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ONGOING AND FUTURE DIRECTIONS OF RESEARCH ON HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT

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Introduction

To understand the way we think about the present, we need to examine the past. The ideas academics have today do not spring into their minds from nowhere, but are rooted in earlier terminologies, practices and debates of which they are likely to be only partly aware. To understand the prospects for higher education for sustainable development we therefore need to examine its principle historical influences. Space is limited, so this discussion restricts itself to two such influences. These are work in environmental education, and education for sustainable development. With this brief analysis in hand, the rest of the chapter considers the successes and challenges of the present and the prospects for the future. In particular, it notes that much sustainable development education in higher education takes place in partial or absolute ignorance of the existence of something called 'Education for Sustainable Development' (ESD), and asks whether this matters and why. In particular, this gives rise to a discussion of the differences between, on the one hand, identifying and assessing ESD and, on the other hand, practising and developing ESD in a purposive way.

A brief and selective history

The perception that human societies are damaging their environment, and that there is something potentially catastrophic about this situation from a moral, ecological, economic, spiritual and/or social point of view, has been with us for a long time. To take one example, John Muir's National Park Bill was passed by the US Congress in 1890. It is certainly possible to argue, however, that this is a poor example because, in fact, 1890 is not very long ago at all. It may be that guilt about human activities that increase economic and cultural wealth but also transform the environment has been with us since the events sometimes known as the 'Urban Revolution' which happened around 6,000 years ago (Kriwaczek 2010), or perhaps since the Flood (whatever that actually was) which occurred only a little more recently.

In any case, and notwithstanding the fact that people have been teaching each other things about and in relation to the environment for *as long as there have been* people, the origins of

environmental education as a distinct curriculum project, pedagogic endeavour and object of study are much more recent. Annette Gough (Greenall Gough 1993) dates it to roughly 1970, when the United States' Environmental Education Act was passed. In the 1970s and 1980s much time and effort was expended trying to delineate exactly what environmental education was, and to embed it in national education documents through United Nations conferences and the like. Much of this work was very good indeed and continues to have an influence, albeit usually an unrecognised influence, on how we think about higher education for sustainable development in the present. The following quotation illustrates the approach most frequently taken at that time:

We might define an environmentally responsible citizen as one who has (1) an awareness and sensitivity to the total environment and its allied problems ... (2) a basic understanding of the environment and its allied problems ... (3) feelings of concern for the environment and motivation for actively participating in environmental improvement and protection, (4) skills for identifying and solving environmental problems ... (5) active involvement at all levels in working towards resolution of environmental problems.

(Hungerford and Volk 1993: 8–9)

There are a number of points that we might note here. Firstly, everything that is being proposed is sensible enough in itself. Teaching these kinds of understandings, awareness and skills seems reasonable, and there are, without doubt, academic colleagues around the world today teaching sustainability topics in science and engineering who might see the above as a pretty decent working definition of what they were hoping to achieve. It is hard to see why anyone would be *against* such teaching. It is quite straightforward to identify more recent work that would appear to be in some respects a development of the Hungerford and Volk approach, even if this is not necessarily made explicit. So, for example, when Disterheft *et al.* (2013) write of 'sustainability science' we might say that they are developing a new idea in a long-standing, and sometimes marginalised tradition:

Sustainability science has emerged over the last decade as a new interdisciplinary field that attempts to conduct problem-driven and action-oriented research on the challenges mentioned above, striving to link knowledge to social actions and creating new visions of natural and social well-being.

(Disterheft *et al.* 2013: 10)

Secondly, however, the Hungerford and Volk text normalises a number of assumptions that are, in fact questionable. These are:

- The appropriate lever for bringing about change is action by citizens. This assumes that citizens have real power, that people think of themselves as citizens (rather than as employees, employers, Christians, Muslims, parents or something else) when making important choices, and, in fact, that everyone *actually is* a citizen.
- The 'problems' that we are concerned with reside *in the environment*. So if they are to be solved it is the environment and its workings that we need to understand. An alternative formulation would be that the problems ultimately reside in society.
- The rather more arcane but, as it has turned out, very significant assumption that scientific understandings can be separated from 'feelings'.

