

Chapter 4 Critical realism - a philosophical framework for higher education for sustainability

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. . . environmental education must weave an analysis of power, politics and the state into an ecology's sense of sustainability, survival and the environment. This kind of interdisciplinary effort could develop a deeply contextual understanding of nature and society as holistic cluster of interdependent relations. Luke, 2001, p.200.

In addressing an appropriate philosophy of knowledge and education to enable the kind of interdisciplinary effort that Timothy Luke recommends, this chapter begins by considering a textbook series that is widely used in the UK.

In the year 2000 Routledge listed forty nine published and forthcoming titles in the series *Introductions to the Environment*. Fifteen of these were environmental science texts in such areas as environmental biology and soil systems; eight were environment and society texts in such areas as environment and economics or environment and planning; the remaining twenty six were environmental topics texts, including one on environmental sustainability. At that time the list did not include a text on the environment and education.

In their preface to the environment and society titles the editors, David Pepper and Phil O'Keefe (2000), write of the mushrooming of research and scholarship on the relationships between the social sciences and humanities on the one hand and the processes of environmental change on the other. This has been reflected in the proliferation of associated courses at undergraduate level, while at the same time changes in higher education mean that an increasing number of such courses are being taught and studied within modular frameworks offering maximum choice or flexibility. Finding more traditional textbooks inadequate the authors and editors had responded to these new challenges by writing texts based on their own course materials.

While seeking 'the right mix of flexibility, depth and breadth' and 'maximum accessibility to readers from a variety of backgrounds' as it sketches 'basic concepts and map(s) out the ground in a stimulating way', the series as a whole, like other attempts to classify and present environmental knowledge, raises important issues of interdisciplinarity in higher education for sustainability (HEfS). Are there texts (aspects of environmental science, environment and society, environmental topics) that are more important than others? Are there key concepts, ideas, and values that link the texts together and provide for a common focus on sustainability? How do the texts deal with issues of philosophy, ethics and politics? Do they accommodate local, non-academic, environmental knowledge? Do they tell a grand story or narrative of the transition to sustainability or many small stories? Above all, do they empower students as ecological citizens who are capable of playing an informed and active role

in this transition? Do they embody a critical pedagogy that fosters such citizenship? Do they reflect the kind of interdisciplinary effort to which Luke refers?

In addressing an appropriate philosophy to underpin such interdisciplinarity, this chapter argues that the key requirement of institutions and courses that seek to educate for sustainability is a philosophy of knowledge that integrates the natural and social sciences and the humanities, accommodates local knowledge, supports critical pedagogy, and continues to regard education as a form of enlightenment linked to a vision of more sustainable futures. It suggests that critical realism provides such a philosophy. This can resolve the tensions between mainstream, Marxist and postmodern environmentalisms in progressive ways, and underpin an HEfS based on a constructive postmodern cosmology, science and grand narrative (Gare, 1995).

Divisions of academic knowledge

Peter Dickens (1996) reminds us that the crisis of sustainability is both a crisis of the ways in which modern capitalist societies combine with nature and a crisis of understanding whereby the citizens of those societies fail to understand their relations with nature. The rise of modernity and new forms of industrial production separated people from nature with new kinds of knowledge contributing to this alienation. People were separated from the land, from the products of their labour, from one another, and from their own inner nature, by new social, technical and spatial divisions of labour that also separated them from knowledge that enabled them to make sense of the world. New forms of generalised and abstract knowledge, that could be applied to the control and management of nature and society, gained power and displaced the local knowledge that people used to monitor, understand and control the consequences of their actions.

The modern university became an institution that reflected modern reductionism and dualism. Academic divisions of labour separated knowledge into discrete compartments with separate natural and social sciences largely talking past one another. Students failed to understand how knowledge connects, how processes in the social world might combine with those in the biophysical world to produce sustainable development, and how people's local knowledge can combine with academic knowledge to foster such development.

