles. Everyone is a learner, including the teacher/leader.
Balancing – embraces cognitive and affective, objective and subjective, material and spiritual, personal and collective, mind and body etc.

Inclusive – for all persons, in all areas of life and extending throughout their lifetimes.
Synergetic – deeply aware of emergence, and designs curriculum, organisation and management, culture to be mutually enhancing. Energy, material, and money flows are organised on sustainability principles and are reflected in the whole curriculum.
Open and inquiring – encourages curiosity, imagination, enthusiasm, innovation, creativity, community, spirit, to arise. At ease with ambiguity, and uncertainty.
Diverse – allows for variety, innovation and difference of provision and ways of knowing within a coherent framework.
A learning community – institutions promote learning through themselves engaging in reflexive learning (learning organisation).
Self-organising – balancing autonomy and integration through different system levels and practising subsidiarity and democracy.

Such an education and learning situation would be intrinsically transformational, of itself and of its community members, and would have systemic coherence.

From Sterling, S (2001) *Sustainable Education – Re-visioning Learning and Change,* Green Books, Dartington, 84-85.

Table C.3: Summarising the contrasting paradigms

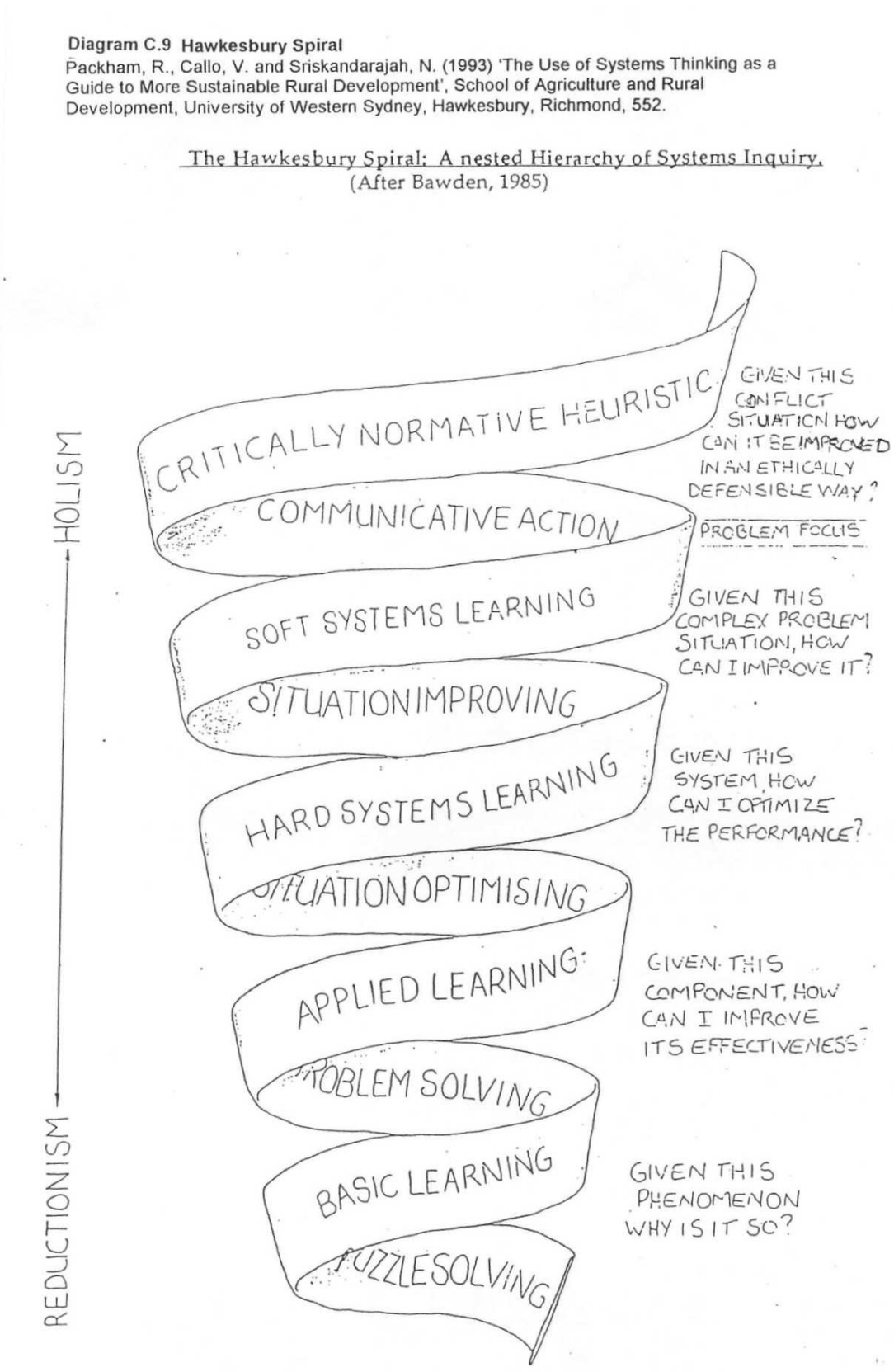
MECHANISTIC VIEW	ECOLOGICAL VIEW
LEVEL 1: EDUCATIONAL PARADIGM	
Core Values	
• Preparation for economic life	• Participation in all dimensions of the sustainability transition – social, economic, environmental
• Selection or exclusion	• Inclusion and valuing of all people
• Formal education	• Learning throughout life
• Knowing as instrumental value	• Being/becoming (intrinsic/instrumental values)
• Competition	• Cooperation, collaboration
• Specialisation	• Integrative understanding
• Socialisation, integrating to fit	• Autonomy-in-relation
• Developing institutional profiles	• Developing learning communities
• Effective learning	• Transformative learning
• Standardisation	• Diversity with coherence
• Accountability	• Responsibility
• Faith in 'the system'	• Faith in people
• Modernity	• Ecological sustainability
LEVEL 2: ORGANISATION AND MANAGEMENT OF THE LEARNING ENVIRONMENT	
Curriculum	
• Prescription	• Negotiation and consent
• Detailed and largely closed	• Indicative, open, responsive
• Discursive knowledge	• Non-discursive knowledge also valued
• Decontextualised and abstract knowledge	• More emphasis on local, personal, applied and first-hand knowledge
• Fixed knowledge and 'truth'	• Provisional knowledge recognising uncertainty and approximation