From about 1989 onwards these assumptions were in fact challenged by an alternative body of work originating, for the most part, in Australia and the UK. Initially, academics in this area made use of a distinction between 'education *in* the environment', 'education *about* the environment', and their preferred 'education *for* the environment'. This new approach has been characterised as 'red-green'. This designation has some merit, but is also an oversimplification. It does capture the attempt to link environmental and social justice issues – something that had also been done in the Brundtland Report of 1987, which offered what is still the most widely cited definition of sustainable development as the meeting of present needs without compromising the ability of future generations to meet their own needs. However, of those marching under the 'red-green' banner some were more red (e.g. John Huckle, Ian Robottom), some more green (e.g. Stephen Sterling, Paul Hart) and some already making the turn towards feminism, postmodernism and poststructuralism (e.g. Annette Gough). The 'red' element also derived methodological impetus from the influence of Kemmis and his work on critical curriculum theorising at Deakin University. The point made by Dobson as early as 1990 – that it is not in the least obvious that the exploitation of the natural world and the exploitation of people are linked in any systematic or predictable way (Dobson 1990) – was largely ignored. This was however a period during which some outstanding scholarship was produced, together with some landmark pedagogy in higher education, most particularly the superb Deakin University/Griffith University Environmental Education Project. Through this body of work 'environmental education' gradually began to lose the interest of academics (although not necessarily of practitioners, who were sometimes confused by the ways things were going) and be replaced by a variety of competing terminologies that eventually became consolidated as 'Education for Sustainable Development'. In fact, 1993 saw the publication – all within the Deakin/Griffith project – of John Fien's *Education for the Environment: Critical Curriculum Theorising and Environmental Education*, Fien and Trainer's edited volume *Environmental Education: A Pathway to Sustainability*, and, within the latter, Fien and Trainer's chapter entitled 'Education for Sustainability'.

To continue this historical account beyond this point would require a book in itself, since the idea of Education for Sustainable Development proved a most suggestive one. It was taken up across Western Europe and Scandinavia, in Russia, Canada, Japan, Africa and elsewhere. In every case academics and practitioners took ownership of the term in their own contexts and shaped it to their particular purposes. Further, in all of these settings work specifically focused on higher education was developed. There are some, perhaps most notably Hopkins, who have been ever present throughout these developments from the earliest days of environmental education, and have worked in most of these countries and continents. Professor Hopkins currently holds the UNESCO OC chair in Reorienting Teacher Education to Sustainable Development at York University in Toronto.

Of course, the 'paradigm wars' are now over. As is often the case with wars, the passage of time has caused matters that were once the source of vehement debate – and even sometimes, sadly, ill-feeling between colleagues – to seem rather humdrum and obvious. Most contemporary scholarship takes the need for active and rigorous social science informed by methodologically scrupulous natural science as given. Recent illustrative examples include the following:

- Fuchs' (2012) observation that upcoming environmental challenges for society require not only a strong supply of technically competent engineers, but also changes in the way engineers think about their profession and their role in society, and thus changes in engineering education.

- Work by Thomas and Day (2014) to explore the relationship between the capabilities required of graduates by employers and by sustainability respectively. They note that these sets of capabilities have a great deal in common, so reflecting the reality that while many problems do indeed require technical expertise for their solution, the definition of what counts as a problem, and what an acceptable solution, is a social matter.
- Insights from the field of corporate social responsibility that recognise the complexity of change processes in universities, and the need to understand the interplay of, *inter alia*, their disciplinary and social missions in promoting sustainable development (Godemann *et al.* 2014)
- Sterling's (2014) prospectus for education and sustainable development post-2015, which notes the importance of both specialist competencies and creativity and imagination, and concludes by asking: 'what are the main elements of possible sustainability scenarios over the next 10–20 years with regard to such areas as water and sanitation, energy, health, sustainable cities, climate change, etc.? What competencies will (i) policymakers, (ii) specialists and (iii) the public need to ensure that desirable scenarios are realized?' (Sterling 2014: 111).