Dickens (1996) argues that HEfS requires a unified science that can explain how social processes as understood by the social sciences combine with ecological and biophysical processes as understood by the physical and natural sciences. Critical realism (Archer et al, 1998, Collier, 1994) provides an appropriate philosophical foundation for such a science which is socialist in that it predicts the need for greater self management and new kinds of ecological (Barry, 1996, Dryzek, 1997) or cosmopolitan democracy (Held, 1995) if development is to realise the social, cultural and personal dimensions of sustainability alongside the ecological and economic.

Interdisciplinarity

While the rise of the new social movements and the impact of radical politics on universities in the late 1960s and 1970s led to interdisciplinary courses, including those in environmental and development studies, Jones and Merritt (1999) draw on

reports from the Higher Education Funding Council to suggest a dearth of interdisciplinarity in contemporary British environmental higher education. Like *Introductions to the Environment* most courses are multidisciplinary rather than interdisciplinary, juxtaposing knowledge in often unrelated parts rather than realising a genuine integration of disciplines. Interdisciplinarity challenges academics to reconcile ideas about the nature of reality, how that reality can be known, and what procedures should guide enquiry (ontology, epistemology, and methodology) and we will see that critical realism offers a philosophical framework for accommodating different knowledge claims. It is particularly relevant for HEfS which focuses on an ambiguous and contested concept (Bourke & Meppem, 2000, Sachs, 1997) and where knowledge (in such areas as climate change or the impact of genetically modified organisms) is often uncertain and provisional in nature.

Geography is a particularly significant for HEfS since it has long concerned itself with the relations between the biophysical and social worlds. Advances in the subject that draw on ideas reviewed in this chapter now allow an intradisciplinary approach that may be superior to some interdisciplinary and multidisciplinary approaches (Huckle & Martin, 2001). Readers can assess the relevance of UK university geography by visiting the Learning and Teaching Support Network for Geography, Earth and Environmental Sciences (<http://www.gees.ac.uk/planet/index.htm>), and the Geography Discipline Network (<http://www.chelt.ac.uk/gdn/>). In the latter's resource database they will find Judy Chance's paper on curriculum integration at Oxford Brookes University, a leader in HEfS (Pepper, 1996). In the remainder of the chapter an asterisk indicates a geographer (eg. Pepper*, 1996) in order to highlight the subject's potential.

Local knowledge and citizen science

Before moving to a consideration of critical realism it should be noted there is currently much evidence of individuals and workers' and citizens' movements attempting to re-embed themselves in nature by discovering new ways of working, living, and knowing. Those who reject science are clearly not progressive but others do seek to engage private corporations and the state in new forms of consultation and participation aimed at creating forms of knowledge or citizen science (Irwin, 1995, Eden*, 1998) that have greater relevance to their lives. As citizen science, a unified science for sustainability should combine relevant aspects of academic or abstract knowledge with relevant elements of the local (tacit and lay) knowledge that people develop in their everyday lives. Tacit knowledge is that which cannot be easily described or encoded in the form of words, written documents or other impersonal means (eg. the farmers' knowledge of soil, children's knowledge of their playground), while lay knowledge is popular, commonsense knowledge that may enable people to live sustainably with one another and the rest of local nature. New information technologies such as the internet allow people to link abstract and local knowledge in new ways and so provide for a critical postmodern pedagogy (Castells et al, 1999). Universities can clearly assist in developing citizen science, use postmodern pedagogy, and so help to empower their students and the wider community with new ideas and outlooks.

Dialectical materialism

Critical realism is a materialist and dialectical philosophy. Materialism maintains that the world should be understood primarily in terms of matter and material causes rather than spirit, mind or ideas (idealism), while dialectics suggests that such matter is best viewed as a system of processes, flows and relations, rather than a complex of ready-made things (mechanical materialism, positivism) (Cornforth, 1987, Harvey*, 1996). People and other organisms do not exist outside of or prior to the processes, flows and relations that create, sustain or undermine them. They are constituted by flows of energy, material and information in ecosystems, made possible by the relations between things in the biophysical and social worlds. The new biology and the life sciences support dialectics, seeing a constant two way exchange between organisms and their environment such that the one shapes the other with no sharp dividing line between them. The idea that people constantly change nature, and develop in relation to a nature that they modify or socially construct, accords with our practical or commonsense view of the world and offers a starting point for collapsing the dualism between the natural and social sciences.

