PREAMBLE

Purpose: to provide a perspective which places the origins of the Thesis and the nature of the inquiry into the context of personal experience.

1.1 Aim of the Thesis

The aim of the Thesis is:

To identify and clarify the nature of the shift of consciousness and cultural paradigm that appears necessary to the sustainability transition, through first, an exploration of the potential thought bases for this shift, and secondly, the development of conceptual tools and models for thinking about both the shift and the kinds of change in our collective view of education and learning that may be required to assist such a transition. In sum, I seek to reflect and develop an emerging 'theory of relation' able to transcend the dominant paradigm.

1.2 Summary of the argument

> *What is the nature of the change of consciousness that appears necessary to the achievement of a more ecologically sustainable society? What changes may be required in the way we view and practice education and learning if they are to contribute fundamentally to such a change of consciousness?*

These core questions have been at the heart of my professional practice and personal interest for more than three decades, and continue to occupy my energies and inform my sense of purpose. I see the questions as co-dependent, and paradoxical. This is because learning is fundamental to significant consciousness change, yet such consciousness change affects our view of the nature of learning, from a functional view towards a transformational view. This Thesis is presented as a partial summary of my own learning journey to date. I believe the Thesis as a whole goes some way to answering these core questions and illuminating their relationship. There are of course, no definitive or complete answers, but there are directions, concepts, and arguments, which I hope, as presented here, may help others evolve their own answers and practices in a spirit of collaborative movement through which education 'can serve as

the core of a lifelong journey towards wholeness' (Glazer, 1999, 3), and towards a more ecologically sustainable future.

The key questions cannot be simply or briefly answered, not least because they concern cultural, social and personal change that is at once fundamental, urgent and contentious. Therefore an inquiry that is wide-ranging, yet coherent and creative is required, and I have endeavoured to meet these demands. The broad scope of the inquiry follows from the approach I have employed which is informed by a systemic and co-evolutionary perspective whereby each identified focus is seen as influenced by its wider context, which in turn becomes the next focus. Therefore, I look at but also beyond my immediate professional field, which is environmental education, and view it within the larger context of debate and movement concerning dominant paradigms operating in education as a whole. This in turn is seen within the contextual framework of cultural change represented in the discourse of modernism and postmodernism. It is thus necessary to consider each contextual level to provide - as far as is reasonable and manageable - a whole picture of constraints, movement and possibilities which can then inform more detailed discussion.

Within postmodernism, I distinguish between deconstructionism and revisionary postmodernism, the latter suggesting an emerging, fragile, yet potent 'postmodern ecological worldview', which has profound implications for the visioning and realisation of a more sustainable society and future. The current of gradual but hesitant cultural change in Western society, through modernism and deconstructionism towards an ecologically informed revisionary postmodernism, I view as a deep learning journey through which earlier 'moments' and metaphors are not abandoned but become subsumed within a larger framework of understanding and meaning. I argue that such learning might either be *contingent* (by *default*, arising from our response to crisis) or *intentional* (learning by *design*, and so involving educational policy, theory and practice). I suggest the latter journey may be assisted and accelerated through the elaboration, articulation and employment of what I term 'whole systems thinking', and in this argument I echo a small but significant group of leading commentators concerned by global conditions of unsustainability, inequity and environmental degradation, who argue that these conditions can only be adequately addressed through a fundamental change towards more relational thinking and an integrative consciousness which is both critical and deeply connective. Essentially, this is a change in epistemology - of knowing 'more wholly' - which is both inspired by and manifests the postmodern ecological worldview, equivalent to what Gregory Bateson called a 'recursive' or

'ecological epistemology' (Bateson and Bateson 1988). I argue that 'whole systems thinking' arises from a desirable syncretisation of the concepts, tools and methodologies of *systems thinking* and the vision, values, and philosophy of *ecological thought* - movements which are otherwise often perceived and practised separately, to the detriment of both. These, and some of the other main roots and antecedents of this holistic epistemology - systems thinking, indigenous thought, the organicist tradition in Western science and philosophy, environmentalism, and the emerging complexity sciences - are outlined and discussed in more detail in **Appendix I.**

In essence, whole systems thinking involves an *extension* of perception, a quality of *connection* in our conceptual thinking, and *integration* in our planning and actions towards healthy systems - given that, in Bawden's words (2000a, 5), "actions are invariably also interactions". This triadic model of three interpenetrating dimensions of worldview change - summarised as 'Seeing', 'Knowing' and 'Doing' - is a central and recurrent theme in the Thesis. I argue that whole systems thinking both arises from and can assist paradigm change at collective and individual level, and suggests a shift of emphasis of cultural root metaphor from mechanism, and more latterly, text, towards organicism or a living systems metaphor. The theory of staged learning levels towards deeper learning developed by Gregory Bateson (1972) and echoed and adapted by others, is employed to shed light on the nature of the learning experience that paradigm change appears to involve, and this theory is supplemented with ideas about learning emerging from complexity theory and the 'biology of cognition'. The triadic model of paradigm and experience is revisited and employed in **Appendix I** to illustrate further this shift of worldview and a pattern of relationship between this model and Bateson's model of staged learning levels is suggested. In addition, the model is employed and substantiated through discussion of aspects of sustainability.

