# The catalyst that is sustainability: bringing permeability to disciplinary boundaries

David Selby, Centre for Sustainable Futures, University of Plymouth

## Abstract

University teaching and learning are still dominated by disciplines. Education for sustainable development is now being actively promoted with encouragement to universities to embed sustainability in curriculum and pedagogy. Sustainability, with its many interrelated dimensions, defies disciplinary containment while each disciplinary culture is likely to be receptive to some, but not all, dimensions. So, how do we seek to ensure that students are confronted with the multi-dimensional challenge of sustainability rather than a discipline-comfortable and somewhat emasculated challenge? Against the backcloth of this question, infusionist, interdisciplinary and trans-disciplinary approaches and avenues for education for sustainable development are considered.

## The discipline<>sustainability conundrum

Learning within disciplinary structures and cultures is 'still an inviolable fact of university life' (Blewitt and Cullingford, 2004, p. 2). In higher education, disciplines largely provide the organizing framework for learning, teaching and research as well as the lens through which contemporary developments and trends are interpreted and reported.

There are now strenuous efforts to encourage universities to be responsive to a sustainability agenda. The Higher Education Funding Council for England has recognized its 'key role' in engaging in the promotion of sustainability-related curriculum and pedagogy and in supporting the Higher Education Academy in 'identifying, sharing and augmenting good practice in learning about sustainable development' (HEFCE, 2005, p.4, pp.39-40). In a separate article elsewhere in this journal (pp. 53-56), it is pointed out that fifteen of the twenty-four HEA Subject Centres are seeking to address the challenge of education for sustainable development (ESD) within their respective curricular spheres.

ESD, however, defies easy compartmentalization into disciplinary silos in that, folded into the many renditions of its goals and scope, all in one way or another contested, are most (in some renditions, all) of the following dimensions: aesthetic, cultural, ecological, economic, environmental, ethical, philosophical, political, scientific, social, spiritual, technological. Their interrelated nature notwithstanding, for many teachers (and students), it may well feel counter-cultural to trespass too far into those dimensions not usually identified as falling within the framework of reference of the discipline in question. Science and technology teachers may, for instance, feel ill-equipped to facilitate reflection on cultural, ethical and political aspects of sustainability, and their students resistant to such reflection, while their social scientist counterparts may draw back from anything but a light touch approach to its scientific and technological aspects. Giving sharper relief to the difficulty is that ESD pedagogical proposals often call for student learning to be increasingly grounded in place-based, concrete, 'real world' contexts awash with all the complexities and dilemmas of implementing sustainability in practice. Given that learning rooted in real life situations tends to shift curriculum away from the pre-ordained and towards the emergent, all of the many dimensions have, to a greater or lesser extent, the potential to become manifest. In the interest of their own comfort, do teachers (and learners) draw back from anything more than tokenistic acknowledgement of dimensions that are held to fall outside their disciplinary allegiance? Or do they take on the omni-dimensional challenge of sustainability? This conundrum raises the issue of the pros and cons of infusionist, interdisciplinary and trans-disciplinary learning frameworks for embedding sustainability in the curriculum.

*ESD defies easy compartmentalization into disciplinary silos*

## Infusionist approaches to ESD

Infusionist (or permeationist) approaches to sustainability-related curriculum involve identifying and working creatively with windows of opportunity for building sustainability-related concepts, issues and cases into established discipline-based programmes. So, for instance, the medieval history curriculum might explore the relationship between medieval culture, religion and environment, reforestation in thirteenth century France, species loss in medieval England, the monastery as an exemplar of sustainable and communitarian horticulture and livelihood, or the nature philosophy of St. Francis of Assisi. In chemistry, fundamental chemical concepts might be illuminated through sustainability-related topics such as the environmental, economic and health impacts of fertilizers, the remediation of heavy metals and soils, or the clean up and disposal of petroleum spills.

Essentially, infusionism seeks to add value to the content of the curriculum, as laid down, without diminishing that content. It can be attempted in a piecemeal way (i.e. by a school acceding to the enthusiasms of its few vocal ESD advocates) or in a thoroughgoing manner (i.e. by ensuring students' incremental and cumulative exposure to a sustainability agenda throughout their period of study).

The pragmatic advantages of infusionist approaches to ESD are that it can be taken forward by individuals while not necessarily involving a radical rewrite of curriculum or deep challenge to the disciplinary culture or student expectations. It can happen quickly without creating great waves. Its disadvantage is that there is less likelihood of dimensions of sustainability that seem extra-disciplinary being actively addressed. Learning outcomes are more likely to reflect a narrowly focused understanding of the scope and sway of sustainability.

Cross-university approaches to infusionism can help in this regard and open opportunities for interdisciplinary and inter-professional ways of working. These include:

- ***The generic module approach.*** This involves the development of a university-wide generic module at undergraduate and/or Masters level providing a framework of sustainability concepts, ideas and cases, the whole being customizable to accord with the culture of specific disciplines. The module can be taken up and customized by a school as a whole or, more likely, aspects picked up selectively.