In addition to seeing everything in nature as related and in a constant state of transformation, dialectics also regards nature as undergoing an evolutionary process towards higher states or self-organisation and complexity (Lewin, 1997, Manson*, 2001). Organisms contain latent structures and potentialities which are realised in different ways in different environments and some organisms are more successful in changing environments and adapting to them than others. Humans have been particularly successful but there is accumulating evidence that they are modifying or constructing nature in unsustainable ways and that it is taking its revenge. Contradictions between the promise and reality of modern development now challenge them to reshape the processes, flows and relations in ecosystems (by developing new technologies and forms of social organisation) in order to put development on a more sustainable path. Sustainable development requires the co-evolution of society and the rest of nature, and dialectics suggests that the prospects of such development are linked to the struggles of opposing forces that are inherent in all things. Particularly significant for education is the struggle of ideas (Sneddon*, 2000).

Hartmann (1998) reminds us that ideas about sustainable development are inevitably contradictory since its advocates have different values and interests and wish to sustain different sets of ecological, environmental and social relations. Attention to all three sets of relations leads him to suggest that maintaining the metabolism between bio-physical and social systems in ethically and politically acceptable ways, involves sustaining:

1. Relations among humans (social relations) based on mutual respect and tolerance. Just relations allow equitable access to food, clothing, health care, shelter and meaningful work, provide for freedom of thought and mental development, and promote democratically determined political and economic decisions.
2. Relations among humans and other species (environmental relations) that minimize human domination of and impact on other species and their environments or habitats.
3. Relations among organisms and their environment (ecological relations) which have created the climate, hydrological cycle, radioactive levels, and other environmental conditions (ecological processes) that we have experienced throughout most of human history.

Creating and maintaining these relations requires us to care for the welfare of other human beings, future generations and other species, and requires us to translate this concern into appropriate forms of governance and citizenship (Christie & Warburton, 2001). Appropriate forms of education can guide such development but dialectical materialism suggests that education should be a form of praxis that is process rather than product based (Gadotti, 1996). Since all knowledge starts from activity in the material world and returns to it dialectically, theory becomes a guide to practice and practice a test of theory. Critical pedagogy is developed around concepts of structure, power, ideology, emancipation and critique (Janse van Rensburg et al, 2000,) and claims that knowledge and truth should not be products to be transmitted to students, but practical questions to be addressed as students and teachers reflect and act on significant events and issues that affect their everyday lives. Efforts to realise sustainability on the campus, and in the surrounding community, can provide opportunities for praxis and for evaluating academic ideas alongside lay and tacit knowledge.

Critical realism

Critical realism is a development of dialectical materialism. It acknowledges that the mind only knows the world by means of perception, thought and language, but clings to the ontological assumption that there is a real objective knowable material world. This real world displays three levels of abstraction at which mechanisms can be examined and knowledge generated. At the deepest or more abstract level are the real objective powers of objects, the processes made possible by relations between things. At an intermediate level are more contingent factors, specific to given historical and social circumstances, which determine whether or not objective powers are realised (whether processes cause events). At the surface level are experienced phenomena which arise out of the combination of objective powers with contingent factors and can be observed at a given place and time. Realist explanation consists of connecting experience in the empirical domain (eg. warmer summers, more frequent storms) to structures and processes in the real domain (eg. the workings of the atmosphere and global energy economy) through contingent factors in the actual domain (eg. increased use of fossil fuels, failure of politicians to control carbon emissions).

Critical realism offers a unified approach to the natural and social sciences while recognising real but different structures and processes with the physical, biological and social worlds. The biological world is emergent from the physical world and the social world emergent from the physical and biological worlds. The causal mechanisms and properties of inorganic and organic nature combine with human nature in dialectical ways allowing each to grow and develop in ways that are more or less sustainable. The new physical and life sciences enable us to understand the dialectical and systemic nature of the physical and biological worlds and the processes of emergence that underpin the principle of qualitative change. The critical social sciences enable us to understand the ways in which social institutions (eg. markets, systems of production, governments, universities) facilitate or undermine the interactions between human and non-human nature that foster sustainability.