Throughout the Thesis, an evolutionary and emergent view of paradigm change is suggested as a more prevalent pattern of cultural change, in contrast to the Kuhnian revolutionary view of successive incommensurable paradigms which tends to be reflected in social science discourse (Kuhn 1962). The significance of this is that the evolutionary view acknowledges the *partial validity* of multiple preceding views and stresses the role of learning. Hence the methodology of the Thesis does not seek, for example, to affirm the ecological paradigm by simply negating mechanistic and dualistic thought, but by building from their partial validity. I argue that the three components of any paradigm may be seen as *ethos* (the affective, belief and imaginal dimension), *eidos* (the dimension of ideas and concepts) and *praxis* (the dimension of

reflective intention and action), and that these *dimensions of paradigm* are in relationship with the *dimensions of our lived experience* and knowing, that is, our epistemology, our ontology and methodology. I then argue that a fundamental change in each of these components - through greater *extension, connection* and *integration* within each and between them - brings us closer to an ecological worldview and to sustainable living.

The key ideas of learning, paradigm change, and whole systems thinking in relation to education and educational paradigms, are elaborated in Parts C and D. In particular, the paradox whereby education, internationally recognised for some three decades as the key to social change and sustainability, is at the same time a largely conservative influence, is analysed. A co-evolutionary view of the relationship between education and its social context is offered both as an explanation of this conservatism, and as a key to achieving systemic change within educational thinking and practice. A model of staged change describing the sustainability transition (O'Riordan and Voisey 1998) is paralleled against the Batesonian model of staged learning levels, and these inform a model of staged educational responses to sustainability. The nature of transformative or epistemic learning is explored, and I suggest that second and third order learning needs to take place, at least in parts of the educational community, in order to achieve a change of operative paradigm - the manifestation of which I call 'sustainable education', or education 'as' sustainability.

Thus, my theme is the intentioned reorientation of education, particularly its purposes and ethos, informed by an emerging worldview - a 'theory of relation' arising from such areas as ecological thought, systems thinking, and complexity and change theory. Such bases potentially provide a renewed sense of connectivity, community and meaning which is essential if we are to work towards a more sustainable and collaborative future in an otherwise fragmented and turbulent world.

- Key point: In sum, the Thesis seeks to bring together, develop and indicate the grounding for holistic theories *which may help* a transformed ecologically-oriented educational paradigm to emerge, *which in turn* supports transformative learning - *which in turn* is required to support the sustainability transition.

1.3 Some key ideas

What is new and interesting about this Thesis? It is not so much the 'parts' that are new, but their synthesis which has generated insights and tools that help me - and

hopefully, might help others - to better appreciate, understand and handle a complex whole. These parts or elements include ideas from systems thinking and systemic learning theory, ecological thinking and revisionary postmodernism, complexity and change theory, sustainable development theory, and sustainability education discourse - which together, indicate an ‘alternative story’ or ‘theory of relation’. To indicate the nature of the content to the interested reader, I now summarise some of the concepts explained, explored and developed in the Thesis:

- the differences between systems thinking and ecological thinking
- Bateson’s notion of epistemological error (as regards our sense of separation) in Western thought, and the difference between making a distinction and assuming dissociation
- the possibility of a closer relationship between systems thinking (systemisism) and ecological thinking (ecologism)
- the notion of whole systems thinking as a syncretisation of systemic thinking (systemisism) and ecological thought (ecologism), and of both critical and participatory orientations
- ‘wholeness’ as a touchstone of purpose, description and action, to counter fragmentation
- a view of paradigm as comprising the dimensions of ethos, eidos and praxis
- the development of a recurring triadic model to represent the three dimensions of paradigm and of experience/knowing
- the identification and elaboration of four contributory areas of thought to the emergence of a postmodern ecological paradigm and whole systems thinking - being systems thinking, indigenous thought, organicism and ecologism, and the complexity sciences
- the possibility of a meta-connective pattern bringing together ideas from systems theory, sustainable development theory and learning theory around the ideas of self-organisation, emergence and systems health
- the idea that ‘hard’ systems approaches may be seen as first order change, ‘soft’ systems approaches as second order change, and whole systems thinking as third order change
- the nature of revisionary postmodernism as an articulation of the postmodern ecological worldview
- an evolutionary view of paradigm change as opposed to the Kuhnian revolutionary view, and the possibility of affirming both realist (universalist)and idealist

(deconstructionist/constructivist) positions *within* an emergent and transcending participative or relational view - relationalism