However, before moving on we should note one further tension that runs throughout the period and into the present. This is, quite simply, what ultimately is the purpose of (higher) education in this context. If we want to judge the success or failure of an initiative, what should we look for? Should we look for learning by students? Should we look for substantive improvements in environmental variables such as carbon emissions, biodiversity loss or water quality over time? It is very clear that these two different kinds of goal *do not* necessarily, or even very often, go hand in hand. Students do not have control of environmental variables, now or in the future: there are many factors in play including the economic, legal, political, social, technological and ecological contexts in which learning takes place and is applied. Students may, of course, have an influence: but that is not the same thing. Further, teachers and lecturers have a primary professional duty to their students: and students, by-and-large, are looking for an education that will serve them in *this* world, and not a world that, however regrettably, exists in the present only as an aspiration in the minds of their teachers.

Nevertheless, when policy-makers support ESD initiatives they usually do so because they want to see environmental (or wider social sustainability) outcomes. Of course, progress can be made towards these, but it is often difficult to show that education produces a stronger impact than, say, changes in regulatory environments, technological processes or financial incentives. An alternative view, squarely in the Deweyian pragmatist tradition in education, is that (good) education *is an inalienable and central component* of any sustainable way of life, enabling continuous, intelligent adaptation to a world that is always subject to change. The earliest expression of this conception is probably Foster's (2001) paper. It underpins his later work (see, for example, Foster 2008). In this view, the purpose of education for sustainable development is not to transmit a set of prescriptions that will bring about a sustainable form of life, because no sufficiently detailed and enduring set of prescriptions *can ever possibly* be available. Rather, it is to enable learners to make better decisions throughout their lives. The test of success is not environmental, but educational.

Such a proposition is not unique to an English language tradition. It is, for example, broadly consistent with the action competence approach developed in Denmark and Sweden (see, for example, Mogensen and Schnack 2010). However, this perspective does not render evaluation of ESD any less complex and problematic, if anything quite the reverse (see Kopnina and Meijers 2014, for a recent discussion of some of the issues and possibilities).

At this point we might usefully return to the title of this chapter and ask what it entails. The title is: (Ongoing and future directions of) Research on Higher Education (for Sustainable Development). The brackets serve to emphasise that the present project is an instance of research within the higher education system *into* research within the higher education system. The addition of the contents of the brackets narrows down the focus within a wider field of higher education research. In that wider field, one issue dominates all others: the impact of neo-liberal globalisation upon higher education provision around the world, particularly in relation to performativity and instrumentalism.

To illustrate the importance of this, contrast the following two quotations, both significant in their way in the development of higher education in Britain. The first comes from the Executive Summary of the October 2013 Witty Report into universities and growth:

Universities should assume an explicit responsibility for facilitating economic growth, and all universities should have stronger incentives to embrace this ‘enhanced Third Mission’ – from working together to develop and commercialise technologies which can win in international markets to partnering with innovative local Small and Medium Enterprises.

(Department for Business, Innovation and Skills 2013: 6)

The second comes from the work of the philosopher Oakeshott:

This, then, to the undergraduate, is the distinctive mark of a university; it is a place where he has the opportunity of education in conversation with his teachers, his fellows and himself, and where he is not encouraged to confuse education with training for a profession, with learning the tricks of a trade, with preparation for future particular service in society, or with the acquisition of a kind of moral or intellectual outfit to see him through life. Whenever an ulterior purpose of this sort makes its appearance, education (which is concerned with persons, not functions) steals out of the back door with noiseless steps.

(Fuller 1989: 101)

As academics in the field of education, the tension between these two kinds of position is part of our intellectual heritage. It leads us perhaps, sometimes anyway, to get unnecessarily bogged down in questions of ontology, epistemology and methodology: and while we are engaged by these arcane and difficult matters we can easily forget that our academic colleagues in other disciplines do not share our concerns, but are simply getting on with developing and delivering to students programmes that are, by any defensible standard, practical examples of education for sustainable development. They should, therefore, be studied by research into education for sustainable development. This is to suggest that while part of the task of developing or implementing sustainable development through higher education is clearly to refine the ESD concept, another is to be able to identify useful elements in the professional practice of others that do not, necessarily, accord with our currently most refined conceptualisations. The following discussion of a research example illustrates this point.