• Confusion of 'data', 'information' and 'knowledge'	• Ultimate concern with wisdom
• Disciplines and defence of borders	• Greater transdisciplinarity/ domains of interest
• Specialism	• Generalism and flexibility
Evaluation and assessment	
• External inspection	• Self-evaluation, plus critical support
• External indicators, narrowly prescribed	• Self-generated indicators, broadly drawn
• Quantitative measures	• Qualitative as well as quantitative measures
Management	
• Curriculum control and prescription	• Curriculum empowerment and determination
• Top-down control	• Democratic and participative
• Architecture, energy and resource use, and institutional grounds neither managed ecologically nor seen as part of the educational experience	• Ecological management, linked to educational curriculum and experience

• Scale not considered	• Human scale structures and learning situations
• Synergies and emergence not considered	• Positive synergies sought
Community	
• Few or nominal links	• Fuzzy borders: local community increasingly part of the learning community
LEVEL 3: LEARNING AND PEDAGOGY	
View of teaching and learning	
• Transmission	• Transformation
• Product oriented	• Process, development and action oriented
• Emphasis on teaching	• Integrative view: teachers also learners, learners also teachers
• Functional competence	• Functional, critical and creative competencies valued
View of learner	
• As a cognitive being	• As a whole person with full range of needs and capacities
• Deficiency model	• Existing knowledge, beliefs and feelings valued
• Learners largely undifferentiated	• Differentiated needs recognised
• Valuing intellect	• Intellect, intuition, and capability valued
• Logical and linguistic intelligence	• Multiple intelligences
• Teachers as technicians	• Teachers as reflective practicioners and change agents
• Learners as individuals	• Groups, organisations and communities also learn
Teaching and learning styles	
• Cognitive experience	• Also affective, spiritual, manual and physical experience
• Passive instruction	• Active learning styles
• Non-critical inquiry	• Critical and creative inquiry
• Analytical and individual inquiry	• Appreciative and cooperative inquiry
• Restricted range of methods	• Wide range of methods and tools
View of learning	
• Simple learning (first order)	• Also critical and epistemic (second/third order)
• Non-reflexive, causal	• Reflexive, iterative
• Meaning is given	• Meaning is constructed and negotiated
• Needs to be effective	• Needs to be meaningful first
• No sense of emergence in the learning environment/system	• Strong sense of emergence in the learning environment/system