- the idea that the realist, idealist and participative moments may be seen as respectively manifesting first order, second order, and third order change
- the identification of key shifts from the mechanistic metaphor and paradigm towards an ecological metaphor and paradigm (these being *reperception, connection,* and *integration)*
- identification of key thinking habits of the dominant paradigm, and key ideas of ecological thought
- ideas of resonance and the state of being as 'neither separate nor the same' as a challenge to dualism
- the implications of complexity theory in supporting a holistic and living systems view of the world particularly in the light of the metaphor of 'edge of chaos'
- elaboration of Bateson's model and derivative models of staged levels of learning from basic to deep and their use in developing a theory of differential response by educational actors and organisations to sustainability education. Juxtaposition with O'Riordan and Voisey's (1998) model of staged response to sustainability in society
- belief systems as resilient systems (as regards resistance to deep change)
- the importance of prior disposition and readiness in the person or group as regards the possibility of paradigm change
- the implications of a view of education as a subsystem of society, of society/economy as a subsystem of planetary ecology, and the whole as a nesting ecology
- the idea of ecological design as intention, and new ideas from sustainability theory including adaptive management and ecosystem resilience - and their possible relevance to educational design and management
- the idea of a 'sustainable education' paradigm
- seeing educational ethos, policy, and practice as a nesting ecology
- the need for and possibility of reconciliation of realist and idealist positions through relationalism
- intrinsic and instrumental values in education, and transmissive and transformative methodologies in education
- autonomy and integration as a system dynamic and its relevance to sustainability and to environmental education debate
- the possibility of positive co-evolutionary change in the relationship between education and wider society

- the implications of complexity theory for organisational change and educational design towards sustainability
- the possibility of designing 'critical learning systems' which encourage emergence.

What is important here is not each individual point, but their association: that they add up to a larger whole. My sense of this whole, or alternative story, has arisen from my personal and professional experience, and this is outlined below.

1.4 My story

The Thesis arises from my personal experience working in the field of environmental education, since entering teaching in 1972. This experience sets a background context as the evolution of my philosophical orientation has been enmeshed with my engagement in the professional field. Indeed, much of the Thesis rests on accumulated experience and reflection which evolved over the decades before the actual research period which effectively began in 1996. So I will briefly outline some of the key experiences, and 'lessons' that I have learnt from these experiences, in order to show something of the provenance of the aims, orientation and content of the Thesis.

From childhood to twenties – environmentalism and a systemic sense

I was born into a 'thinking family', socially aware, socially engaged, reflecting such liberal values as justice, peace, and equality, and politically leftwards leaning. As a child and young person, my political awareness and environmental interest began early, and I saw them as interrelated. In 1962, for example, I was reading serialised instalments of Rachel Carson's *Silent Spring,* in my *Animals* magazine, and Carson's narrative of pesticide pollution also contributed to an early systemic and political awareness. In my late teens and early twenties, I was engaged in the wave of environmentalism that marked these times. For example, I read reports written for the UN Conference on the Human Environment in 1972, and bought and read avidly Paul Ehrlich's book *Population, Resources, Environment*, and The Ecologist's *Blueprint for Survival.* I was also influenced by the Meadows' *Limits to Growth* (1972)*,* and their 'systems dynamics' approach to issues. I remember feeling strongly at that time that such thinking 'concerns everything', and questioning perceptual and conceptual boundaries and boxes became part of my outlook. My concern for the environment then, was not just born from evidence of environmental degradation, but from what I would call now, an extended sense of self, an empathy with a wider reality. This was reflected in and strengthened by an interest in Eastern philosophy, which appeared to me to suggest a more complete and holistic view of life and the world than that offered

by the mainstream Western traditions of analytic and linguistic philosophy. Later, when I was 31, I would take up Tai Chi. This embodiment of balance, flow and change which I still practise, echoed and supported my relational view of the world.

I seem to be a ‘natural’ systemic thinker. It was only later in life that I found this way of thinking had a name and a recognised tradition. For as long as I can remember, I have always sought pattern, coherence and meaning, and this was partly expressed through questioning norms which seemed to support a fragmentational outlook. Looking for connections and patterns seem to me to be a key part of how people learn, and is particularly evident in young children (I think of my own children here). Yet this way of seeing and knowing is not valued or very much recognised in Western culture which - rather - puts emphasis on binary logic, analysis, distinctions and unidirectional causality, rather than pattern recognition, synthesis and feedback.

In 1971, I came across an American book in a London bookshop entitled *Teaching for Survival* (by Mark Terry, 1971) which was the first book I’d seen on environmental education. Terry’s book was my ‘tipping point’ and having just graduated, I decided to become a teacher as I saw education as critical in helping address environmental issues. It was at a time when liberal humanism was the dominant ethos in education. I had lectures from R S Peters at the Institute of Education in London, and we studied such educational thinkers as Bruner, Piaget, Dewey, Rogers, Holt, A S Neill, and Stenhouse. It was a view of education with which I felt largely in tune, and one that I now feel we need to recover and revalue, as part of the task of re-visioning and reclaiming education. I was lucky to start my career in a demanding but rewarding role as a member of a comprehensive school staff team characterised by a strong collective ethos, energy, creativity, and commitment. After some years teaching in England and Canada, I took a diploma in environmental education at the University of Reading, and this year out of the classroom deepened my understanding of this developing field. An instrumental belief in the role and nature of education, that raising awareness and understanding about the environment would change thinking and behaviour towards it, was widely shared at the time - and is still a strong current in environmental education discourse and practice. This construction of environmental education was also reflected at the Council for Environmental Education (CEE) based at the University of Reading, which I joined as assistant director in 1978. I stayed eight stimulating years working with many of the leaders and principal organisations in the field.