Social science needs to be combined with natural science to understand how society is embedded in nature, while natural science needs to be combined with social science to

understand the forms that nature takes in specific social (historical and geographical) circumstances. Critical realism offers a unified science with the methods of the natural and social sciences sharing common principles but adopting different procedures due to their different subject matters. The social sciences can be sciences in the same sense as the natural sciences but not in the same way. This is because:

- The subject matter of the social sciences cannot be reduced to that of the natural sciences (eg. human behaviour cannot be reduced to biochemical reactions), there are qualitative differences;
- Social reality is pre-interpreted. Society is both produced and reproduced by its members and is therefore both a condition and an outcome of their activity (social relations and structures). The social sciences have a subject-subject relationship with their subject matter, rather than a subject-object one of the kind that characterises the natural sciences;
- Social structures, unlike biophysical structures, are usually only 'relatively enduring'. The processes they enable are not universal or unchanging over time and space.

Critical realism is anti-positivist since it claims that to explain a phenomena it is not sufficient to show that it is an instance of well established regularities or connections, but necessary to discover its connections with other phenomena via knowledge of the underlying structures and mechanisms that work to produce these connections. It accepts a weak social constructivism (Dickens, 1996) by recognising that social reality is pre-interpreted and that language, discourse and ideology shape its production and reproduction. At the same time it rejects a strong social constructivism that denies the material reality of nature.

Critical realism regards nature as socially constructed or produced in two senses: it is materially shaped by social practices and it is existentially produced as cultural meanings, discourses and representations. Nowhere on the surface of the earth is there a 'first nature' untouched by human influence but when speaking of the social construction of nature we should not imply that such natures as the countryside, food, our bodies, and landscape, are wholly artefacts of society or culture. To do so would deny a realist concept of nature that *refers to the structures, processes and causal powers that are constantly operative within the physical world, that provide the objects of study of the natural sciences and condition the possible form of intervention in biology or interaction with the environment. The nature whose laws we are always subject, even as we harness them to human purposes, and who processes we can neither escape nor destroy* (Soper, 1995, p. 155/6)

Nature in the realist sense sets elastic limits on how people can live in the world, but for the critical realist nature is a theoretical, explanatory concept, not a source of value. It tells us the facts about our predicament but we ourselves must decide what forms of ethics, politics and governance should regulate our relations with the rest of human and non-human nature. Democratic socialist politics appear rational to critical realists (Collier, 1994, p. 200) because:

- Socialism suggests that change comes about by changing social structures and mechanisms not by changing the way we view the world (idealism);

- There is a correspondence between critical realism's world view and certain models of socialist cosmopolitan or ecological democracy. Just as the world is one of stratified mechanisms, with wholes not reducible to parts nor parts to wholes, so a genuine democracy should embrace all sites of power (the body, social welfare, the economy, culture, civil society, coercive relations and organised violence, regulatory and legal relations) at all levels from the local to the global.
- A socialist political philosophy should be partly based on knowledge of those constraints which prevent human nature (and the rest of nature) from realising its potential. In that critical realism, linked to critical theory and Marxist political ecology, reveals the contradictions of capitalism, and the associated causes and possible solutions to the crisis of sustainability, it is an appropriate foundation for revolutionary praxis and HEfS.

Critical realism and HEfS

Critical realism's approach to education seeks to overcome the epistemic fallacy that suggests that reality is simply what experience or experiment tells us it is. It claims that the world cannot be changed rationally unless it is interpreted adequately. Such interpretation requires teachers to engage dialectically with students to:

- probe experience;
- liberate knowledge of deeper realities (structures, processes and events);
- reveal those structures and processes that produce and reproduce powerful interests that prevent people from realising their potential;
- expose knowledge or ideology that sustains such interests; and
- reflect and act on alternative structures, processes and knowledge which allow a greater degree of self determination and democracy.