From Sterling, S (2001) *Sustainable Education – Re-visioning Learning and Change,* Green Books, Dartington, 58-59.

2.4 Transformative learning, systemic change and sustainability

Diagram C.9 Hawkesbury Spiral
Packham, R., Callo, V. and Sriskandarajah, N. (1993) 'The Use of Systems Thinking as a Guide to More Sustainable Rural Development', School of Agriculture and Rural Development, University of Western Sydney, Hawkesbury, Richmond, 552.



Box C.7: Case Study – Schumacher College, Dartington

In 2002, I conducted an evaluation of the learning environment and effects of Schumacher College, the privately run 'international centre for ecological studies', at Dartington (Sterling and Baines, 2002). There is good deal I could say about the College, but space is an issue and my main interest here is to outline some of the characteristics of the College which appear to contribute to its unusual reputation for providing deep learning experiences for a significant proportion of its participants. In my view, it is an excellent and very rare example of a learning institution that has intentionally sought and designed its own systemic development in order to offer a systemic development learning experience (to adapt Bawden's phrase). In many aspects, it is the opposite end of the spectrum from most mainstream institutions. Whilst the latter are often characterised by *systematic* management and organisation including top-down control, explicit rules, defined structures and areas of responsibility, and a degree of rigidity, Schumacher College demonstrates a high degree of *systemicity* that is, internal connection, relatedness and coherence which is in many ways the key to understanding its operation and distinctiveness. In some respects – and this was part of our critique – the College has taken this operational systemicity too far, evidenced by a lack of clarity and inconsistency at times.

However, and in contrast to the mainstream, the aims and objectives of the education programme and of the individual courses are less tightly defined, subject to change and evolution depending on how a course evolves, not spelt out at the detailed level of course aims and learning outcomes, and where expressed, relate to levels of personal change and long-term change in the wider world. Further, the College's ethos and operating principles are based on a partly implicit philosophy of holism, ecologism and systemisism, where 'everything relates to everything else'. There is a fine and dynamic balance between explicitness and implicitness, autonomy of the part and integration within the whole, structure and spontaneity, and healthy emergence and synergy is inherent to the mode of operation.

In this situation, transformative learning is more likely, often reported (including in feedback to our questionnaires), but not of course, guaranteed. Part of our evaluation sought to understand how and why this took place. Without going into too much detail, it is clear that the College often provides an intense, engaged learning experience, where the teacher/learner distinction breaks down and a particular learning community emerges. There is a systemically coherent total learning environment that both

challenges *and* values/provides security for people and their beliefs, and further, works at different levels of consciousness and of knowing. Participants are challenged to look at their thinking, beliefs and actions and are offered new frameworks for thought. For many this is an extension and an affirmation, rather than a shift of fundamental thinking, depending on how 'ecological' their starting point is. For others, a more profound and sometimes unsettling shift is reported.

In brief, Schumacher College has evolved a 'learning system' which can, and often does, facilitate epistemic (or transformative) learning. This learning environment is characterised by its fluidity, integration, multidimensionality, intensity, ethical integrity, caring and synergy.