Just before joining CEE, I had taught on a Cree reserve in Northern Saskatchewan, working with native children, some of whom were emotionally disturbed. From that experience, I learnt that in the most unpromising and difficult circumstances, building good relationships might be the only thing you can usefully work at and perhaps is a prerequisite for anything else, and secondly, that there is always some constructive possibility in any situation.

My thirties - ecologism, ethics and education

In 1981, I read Skolimowski's *Ecophilosophy* (1981), a book which, while not exactly changing my life, clarified a good deal of existing thought, and introduced the profoundly radical notion that Western culture perceived and understood the world in an inadequate way: an idea I later found echoed in Bateson's writing. From this point, the already nascent idea that the Western crisis was fundamentally a perceptual one became a critical part of my own belief system. After reading Skolimowski's book, I subsequently attended his ecophilosphy conference at Dartington, in 1982, and was inspired to become involved in the ethics and education elements of the UK response to the World Conservation Strategy. This was followed by reading Fritjof Capra's *The Turning Point* (1982), which - excitingly - argued that there was a strong 'emerging culture' or social paradigm which wove together many of the interests and beliefs I already held or had sympathy for. I also read Morris Berman's *The Re-Enchantment of the World,* (1981) a book which introduced me to Gregory Bateson's ideas, and one which I found both rigorous and visionary. These were formative, or perhaps more accurately, transformative years for me, when an exciting ferment of ideas which hitherto had intuitive coherence began also to assume intellectual coherence, and therefore became more communicable. This clarification took shape in a book that I handwrote at the time. I never intended it should be published, but the ideas provided a platform for further work. This included a paper on ethics and worldviews for *The Environmentalist* in 1985, which led to an invitation to join the IUCN Ethics Working Group, and to contribute a paper 'Towards an Ecological Worldview' to an international collection of essays published in 1990 (Sterling 1990). One of the Group's seminars was held in the US, and I was pleased to meet there David Orr, Herman Daly and Donella Meadows - the latter's work in particular has been a key influence on my own thinking. I subsequently withdrew from direct involvement in this debate, partly through time constraints, but also as I made a distinction between 'ecological ethics' indicating a changed worldview, and the predominant 'environmental ethics' which seemed to me to maintain a questionable dualism between people and nature. Meantime, Capra's *Turning Point* had kindled a latent interest in systems theory, and I followed this up by

attending in 1993 one of his month-long courses at the newly established Schumacher College, ‘an international centre for ecological studies’ in Devon. This proved something of a ‘turning point’, being the beginning of a strong association with the College which was subsequently critical to the process of conceiving and writing the Thesis.

Meantime, I increasingly viewed my professional work in environmental education through the lens of holism, systems thinking, and ecologism - as opposed to a ‘simple’ environmentalism. Through my work at CEE (which I had left in 1987), and subsequently as a consultant, I sought to help extend the discourse in environmental education. This included affirming the global dimension in environmental education (through running two influential conferences in the mid-eighties); and identifying and exploring the implications of sustainable development. I was one of the first in the field to use and explore the term ‘education for sustainable development’ (ESD) (in a keynote address in New Zealand, Sterling 1992a), and subsequently co-wrote and edited the report *Good Earthkeeping - Education, Training and Awareness for a Sustainable Future* (Sterling and EDET Group 1992), which was produced by UNEP-UK for the 1992 Rio Summit. *Good Earthkeeping* was seen as innovative, and was widely influential. This experience led to my joining the founding team of the ‘ground breaking’ distance-learning Masters’ course on environment and development launched at South Bank University, London, in 1994, and my subsequently writing the first Masters-level module on education and sustainability in the UK. Such work was both difficult and exciting, as it involved a good deal of research and also required the generation of ‘new knowledge’ or insight. As a course team, we felt we were creating a new path for sustainability education with our students, and I engaged in the debate and feedback that arose as far as possible. The students have come from a range of cultural and professional contexts in different parts of the world, and they both apply theory in their practice and contribute to theory through their practice. As a tutor, I have felt privileged to learn from the students, as well have the opportunity to develop innovative course materials.

Exploring sustainability and transformation

In the early nineties, I became involved in strategy and organisational change, working with organisations in Eastern Europe struggling to assert themselves in the new post-Communist order, and this led to an interest in the relationships between change, management and learning. Also in the early nineties, I wrote a book chapter (Sterling 1993), and a number of conference papers exploring holistic approaches to

‘sustainability education’, and one of these - delivered at the Association for Teacher Educators in Europe (ATEE) conference held in Prague in 1994 - was sufficiently well-received that I took seriously a suggestion that I should think about turning it into a doctoral thesis. I had felt for some time that I should put my converging areas of interest into a research programme that would, at least, help me make more sense of the whole: environmental education and its broader educational context, learning and change theory, sustainable development, worldview change, ecological thought, and systems thinking.

What matters, I feel, is the pattern of relationships between these areas, and it is in perceiving and clarifying this where I feel I have some ability and contribution to make. What is surprising is that there is so little written that brings together insights on all these areas, although in the years during which this Thesis has been drafted, I have been increasingly aware of people becoming interested in such syntheses, not least, those with whom I have discussed the research. Yet, for the most part, these areas have tended to develop in - and been studied in - relative isolation. For example, in my experience, many people - if not most - who espouse an ecological worldview know little or nothing about systems thinking, and similarly, environmental education discourse is largely lacking in expressed systemisism.