Malcolm Plant illustrates such critical pedagogy by providing accounts of dialectical encounters with students in Chapter 8. For the moment let us consider the example of teachers and students using the internet to interpret corporate social responsibility (CSR), a strategy whereby business claims to be encouraging more sustainable forms of development (Crowe, 2002). Applying Corson's outline of Bhaskar's conception of discovery (Corson, 1991), suggests that this would involve four stages of enquiry or praxis that would reveal the ideological nature of much current CSR and assess its potential given laws forcing environmental and social responsibility on business (Figure 4.1). Such reflection and action is likely to suggest real limits to CSR under capitalism and prompt consideration of ecosocialist alternatives.

Figure 4.1

Critical Education and Corporate Social Responsibility

1. *An effect (result or regularity) is identified and described.* Students use the internet to obtain corporate social responsibility (CSR) reports from a number of firms including Tesco (www.tesco.com/everylittlehelps) and BPAmoco (www.bpamoco.com/alive). They use the Sustainable Development Commission site (<http://www.sd-commission.gov.uk/>) to link such reports to triple bottom line accounting and other approaches to sustainable

- development. They conduct interviews to assess fellow students awareness and understanding of CSR (their lay and tacit knowledge of corporations).
2. *A creative model of the 'mechanism' involved is postulated, as a solution or explanation or response to the problem, which if it were to exist would explain the effect.* Students read extracts from Naomi Klein's *No Logo* (Klein, 2000) and consider her explanation of CSR: that by regulating (or appearing to regulate) themselves corporations avoid or delay regulation by government or democratically controlled law. Such action is an attempt to reconcile the demands of shareholders, consumers, governments, NGOs and anti-corporate campaigners; is encouraged by the decline of class politics and the retreat of the state from public interest issues; and reflects identity politics in risk society (Beck, 1992) that encourages corporations to compete for the public's trust (Swift, 1999). As a 'mechanism' CSR is essentially public relations designed to forestall the imposition of stronger regulation.
 3. *Research of two kinds is undertaken to demonstrate the existence and operation of the mechanism: the first kind, to isolate and in some instances observe the mechanism in action; the second kind to eliminate alternative plausible hypotheses.* Students relate Klein's explanation of CSR to Labour MP Linda Perham's private members' bill that calls for social, financial and environmental reporting to be made mandatory; requires companies to consult on big projects; and demands rights of redress for citizens negatively impacted by business activities. The bill would place specific duties and liabilities on directors and companies and proposes the establishment of a new regulatory body (Macalister, 2002). Does the background to the bill and its support by a coalition of NGOs, including Friends of the Earth (www.foe.co.uk/campaigns/corporates/), suggest CSR is working as Klein suggests? Alternatively, is CSR 'an important part of modern business thinking (in which) British firms are leading the way by showing how they can make a difference on the ground' (Confederation of British Industry, www.cbi.org.uk) and where 'excessive intervention risks stifling innovation' (UK Government Report on CSR, www.ukonline.gov.uk/).
 4. *The postulated mechanism, once shown to be real, becomes available as evidence for interpreting the world (as it is or has recently been); action to replace unwanted with wanted forms of determination provides the critical concluding phase in this emancipatory process of discovery.* Students decide their own position on CSR and its implications for their behaviour as citizens and consumers. Some embark on a campaign to extend their fellow students' understanding of CSR and link this with an audit the university's suppliers and action to replace those with a poor record on CSR (eg Exxon www.stopesso.com) with those they consider to have a better record.

While the example in Figure 4.1 draws on economics, business studies, politics, sociology and ethics, it does not require knowledge from the natural sciences. A similar four stage enquiry into global warming, the impact of genetically modified crops, or the conservation of fish stocks, would require such knowledge and readers may wish to consider such a topic and the manner in which the competing knowledge claims of environmental scientists should be handled and bio-physical knowledge combined with that from the social sciences and humanities.