Rather like Hawkesbury, there was a strong element of design founded upon an expressed ethos in the development of the College, but from the early days, a systemic quality of learning has been intrinsic to the evolution of the 'learning system' that the College became over time. However, there was very little systemic learning theory involved in its development – rather this evolved from a set of guiding principles which reflected its ethos. Its director, Anne Phillips (1999) set out the College's values and principles which may be summarised as:

- reflective learning for individuals and the institution
- cooperation
- shared purpose
- the enjoyment of learning
- service and creating opportunity for service
- treading lightly and living simply
- the intrinsic value of work of all kinds
- celebrating diversity
- living with ambiguity
- a good experience for everyone
- self-regulation within a framework rather than coercion
- recognising limitations, and
- a spirit of rigorous inquiry.

This comprises a management ethos which is key to understanding the College. The principles interact in practice and achieve a synergy which gives rise to the ambience or spirit of the College which, in a positive sense, 'infects' everything - including in most cases, the participants. In essence, it is an ethos of caring, of goodwill, and particularly of trust. In short, transformative learning arises in conditions whereby the College's environment and operation is 'curriculum as lived experience', rather than a backdrop

to formal instruction. A summary of 'defining characteristics' of the College's learning environment are included below.

The defining features of Schumacher College

Human scale - a maximum of 25 participants on any course, so that the College retains an atmosphere of conviviality; also human scale architecture and site.
Inclusion – 'everybody does everything'. This means first, that all staff and resident helpers are involved in day-to-day running of the College. Second, that all members of the College – staff, helpers and participants – partake in daily duties maintaining the College, including cleaning, tidying and cooking in an expression of common service.
Ephemeral but intense learning community – the conditions encourage the emergence of a strong sense of learning community amongst participants, which is the more so as everybody knows it will soon disperse.
Unity in diversity – often, experienced people make up the participants, who are ecologically oriented but have diverse interests and backgrounds within that orientation.
Good food – high quality but simple vegetarian food, mostly locally sourced and mostly prepared on-site. This is a central part of the College's ethos.
Ecological principles - as far as possible operating according to ecological principles with regard to resource use and making this part of the everyday curriculum
Exploration - open-ended enquiry rather than working towards prescriptive 'learning outcomes'
Focus - only one short course running at any one time, resulting in a particular ambience and learning community in residence
Variety - in the working day, with most intellectual input in the mornings, and more opportunity for negotiated activities in the afternoons and evenings.
Aesthetics – a pleasing and atmospheric environment and location.
Emergence – no one attempts to know or control what might emerge from the dynamics of any particular group or course
These interact synergistically to produce the ambience and learning situation.
From Sterling S and Baines J, 2002.

3 CHANGE AND MANAGEMENT

3.1 Theory of systemic management and change

ESSENTIAL MANAGEMENT DIFFERENCES BETWEEN MECHANISTIC AND ECOLOGICAL MODELS OF EDUCATION

MECHANISTIC MANAGEMENT	ECOLOGICAL MANAGEMENT
STYLE OF MANAGEMENT	
• Goal oriented	• Direction oriented
• Product oriented	• Process oriented
• Controlling change	• Facilitating change
• Focus on single variables and parts	• Focus on sets of relations and the whole
• Aware of causal relationships	• Aware of emergence
• Power-based hierarchy	• Leadership and self-management at all levels
• Command and control	• Democratic and participative
• Vertical structures	• Flatter and integrated structures
• Intervention from 'outside' system	• Working with and from inside system
• Interested in prediction	• Interested in possibility
• Problem solving	• Problem reframing and situation improvement
• Adaptive learning	• Adaptive, critical and creative learning
• External evaluation	• Self-evaluation with support
• Quantitative indicators	• Qualitative and quantitative indicators
• Planning	• Design
• Closed	• Open
Effects on system (tend to be)	
• Standardisation	• Diversity and innovation
• Homogenisation	• Heterogeniety but coherence
• Dependency	• Autonomy-in-relation at all levels
• Externally directed	• Self-organisation
• Dysfunctional emergent properties	• Healthy emergent properties
• Poor ability to respond to change	• Flexibility and responsiveness
• Unsustainability	• Greater sustainability

From Sterling, S (2001) *Sustainable Education – Re-visioning Learning and Change,* Green Books, Dartington, 47.