In 1995, I registered with the University of Bath on a part-time and self-financed basis. Having outlined what I wanted to do, my supervisor advised against an empirical element as diversionary from the main task which was to be demanding enough in itself. Secondly, we felt that my past and on-going professional experience provided more than sufficient grounding for the ideas which I was to explore: indeed, the Thesis was largely to spring from and be tested against that engagement with the field.

Meantime, a number of consultancies at local and national level, both in the UK and Eastern Europe, stimulated my interest in the nature of change and appropriate strategy for change. It was the mid-nineties, and it was already apparent that the hopes set in train by the Rio Earth Summit of 1992 both for sustainable development in general and environmental education in particular were meeting with a degree of frustration. I felt that at least part of the problem was both a lack of sufficient recognition and critique of the dominant paradigm which influenced the perception and conception of environmental education, and of the elaboration of a constructive alternative discourse, or at least, an extension of existing discourse. My contribution to debate at this time was to co-edit and contribute chapters to an Earthscan book,

Education for Sustainability (Huckle and Sterling 1996) with John Huckle, a leading socially critical theorist in environmental education. On-going debate with John Huckle over a period of years helped me clarify my contrasting, more ecocentric, perspective. We believed our Earthscan volume to be the first to appear anywhere with such a title, and indeed the book was widely regarded as breaking new ground. In the spring of the same year, I facilitated a course led by the influential American environmental educator and author David Orr at Schumacher College, and engaged more closely with his work and thinking.

In the autumn of 1996, I returned to Schumacher College as a helper, and stayed for two months. Whilst I had registered for my doctorate at Bath in 1995, this two-month period was the first real opportunity to research, think and write intensively. The College library - dedicated to ecological and new paradigm thinking - and the ambience created by the mix of leading teachers and experienced participants made for a rich and stimulating environment for writing. In that short period, two experiences in particular were noteworthy. First, in September, I attended the 'Emerging Approaches to Enquiry' conference in Stroud, co-ordinated by Peter Reason and Judi Marshall from the Centre for Action Research in Professional Practice (CARPP) at the University of Bath. At this conference I was excited to discover more about the meaning of a 'participative research paradigm' as advocated by CARPP - work which echoed and complemented my own interests, and also I felt, lent a degree of legitimacy to an area of enquiry in which I had felt isolated and which was largely absent from environmental education discourse. Secondly, whilst still working at Schumacher College in October, a group of systems students from the Open University came to study for a week. One of their OU tutors was Paul Maiteny, whom I knew as he was also a South Bank tutor on our MSc course. What struck me was the obvious difference between the OU view of systems as a discipline on the one hand, and the College's ethos of Schumacherian ecologism on the other. To that point, I realised that I had rather assumed that there was a natural resonance between the systems view of the world and the ecological view of the world, but the tensions that arose that week suggested an altogether more complex picture. Paul and I had a number of very interesting conversations about this issue that subsequently were to prove formative in my doctoral thinking.

Earlier in 1996, I was asked to evaluate 'Reaching Out', a programme of in-service training and professional development for teachers on education for sustainability, that WWF-UK had developed and run nationally since 1993. This programme had been developed by a skilled team of writers and trainers - including John Huckle - and was

delivered through face-to-face courses with teachers and other educators, including consecutive weekend courses involving action research and co-operative inquiry. The programme was gaining a reputation as a catalyst for significant personal and professional change, and this was confirmed by the findings of the evaluation. Subsequently, I was pleased to be asked to co-direct the programme for WWF between 1997-2000. My engagement with Reaching Out as an evaluator, and later, trainer and manager further fired my interest in the kinds of learning situations and experiences that can foster significant personal change. It was at this time I came across literature on transformative learning which helped me understand better the 'special experience' that many participants on Reaching Out courses reported and which had been verified by a further independent evaluation carried out by Manchester Metropolitan University. WWF's programmes also included grants and on-going support for institutional change (the Curriculum Management Award Scheme), and I became involved in WWF's on-going internal debate on and experience of supporting systemic change in educational institutions. I also worked with the WWF Education Department on organisational change. We tried to achieve greater cross-departmental synergy between sections of the Department, and between separate outreach programmes and their effects. Meanwhile, I was teaching on the South Bank University MSc, which attracted experienced and committed mature students keen to improve their capacities as 'reflective practitioners' and 'change agents'. Over those years and to the present, the students and tutor team felt they were part of a research community that was at the forefront of elaborating the theory and practice of education for sustainability. Again, this experience helped me develop my own thinking and engage with the wider debate.

Tensions in sustainability education

In the late 90s, the growing interest of policy-makers in education for sustainable development (a term they favoured) was manifest in the appointment of a government advisory group, the Sustainable Development Education Panel, in 1998. I was asked to carry out two consultancy tasks: first, to write a research and briefing paper on the definitional issue surrounding ESD, and second, to chair a subgroup of the Panel to work on a document subsequently published as *Education for Sustainable Development in the Schools Sector* (Sterling 1998). This latter document, which partly drew on an internet research group involving both practitioners and academics, directly influenced the new national curriculum. The seven key sustainable development concepts that were identified by the document have since become seminal, and are widely reflected in policy and curriculum documents both nationally and internationally.