An English example, and more recent developments

In 2007 the Higher Education Funding Council for England (HEFCE) commissioned research into sustainability in the country’s (then) 132 universities. This research tender was won by a

consortium comprising the Policy Studies Institute, PA Consulting Ltd and the Centre for Research in Education and the Environment of the University of Bath. The research was conducted under three main headings: research in sustainability; sustainability through the management of university estates; and, teaching (see Katayama and Gough 2008 for an account of the work on teaching and sustainable development, the full report of the research is at www.hefce.ac.uk/pubs/rdreports/2008/rd03_08/).

As a result of this work a database of teaching in all universities in England was produced for the funder. The database is searchable by three primary headings:

- Discipline (for example, mathematics; sociology; chemical engineering)
- Institution (for example, University of Bath, Loughborough University)
- Academic level (for example, Diploma, Bachelors with Honours, Masters)

Standard headings were used throughout to ensure comparability. For example, courses were allocated to a discipline based on which of a set of national, standardised disciplinary headings host universities used when reporting to the Higher Education Statistics Agency (HESA). The database contains in excess of 1,600 items, of which a little over 300 are modules within programmes that have no other sustainability content. The remainder are programmes. The largest amount of sustainability-focused teaching was found to be at masters level. In terms of disciplinary areas, there were only three in which no sustainability-related teaching was found at all. These were 'clinical dentistry', 'pharmacy and pharmacology' and 'anatomy and physiology'. The most sustainability-related teaching nationwide was found in the areas of 'earth, marine and environmental science', 'architecture, built environment and planning', 'social studies', 'business and management' and 'geography'. It is also noteworthy that there appears to be no reliable correlation between the inclusion of 'sustainable development' as a goal within an institution's mission statement and the presence of teaching that promotes sustainable development.

An interesting finding was that the use of the terms 'sustainability' or 'sustainable development' in the names of programmes was typically a matter of the institution's position in the academic marketplace. So, for example, the Dean of a School in one of the country's elite universities reported that, although sustainable development lay at the intellectual heart of *all* programmes, the words themselves were *never* used in programme or module titles. The reason given was that the institution sought to attract the very best student applicants, and its internal research showed that such applicants *did not want* a qualification with a title that might appear to be unusual to future potential employers. Hence, for the best applicants, and on the whole, 'Mechanical Engineering' was attractive but 'Mechanical Engineering for Sustainable Development' was not, even if the programme content was the same in both cases. In less prestigious institutions that were competing for candidates with lower entry scores this situation was reversed, perhaps because the applicants hoped to improve their subsequent position in the labour market by demonstrating a fashionable specialism. An important lesson here is that it may well be factors of this sort, operating at the margin, that determine the attractiveness and success of offerings in sustainable development, rather than high-level rhetoric (however convincing and justified) about environment threats, saving the planet and so on.

Overall, a four-part classification of sustainable development teaching suggested itself. *Problem-oriented* courses set out to equip students to help address particular, serious issues in the modern world. These include contaminated land remediation, climate change, mathematical modelling in relation to, *inter alia*, biodiversity loss and habitat fragmentation, waste management, poverty, emergency disaster response and so on. *Responsibility-oriented* courses focus on corporate social responsibility in relation to a range of matters that include tourism

management, ethical fashion, global supply chain management, social enterprise and land management. *Creativity-oriented* courses seek to use sustainability to acquire creative impetus across a wide range of areas that include garden design, product engineering, town planning and rural regeneration. Finally, *skills-oriented* courses offer training in sustainability skills for the labour market, and may be further subdivided into those dealing with manufacturing skills (for example in relation to energy efficiency, sustainable technologies and sustainable design), environmental management skills (in, for example, groundwater engineering, marine resources management, aquatic chemistry and quantitative environmental analysis), and social skills (such as participatory design, regeneration management and knowledge transfer).