Having examined the potential of critical realism to provide a philosophical framework for interdisciplinarity in HEfS, it remains to examine how the framework can combine elements of mainstream, Marxist and postmodern environmentalism.

Mainstream environmentalism

Mainstream environmentalism and environmental education are technocratic, pervaded by positivism, and place the environment outside society, beyond the grasp of ordinary citizens, to be managed by experts in such areas as resource management, risk assessment, and curriculum planning (Luke, 2001). These experts have varying amounts of power to define environmental issues (generally as ‘green’ issues at the expense of ‘brown’ issues) and prescribe technical, behavioural and legislative ‘fixes’ that leave existing social relations relatively undisturbed. Environmental economists are particularly influential in shaping the mainstream discourses of sustainable development and ecological modernisation, but the mechanisms they advocate to put value on ecological capital, ‘price the environment’, and increase resource productivity, face real limits in an era of globalisation and deregulation. Evaluating elements of the environment solely or mainly in terms of their monetary or exchange value encourages people to regard them simply as commodities. Such commodity fetishism mystifies the relationship between people and the rest of nature and prevents them from understanding and controlling the system of which they are a part.

Clearly HEfS should not ignore mainstream environmentalism and approaches to sustainable development. Students should read mainstream texts, understand the substance, processes and tools of sustainability as advocated by mainstream reformers, and recognise that while the ‘greening of capitalism’ is to be encouraged it may not deliver social, cultural and personal sustainability (social justice, cultural diversity, physical and mental health) along with ecological and economic sustainability (Sachs, 1999). As we have seen such limits are revealed by giving due attention to the power relations that shape the fate of proposed and real reforms to environmental relations.

Marxist environmentalism

My accounts of dialectical materialism and critical realism have already sketched some elements of Marxian thought that explain the development of human nature alongside the rest of nature. Marxist environmentalism regards the contemporary capitalist world order as one that is unsustainable because the drive for capital accumulation results in inter-related economic and ecological crises. These crises prompt workers and citizens’ movements to struggle for a more sustainable order assisted by transformative intellectuals who present a range of critical ideas for validation in praxis or critical action research.

Central among these ideas are those relating to the production of nature or the way in which nature and capital co-constitute one another in temporally and geographically varied and contingent ways (Castree*, 2000, Castree* & Braun*, 2001, Braun* & Castree*, 1998, Dickens, 1997, Smith*, 1984, 1996). Both capital and realist nature exert power or agency in such production but the diversity of capital/nature relations in time and space means that we should be cautious about making (teaching) universal statements about the causes of unsustainable development or the route to

sustainability. Some productions of nature are more beneficial to humankind than others and questions of environmental ethics can similarly not be addressed in general terms. What is sustainable and beneficial in one time, place and culture may be unsustainable and destructive in another.

In developing a political ecology that integrates ecology and environmental issues into political economy (Keil et al, 1998) Marxist environmentalists seek to overcome the latent dualism and industrialism in Marx's thought; apply critical ideas about such topics as the state (Johnston*, 1989), globalisation (Held et al, 1999), and feminism (Dordoy & Mellor, 2000); and develop the theory and practice of a sustainable eco-socialism based on new economies of time and nature and new forms of welfare and citizenship (Pepper*, 1993, Little, 1998, Soper, 1999). The journal *Capitalism Nature Socialism (CNS)* provides a guide to these developments and its contributors include those who draw on critical theory and related theories of reflexive modernisation (Beck, Giddens & Lash, 1994, Blowers*, 1997). The articles in CNS's Teaching Political Ecology series (<http://gate.cruzio.com/~cns/syllabus/>) are particularly relevant to the theme of this chapter (eg. Walker, 1998)

Critical theory shifts the focus of Marxist environmentalism from the economy and capitalism to technocracy and modernity (Barry, 1999, Goldblatt, 1996). Instrumental reason (positivism) rather than capital accumulation is now the prime target of critique, and Habermas' theories of legitimation crisis, knowledge constitutive interests, communicative action, and colonisation of the lifeworld, provide insights into the crisis of sustainability, the interests shaping different kinds of EfS (technical, hermeneutic and critical), critical pedagogy, and the role of new social movements in the creation of an ecological democracy (Huckle, 1996). Sustainable development requires the erosion of instrumental reason and its control by communicative reason that can balance considerations of what is technically possible with considerations of what is culturally appropriate and morally and politically right.