In the same year of 1988, I also worked on a *Teacher Education Specification* for the Forum for the Future's HE21 project - outlining key concepts for initial teacher education (Ali Kahn and Sterling 1998). Those involved in these projects, including myself, felt satisfied that we had both interpreted and communicated the slippery concept of sustainable development in educational terms and made an impact on policy. Yet I also felt a degree of disquiet - a sense that education for sustainable development, paralleling sustainable development in wider society, was being accommodated by the mainstream. I had taken the lead role in this work, but the experience left questions again in my mind about the nature of change, and of resilience to change, and whether in this instance, the gains of incorporation of isolated sustainability ideas into the curriculum outweighed the disbenefits. I remember asking a member of the government's Qualifications and Curriculum Authority (QCA), in 1999, whether the government's rather fragmentary response to our submission indicated that the government understood ESD and therefore felt the need to contain it and render it safe, or did not understand it and therefore had dealt with it in the usual 'bolt-on' way. I did not receive a clear answer.

Meanwhile, the international community was grappling with the relationship between environmental education and the newer ideas of education for sustainability and education for sustainable development. Tensions and contesting interpretations were in evidence at the UNESCO conference 'Environment and Society: Education and Public Awareness for Sustainability' held in Thessaloniki in 1997, and in the international internet 'ESDebate' held by IUCN in 1999 to try to clarify and advance the debate. As an active participant in these and other key international events, I felt the ecological and systemic view that informed my own thinking was largely missing, but also, that it potentially indicated a way through some of the perceptual and conceptual difficulties that were in evidence in the debate. At least, I felt it could introduce the dimensions of ecological and holistic thought, of systemic learning theory, and systemic change that were often weak in environmental education discourse.

As I was working both as a part-time tutor for South Bank University, and as a consultant to WWF and on other projects, my main method of working on the Thesis was to find the odd week or two-week slot and use a study bedroom at Schumacher College for short intensive spells of work. As my son was born in February 1997, and my daughter was four in the same year, 'getting away' was often essential to any progress. Irregular periodic visits to the College between 1996-2002 had other benefits. In that time I gained from meeting and listening to many of the scholars who came to

teach at the College including Fritjof Capra, Arne Naess, Charlene Spretnak, Rupert Sheldrake, Warwick Fox, Henryk Skolimowski, Henri Bortoft, David Orr, John Todd - and Brian Goodwin who became resident when he lead the MSc in Holistic Science started at the College in 1998. From such encounters, I deepened my understanding of ecophilosophy and deep ecology, Gaia theory, revisionary postmodernism, systems thinking, complexity theory, holistic science and the biology of cognition, ecological design, and sustainability. In 1998, I was asked to lead a week's course on 'Systems Thinking and Learning for Change' at the College. I worked with Paul Maiteny, Jane Reed (whose background was in deep ecology, ecoliteracy, and school improvement), and Roger Packham from Hawkesbury College in Australia, a leading centre of systemic thinking and pedagogy. In that week, we attempted to create a transformative learning situation - and to bring together the perspectives of systems as discipline or methodology, and the ecological worldview that the College studied and represented. For me, running this course further stimulated reflection on how far systems thinking in some form was necessary to achieving systemic change in individuals and organisations.

Testing the water – the 'sustainable education' Schumacher Briefing

Meanwhile, the political neo-liberal agenda of managerialism and marketisation was affecting educational thinking, policy and practice in the mainstream. Whilst this tendency was not new, I was increasingly conscious of the narrowing effects on curriculum and pedagogy at school and higher education levels, and the often deleterious effects on children and teachers, from evidence from our local schools, from colleagues and the educational press, and from my doctoral research. The top-down, impositional, managerial ethos seemed to me to be contrary, if not antithetical, to the caring essence and ethos in the meaning of education derived from the original Latin *educare* and *educere* which invoke nurturing, fostering and drawing out.

Whilst conducting research for the Thesis in the late nineties, I felt that my analysis was increasingly validated - that the argument needed to shift from a focus only on 'environmental education' or 'education for sustainability' as contained sets of theory and practice, towards the much more ambitious and difficult task of envisioning and articulating an alternative educational paradigm. If, as I felt, there was evidence of an emerging postmodern ecological paradigm capable of challenging modernism and going beyond deconstructionism, then logically, it had implications for most areas of human thought and endeavour. This was about far more than getting ecological concepts into the curriculum, it was about re-visioning education through the

employment of ecology as the fundamental organising metaphor. As I would later write, it was less about the 'learning of ecology', more about the 'ecology of learning' (Sterling 2003). In 1999, and with the Thesis barely half-written, I was offered the opportunity to contribute to the Schumacher Society's 'Briefing' series on aspects of sustainability. I decided to write the education Briefing as a way of accelerating the Thesis research, but also as a way of getting some key ideas out into public debate. I soon decided on the title 'sustainable education' as way of suggesting the need for a shift of culture in educational thinking and practice itself, rather than 'education for sustainability' which tends to put the emphasis on the effects of education - a distinction between education as 'subject of change', and as 'agent of change' which I had made earlier in the 1996 Earthscan book. Using systems ideas, I saw this important difference in terms of the need for at least second-order change - a significant shift in the way we view education and learning achieved through deep reflexivity - rather than the first-order change (making adjustments in the existing system) so often assumed in education for change movements. By mid-2000, the Briefing was half completed, and I was able to both inform and test the ideas at my second Fritjof Capra course held at Schumacher College - an experience which gave me confidence and inspiration to finish the Briefing. It was published as *Sustainable Education - Re-visioning learning and change,* in June 2001 (Sterling 2001). The term 'sustainable education' has since entered the debate.