This review provides a snapshot of universities in a particular country at a particular time, using a particular organising framework. That framework includes, for example, a clear distinction between learning and teaching, research and estates management; and, a four-part classification of sustainable development teaching in higher education. No claims are made for the merit of these particular conceptual devices, but it might be helpful if academics in the field could agree some basics of classification so that sequential reviews and studies could compare like with like. Now, of course, we do have available the findings of other, subsequent reviews undertaken in other places. They have tended to use quite different (and, no doubt, quite possibly better) methodologies, so making it difficult to develop iterative measures of progress. So, for example, a study of ESD in HE in Scotland was conducted in 2008 and reported in 2009 (HEA, 2009). It used a questionnaire, interviews and case studies, and found, *inter alia*, that;

- 9 of the 16 responding HEIs (56.25 per cent) had specific learning and teaching commitments to nurture ESD
- 32 UG and 47 PG programmes were identified as explicitly targeted to sustainability issues
- Various pedagogic approaches to ESD were emerging.
- All 16 responding HEIs anticipated some intentional increase in their formal sustainability provision. (HEA 2009: 3)

These findings are similar to the English ones, but it is hard to make detailed comparisons. More recent reviews reinforce the point. Sterling *et al.* (2012), for example, set out precisely to share lessons from UK experience with others around the world. They offer a wealth of case study examples, and organise their material under three headings, 'context', 'aspects' and 'institutional change'. The inclusion of the last of these, at the very least, is a significant step forward, and one which goes some considerable way to provide a framework in which the issue identified earlier, of synthesising the identification of ESD in higher education with its development, might be addressed.

Moving forward would be facilitated if we could be sure to preserve and build on such classificatory improvements. Other recent examples of attempts to review ESD in higher education across different contexts include the UNESCO review of ESD in the UK (UNESCO 2013) and the UE4SD (2014) report covering 33 countries. There is also a great deal of excellent work that would be more impactful if it could be more readily subjected to critical comparison. This would include, for example, the work of Wright and her colleagues in Canada on the ways in which sustainable development is conceptualised within higher education (Sylvestre *et al.* 2013; Wright and Defields 2012; Wright and Wilton 2012) and the work of Thomas and his collaborators in Australia on the relationship between the perceptions of employers and sustainable development in higher education (Thomas 2014; Thomas *et al.* 2012).

None of the foregoing should be taken as providing cause for despair, but it does suggest that educationalists working in higher education should be asking how they might best

contribute to a creative team effort. So, for example: 'what sustainability knowledge and pedagogy will contribute to producing the best engineers?' is a question that invites a collaborative and iteratively-developing process leading to a shared goal. By contrast, simply asserting what every engineer needs to know about sustainability will usually seem unwarrantably intrusive to academic colleagues and students alike.

Happily, there is much work taking place in the field of education that points in a very promising direction. One recent example (Krasny and Dillon 2013) identifies environmental problems as being 'wicked' – in the sense of having multiple problem definitions – and experiments with innovative educational techniques in order to address them. In setting out these techniques the authors state:

Our experiment showed that pairing individuals with common interests yet different disciplinary perspectives can produce novel ideas and approaches; the general idea of providing a structure for working across disciplines may have application to other cross-disciplinary settings such as research projects and academic departments.

(Krasny and Dillon 2013: 275)

Here we begin to see the possibility of education for sustainable development in higher education as a facilitating tool, or set of techniques for bringing together different approaches to create new knowledge in the face of new and/or intractable problems. The problems we face often are both new and intractable. Of course, it may be objected at this point that dealing with new and intractable problems does not sit particularly well with the idea of standardised systems for classification of ESD. A more refined view, consistent with Krasny and Dillon's insight and also, at a more philosophical level, with the pragmatist tradition in education, would be that a settled classificatory system is likely to elude us, but discussions held in good faith about what one might best look like are likely to be most productive.

Sustainability in context: three examples

Each of the following three cases draws on recent or ongoing doctoral study, and is itself, therefore, a contemporary example of higher education for sustainable development. In each case, ESD in higher education is at the centre of things: in the first two examples because ESD learning is taking place in an HE setting, and because the idea of sustainability is at the heart of the research project. In the third case ESD in HE is the focus of research as well.