Habermas' ideal speech situation provides a context for balancing such considerations free from social structures that systematically distort communication, so allowing people's common interest in sustainability to emerge. It is a model for organising and evaluating the knowledge claims advanced by different disciplines during an interdisciplinary enquiry and for cultivating the kind of critical thinking and values awareness sought by the Teaching and Learning at the Environment-Science-Society Interface (TALESSI) project (www.greenwich.ac.uk/~bj61/talessi/). Readers are encouraged to visit the project's website, consider its rationale in relation to the arguments advanced in this chapter, and evaluate some of its teaching and learning resources on sustainability after these have been downloaded and used in the classroom.

Postmodern environmentalism

While the development of postmodern science (the new physical and life sciences including quantum theory, complexity theory, and postmodern ecology) confirms dialectical materialism and critical realism in their assertion of a dynamic world of structures and processes, postmodern popular and academic culture raises contradictions for HEfS. On the negative side it fosters ironic detachment and a nihilistic indifference to the world that undermines any prospect of co-ordinated

political action for sustainability. On the positive side it brings a new sensitivity to marginalized voices and knowledge claims concerning science, environmental issues and sustainability.

Postmodern approaches to the social sciences and humanities reject critical realism's ontology, claiming that there are no universal foundations for knowledge in realist nature or that there is no reality outside language and discourse. Since there is no single reality, there can be no grand theories to explain how reality works and hence no prospect of progress or utopia based on related grand narratives (eg. Marxism, ecological modernisation). Since all 'truths' including scientific ones are particular to the groups or societies that believe them and have no universal validity, the grounds for common agreement (communicative action) together with the emancipatory power of social criticism and critical pedagogy are undermined.

While critical realism rejects postmodernism's ontological relativism or strong social constructivism (Gandy*, 1996, Proctor*, 1998) it can, as noted above, accept a weak social constructivism that accommodates epistemological pluralism (there are many ways of knowing and many perspectives and discourses on the environment and sustainability). The related challenge for HEfS is to ensure that its critical pedagogy is also a constructivist pedagogy (Janse van Rensburg et al, 2000) that builds upon student's existing knowledge and interests, accommodates lay and tacit knowledge, and acknowledges how power is wielded through language and discourse. By engaging with cultural politics, marginalized voices, and texts of all kinds, such pedagogy can reinvigorate the modern vision of education as enlightenment (Parker, 1997).

Risk society produces a new generation of youth between the borders of a modern world of certainty and order informed by the culture of the West and its technology of print, and a postmodern world of hybridised identities, electronic technologies, local cultural practices, and pluralized public spaces. Consequently many students experience programmed instability and transitoriness, and are condemned to 'wander across, within or between multiple borders and spaces marked by excess, otherness, difference, and a dislocating notion of meaning and attention' (Giroux, 1999, p. 103). Critical pedagogy should address their shifting attitudes, representations and desires by fostering aesthetic and cognitive reflexivity (Beck, Giddens & Lash, 1994); enabling them to reflect and act on the structural roots of their own subjectivities; and so developing a shared language of resistance that points to possibility and hope. HEfS has a key role to play in this regard.

Conclusion

Dialectics and critical realism do then offer a philosophy that transcends the limits of mainstream, Marxist and postmodern environmentalisms, acknowledges their achievements, and allows the construction of a new grand narrative of sustainability that both relegitimizes and radicalises modernity (Gare, 1995, Jencks 1996, Myerson, 2001). This is a narrative about the co-evolution of society and the rest of nature, their generative qualities, and the need for improved rationality and governance so that tendencies towards self organisation and complexity can lead towards greater sustainability. It allows students and teachers of HEfS to see themselves as part of an

unfinished story and provides an overarching rationale for curriculum development and interdisciplinary.

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