Also in the late nineties, I was asked to help WWF Scotland with a project on systems thinking, education and (initially) river management. This evolved into the 'Linkingthinking Project' and I became lead writer for the generic units which attempted to introduce relational thinking skills and concepts to teachers, lecturers and students in as jargon-free a way as possible, and fill a gap in the 'thinking skills' debate which hitherto had seemed to ignore systemic thinking entirely. The very positive feedback from the trialling stage has indicated a real need for such materials and approaches in education, and in my own mind I have viewed the project as one practical expression of the whole systems thinking ideas that I have worked on at a more philosophical level in my Thesis.

Whilst the process of writing the Schumacher Briefing consumed valuable Thesis writing time, its publication assisted the Thesis in other ways. Not least, the very positive reaction from readers and reviewers and take-up of the notion of 'sustainable education' strengthened my belief that the basic argument was not only sound but resonated with many people's sense of crisis and opportunity in educational thinking

and practice. Further, I found that the book was quickly being used by people at different levels of the educational system from policymakers (for example the Ministry of Education in Sweden) to course leaders and students, and non-governmental organisations (NGOs). Therefore the Briefing has proved a useful 'litmus test' for the more extensive argument that I proceeded to work on in my Thesis during 2001 and 2002. The Briefing suggested a model of staged change in learning and the need for and value of transformative or deep learning in relation to sustainability. I was aware that a significant number of participants in the learning community facilitated at Schumacher College had, over a period of years, reported such learning experiences. I was pleased, therefore, in 2002 to be invited to co-conduct an evaluation of learning at the College and employ an interpretation informed by a systemic approach (Sterling and Baines 2002). This work threw further light on the nature of the transformative learning experience and possible implications for formal education.

Looking back – and forward to the Thesis

Over the two past decades, I have worked with feet both in the academic and the NGO worlds. Being freelance for most of this period, I have not fully belonged to either sector, and felt this to be an unusual stance which has perhaps afforded insights I might not have otherwise gained. I have enjoyed engagement in the academic debate on the nature of environmental education and education for sustainability (which only gained any real momentum from the late eighties) - but been frustrated by the tendency of academic debate to be divorced from action. I have enjoyed the ability of the NGO world to innovate and respond quickly to opportunity with innovative programmes, but been frustrated by its tendency to oversimplify theory on education and sustainability. This dual involvement reflects my own interest both in theory and philosophy on one hand, and practice and change on the other, and I have seen them as co-informing in my own work. This is also a stance which the South Bank University programme, with which I have worked since 1992, reflects in its approach.

Throughout the period described above, I feel I have elaborated a coherent but ever-evolving personal view of the world informed by ecologism, holism, organicism, and systems thinking at philosophical level, and by both Taoist and panentheistic influences at a spiritual level, giving rise to a sense of transpersonal ethics - essentially, a deeply relational view of the world. I have an empathetic sense of 'the Other' both living and non-living, and an awareness and belief that the quality of relation affects everything we think and do. In 1997, I trained in Reiki healing, and this of itself altered my view of

non-material reality and the relation between this and the biophysical world. All this has influenced my outlook on and voice in environmental education.

From joining CEE in 1978 through to the present, I have developed an international reputation in the professional field. In undertaking the doctoral research, I have brought these two strands, the personal and the professional together - and for both personal and professional reasons. At the personal level, I was curious to take my methodological approach (described above) of seeking pattern and coherence to see how far my intuitive sense regarding the integrity and potency of the ecological paradigm was valid. I had an increasing sense that many of the thoughts and insights that I had come across or developed over the years suggested the possibility of a more whole, coherent and credible argument and I wanted to research and test this further. At the professional level, I felt a responsibility for the ideas that I was presenting in papers, lectures and workshops, and I wanted to investigate their deeper grounding and validity. I hoped that the inquiry would reveal a stronger and more articulate basis for arguing for ecological and systemic approaches in education in general, and environmental education in particular. Further, I hoped that I would develop ideas and models that would help educators - with whom I either had direct or indirect contact - develop ways of progressing their own ideas and practice and overcome the obstacles that many found in common, even in different parts of the world.

I am motivated by a deep concern for the state of the world and the planet, and by the belief that it is our individual and collective worldview that is the key both to crisis and resolution. Essentially, the Thesis concerns how far we are learning towards some kind of sustainable future, and how an ecological consciousness might be advanced through re-visioning the nature and role of education and of learning. In this sense, the investigation began in my experiences many years ago, and the doctoral research is but the latest and formalised stage of an on-going process which has occupied much of my personal and professional life as related above.