1. Nepal

It is not possible to separate sustainability according to geographical boundaries, as whatever happens in one part of the world is inevitably linked to another. As an example, Nepal's massive export of unskilled labourers to the Middle East and other wealthy Asian countries has far reaching effects on the prospects for sustainable development. It brings about great unplanned changes in Nepal's rural communities.

As one of the most underdeveloped countries in the world, Nepal has been experiencing massive changes due to the Maoist insurgency which raged for ten years and consequently forced men to flee their villages. So began the massive exodus from rural areas into safe cities and abroad. Nepal's economy and way of life is mostly based on subsistence farming, and the men play a vital role in keeping it balanced. Fieldwork observations at a cluster of villages in Solu Khumbu, Eastern Nepal revealed that most of the men of working age were working

abroad on three-to-five-year employment contracts. One village, for example, has 23 houses (which is equivalent to 23 families); here 30 men between the ages of 20–55 are working abroad. At the same time, 25–50 per cent of the cultivable land is not being used due to lack of manpower. Effects on sustainable development include: reduction of food production leading to the import of food; distortions of family structure and the traditional village welfare system; loss within families and the community of male role models who would otherwise transfer traditional knowledge of agriculture, craft and survival skills in their natural environment (for example, only the older people know how to make a wooden plough which is still the only way they plough their terraces); economic distortions from money repatriated by migrant workers; and, difficulties in reintegration of returning workers.

In this context traditional knowledge is very much alive. Communities are active in seeking to preserve their way of life. They feel proud of who they are and their heritage but also would like life to be more comfortable for them. Research is needed to understand how to develop educational approaches that not only inform children about environmental issues and better practices, but also addresses sustainability from a holistic perspective. If moving towards sustainable living in developing countries is to be achieved it is not only about the survival of the natural environment but of diversity of cultures.

2. Palestine

Non-Governmental Organisations (NGOs) are powerful stakeholders in sustainable development policy and programmes. Within them, learning is often perceived as a tool for social change. NGOs have developed broad programme areas focusing on awareness raising and capacity building. Water is clearly a crucial resource in relation to any conception of sustainable development, is politically contested in Palestine, and is debated in relation to technical understandings generated by a range of disciplines. We may ask what the rationale for learning should be for NGOs and participants, in relation to the sustainability of community water interventions.

Research into the role of learning in addressing water issues needs to be both context sensitive and responsive to the needs, lived experiences and symbolic representations of people at the local level. As an approach to understanding local experiences of water issues, the research suggests a need to explore the broader meanings that people give to water, in order for community interventions to bring about valued improvements in people's lives. The research observed how the sustainability of community water interventions is limited, primarily because communities lack decision making capability due to power asymmetries. Where participation in water interventions is limited to voluntary labour and the maintenance of new technology, the potential for learning is curtailed. During this process, local people struggle to assert and defend their lives in a context of great uncertainty. Further work is needed to explore how learning can be supported between organisations and communities, and how NGOs and other organisations can support local people's ideas – ideas that are meaningful to their lives and help to build capacity.

3. The UK

Though based in the UK, this recent research is informed by very extensive international educational experience, much of it in remote and/or politically troubled settings. For most UK universities today, higher education appears to be centrally concerned with engaging more fully in the economy and responding to pressure to ensure that students emerge with 'employabil-

ity skills'. This might be seen as the neo-liberal agenda running its course, or simply the search for relevance in a shifting scene. But, while this seems to reflect a narrow conception of the economy, simultaneously economists, enlightened employers and others now understand the economy more broadly, and are, for example, pursuing alternative ideas such as 'shared value', 'cradle-to-cradle' or 'working with the grain of nature'. So, rather than research Education for Sustainable Development per se, researchers would do well to leave that particular furrow and investigate instead the extent to which HE does *not* support any definition of a sustainable economy. Are broader conceptions of the economy – and less reductive visions of what it is to be 'at work' – reflected, accommodated, embraced or ignored by higher education, and what might be done about it? Assuming need for a more sustainable mode of development is self-evident, researchers might explore current practice and emerging patterns within higher education and ask: 'to what extent are these practices (1) cognisant of, (2) contributing to, (3) contradicting, or (4) challenging our notions of sustainable development?' This would take academics working in the field of higher education for sustainable development away from the 'making them more like us' approach of some higher education ESD projects (which must irri-tate most academics) in favour of a more truly investigative approach.

Discussion

It has been a recurring theme of this chapter that refining and developing ESD is one thing, and identifying ESD in action quite another. The first two of the foregoing examples build our understanding by identifying opportunities for sustainable development focused learning both *in and from* unique and complex contexts. The third points towards a conceptualisation of ESD in higher education that would require ESD practitioners to learn from engagement with other people in other contexts who may stand to benefit from ESD but are unlikely to engage with it as an idea. Sterling has written that learning:

is commonly seen simply as the 'acquisition of skills and knowledge through experience or study'. But it is important to go a little deeper than this definition. Learning is a response by the individual or group to external change or feedback. This has two aspects: first, *meaning making*, that is, making sense of the change and second, making some internal adjustment or (in systems terms) '*correction*' to take account of the change such as acquiring a new understanding or perspective or a modification or shift in assumptions or beliefs. The changes and challenges that sustainability entails present a profound learning challenge – including *unlearning* some established patterns of thinking and behaviour, *relearning* sustainable patterns where appropriate and *new learning* to be able to recognize, create and engage with necessary alternatives. Where this occurs at a deep level, it is called *transformative learning*. Learning occurs at all levels: individual, organizational and social. Note: There is no change without learning, and no learning without change.

(Sterling 2014: 93)

This applies in equal measure to the learning of those we teach and research, and to how we, as ESD professionals, should learn from them. As researchers in ESD in higher education we are contributors to a human project to move ourselves forward, not the deliverers of 'correct' answers fashioned from our own superior wisdom.

Conclusion: future directions

These examples serve to illustrate the necessarily interdisciplinarity of research in education for sustainable development in higher education. Achieving sustainability cannot be *only* about getting the science right and applying technological solutions: but nor can it be *only* about social dynamics, power relations, competing narratives or something similar. We need to be clear about what interdisciplinarity is. Krasny and Dillon (2013) show the way here when they refer to competing problem *definitions*. It is not about bringing an educational piece to the jigsaw, because everyone has a different jigsaw. It's about making a distinctively educational contribution to how we collectively cope with that situation, all the while respecting the contributions of our colleagues from other disciplines, and our research subjects, and listening to what they have to say about education. At its simplest, this can save us embarrassment. The first two of the foregoing examples engage ancient cultures grappling with irreversible change to produce as yet unforeseeable outcomes. Together, all three engage not only educational thinking, but also economics, soil science, international relations, hydrology, sociology and so on. Each of these disciplines has a body of knowledge that is well established. Proposals made in ignorance of such knowledge may turn out to be plain daft. For example, any policy proposal made in ignorance of the basic economic concept of opportunity cost is unlikely to gain much traction on reality (see Gough 2009, for a discussion of this, and related, issues).

What, then, would a distinctively educational contribution look like? Perhaps it would not be about foreseeing the future better than other people and telling them what to do, nor about delivering the social projects of others, whether they be radical socialists, environmentalists, deep ecologists, practical ecologists, development NGOs or someone else. Perhaps it would simply be about education, about remembering the learner, about the student who, in 50 years from now will need to make good decisions in a world that, however things turn out, will be nothing like anything we can imagine today. In 2001 Foster wrote:

Environmental education – or, as we should now perhaps say, just education – is, after all, radically non-instrumental: an end in itself. Education properly conceived embodies and deploys our heuristic intelligence as the fundamental contemporary form of responsible – and that is, ultimately sustainable – human living. Like all real life, it is instrumental to nothing (though it is relevant without limit) and subserves nothing but itself.

(Foster 2001: 164)

Perhaps, looking to the future, it is this conception of our own worth that should best inform those of us who care about research into education for sustainable development in higher education.

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