In the eight-plus years that the Thesis has been worked on, I feel that systemic and ecological thinking have, at least to some extent, become more recognised in public discourse. Even where the labels have not been used overtly, more holistic, connective, integrative thinking and approaches are increasingly in evidence both in education and wider society - and yet it feels we are still in the early stages of any significant change in consciousness.

This sense of emergence, learning and transition means that the whole Thesis is a reflexive exploration, as indicated in the title. Many of the arguments made, the conclusions drawn, the models and frameworks developed, the relationships suggested, are tentative and offered in a probing and invitational spirit of enquiry, rather than assertion.

The quotes I have chosen to head Part A reflect my assumptions and starting points for what follows in the rest of the Thesis:

- *the Einstein quote - that we need to be able to see 'with new eyes' in order to move beyond the problems the prevailing consciousness has created and this applies at both micro and macro levels:*
- *the Clayton and Radcliffe quote - that sustainability requires a far deeper and more extensive response than a simple environmentalism;*
- *the Bateson quote - that how we perceive and construe the world affects how it comes to be, for good or ill;*
- *the Shakespeare quote - that the quality of thinking is intimately linked to the quality of our experience;*
- *The Schumacher quote - that there is a need for qualitative change in the purposes and practice of education;*
- *The Lyle quote - that ecology implies and requires a changed worldview.*

1.5 Framing the research - asking the questions

My experience, as related above, led me towards a number of research questions related to environmental education. In wider society, I discerned limits to the efficacy and influence of systems thinking and environmentalism, and saw all these issues as parts of an interrelated whole. Such issues gave rise to a list of personal concerns, including:

- What is the root of the ecological and associated crises, and why do we find it so difficult to resolve them?
- How and why are environmental and sustainability education limited in their ability to make a significant difference to social change?
- What is the essential nature of the dominant paradigm that influences thought and debate in society as a whole, and in educational thinking and practice?
- How can we perceive this paradigm if we are part if it, and it is part of us?
- What evidence is there for an emergent postmodern ecological paradigm?

- What is the essence of ecological thinking and does this offer a credible way forward beyond modernism and deconstructionism?
- Why has not systems thinking been more successful in countering reductionist and objectivist thought?
- Why are ‘the environment’ and environmentalism often seen as separate by and from the mainstream?
- What is, and what might be, the relationship between ecological thinking and systemic thinking and can these be brought together in ‘whole systems thinking’?
- How do these forms of thought relate to the sustainability debate, and to the cultural context of modernism and postmodernism?
- Do emerging metaphors such as ‘living systems’ and the tentative insights of complexity theory help us escape the dominance of mechanism as an operative metaphor in thinking and practice, particularly in education?
- What quality of learning appears necessary to facilitate a shift of consciousness from the dominant paradigm to one which is more healing and conducive to sustainability?
- What do we know about the relationship between transformative learning and paradigm change?
- What are the implications of whole systems thinking and an ecological paradigm for change in educational thinking and practice, and in particular in environmental education?
- How can all this be brought together in a logical, clear and accessible way, and in a way that enables me and interested others to move forward?

I focussed these questions down to the following:

- Why are education as a whole, and environmental and sustainability education in particular, limited in their ability to make a positive difference to the human or environmental prospect in terms of helping assure a more sustainable future - and how might they become more transformative?

This gave rise to a research agenda, which is described in Part A.

1.6 Achievement

Whilst it is for others to judge the achievement of this inquiry, my overall assessment is as follows:

I have explored the grounding of revisionary postmodernism, systemisism, and ecologism through analysis, have employed abductive approaches to explore common patterns within the four fields that I have identified as foundational to whole systems thinking, and synthesised a key model and theory of learning and change which, I believe, by its articulation, helps us move beyond the grip of mechanism in our personal, social and educational paradigms, through clarifying the possibility of deep learning. I have suggested why and how systemic thinking and ecological thought/thinking should develop a closer synergy in addressing the challenge of the sustainability transition, and indicated what this means for environmental and sustainability education within the contexts of systemic change in education as a whole, and of signs of transformative change in our cultural worldview.

1.7 To the reader

The Thesis is long. However, I have tried to write it so that any Part, or even any section, can be read meaningfully without necessarily referring to the rest of the text. Second, because of an iterative structure, any theme of interest to the reader - such as 'learning levels' - can be picked out from the Contents and followed through the Thesis as a flow of argument, discussion and application. More details of the structure of the Thesis may be found in Part A, subsections 1.1 and 2.4 below.

1.8 A last word

The Thesis has taken some eight years to write, as it has been self-financed and in my 'spare time', coinciding with the birth of one and the early years of both our children, and with a need to keep my freelance career and family income reasonably afloat. There have been many interruptions and difficulties as a result. Over this period, my ideas have evolved and new sources have kept appearing or have been discovered. Hence, I found some of my older writing had to be revised, edited or discarded. It would have been much easier to write in two years full-time - yet, I've been aware of the benefit of a gradual maturation of ideas and a slow but deeper learning process occurring, which I hope is reflected in the actual writing. If I had known at the outset what I have learnt over these years, no doubt the Thesis as a whole would be more concise, elegant and sharp, but inevitably the path was made in the writing, and not before. However, I hope it is readable and accessible, and brings some clarity to an area of thought which I believe more strongly than ever, is critical to our common future.