- ***Overarching concepts approach***. This involves identifying key concepts falling under the umbrella of sustainability and asking different disciplines to address those concepts according to their own lights. For instance, the concept of harmony can be applied to architectural, mathematical, musical and social relationships while ecology and its sub-concepts (e.g. co-adaptation, diversity, assertion, integration) might be applied within the sciences, social sciences, psychology, education, philosophy and so on.
- ***Case study approach (limited version)***. This involves the use of identical case study material on sustainability issues and initiatives from a university case study bank within different disciplinary contexts and the analysis of the case through the lens of each discipline. As in the Faculty of Education at Deakin University, Australia, students undertake action research that involves adding their own case to the archive of cases available for different disciplines to use in their learning and teaching programmes.

These approaches indicate the interdisciplinary potential of infusionism. It is not too difficult to envisage structures and spaces that would enable students of different disciplines to congregate and share responses to common learning stimuli. The overarching dominance of the disciplines would tend to suggest an uphill battle in this regard.

If infusionism stays within the disciplinary silo, what kind of learning occurs? Stephen Sterling (2001, p.15), among others, has written of first, second and third order learning. First-order learning is adaptive (about 'doing things better'), leaving basic values and assumptions unchallenged and unchanged. Second-order learning involves critically reflective learning where assumptions and perspectives are challenged and 'thinking out of the box' is encouraged. It is change-intentional ('doing better things'). Third-order learning involves deep engagement with alternative worldviews, epistemologies and behaviours, necessarily involves a fundamental challenge to the way we see the world, and is transformative-intentional. While the sustainability agenda involves deep personal and professional challenge, staying within the disciplinary silo is likely to mean a preponderance of first and second order learning.

## Interdisciplinary approaches to ESD

Interdisciplinary approaches to ESD, on the other hand, have greater intrinsic potential for fomenting deeply reflexive third-order learning while retaining all the potential for first and second-order learning. A cautionary note would be that ESD-related interdisciplinary learning at universities – the coming together and interchange of ideas and perspectives between two or more disciplines - tends to be of the contiguous or proximate variety. Hence, link-ups between disciplines such as geography, environmental sciences and biological sciences or between architecture and technology are more likely to be evident as against, say, interdisciplinary alliances between agriculture and fine arts or psychology and environmental sciences. Student engagement in non-contiguous or non-proximate interdisciplinary arrangements, offering the shock of the seemingly distant, carry significant and largely untilled potential for third-order learning. Interdisciplinary approaches to ESD include the following:

- ***Sustainability-related interdisciplinary programmes.*** Sustainability-related interdisciplinary programmes are necessarily team-taught (team members being drawn from a range of disciplines), the quality of learning in response to the sustainability agenda often correlating closely with the nature and quality of the teamwork. Team members can work in relative isolation from each other, with consequent loss of third-order learning potential, or they can work together to foment dynamic learning contexts rich in fundamental challenges to assumptions, perspectives and worldviews. At the University of Plymouth a BA in Sustainable Learning Communities is on the drawing board that will confront students with learning challenges from academics from across the institution that will happen in real world contexts while the newly-launched Masters in Learning for Sustainability, set within the Science Faculty, is staffed by academics from Biological Sciences, Education, Ocean and Environmental Sciences with opportunities being opened up for contributions from colleagues attached to, inter alia, Architecture, Business Studies, Computing, Design, Geography, Law and Technology.
- ***Cross-fertilization approach.*** This involves a loosening of the disciplinary frame by building in inputs from other disciplines into subject-based programmes. A notable example at the University of Plymouth is provided by the School of Law, its academic staff providing inputs on environmental and sustainability-related law into undergraduate and Masters courses in agriculture and rural management, architecture, building technology, geography, and environmental and ocean sciences. The efficacy of the approach depends upon the university in question facilitating (encouraging and removing obstacles to) the flow of personnel (and payments) between schools.
- ***Case study approach (elaborated version).*** This extends the case study approach as already described but also establishes structures and spaces so that academics and students can work co-jointly on interpreting the case, sharing their understandings of the case and, in the wake of the interaction, working on embedding received insights from other disciplines into their own understandings.
- ***Special event approach.*** Under this approach, academic staff and students from a range of disciplines engage in co-learning around sustainability-related themes; for instance, a day conference on climate change; a shared field trip to investigate regional sustainability initiatives; a workshop series for corporate sector representatives to relate their CSR narrative and have students respond. Having recognized that different sustainability paradigms were evident between students taking any of the range of sustainability-related Masters courses at the University of Plymouth, the Centre for Sustainable Futures has established a Wednesday afternoon workshop programme open to academics and students from all the courses. Each workshop is facilitated by an invited expert offering a different slant, practical and/or theoretical, on sustainability, their remit including ensuring students of different disciplines interact as they respond to whatever stimulus is offered.

Just as infusion can blur into the interdisciplinary, so can the interdisciplinary morph into the trans-disciplinary.

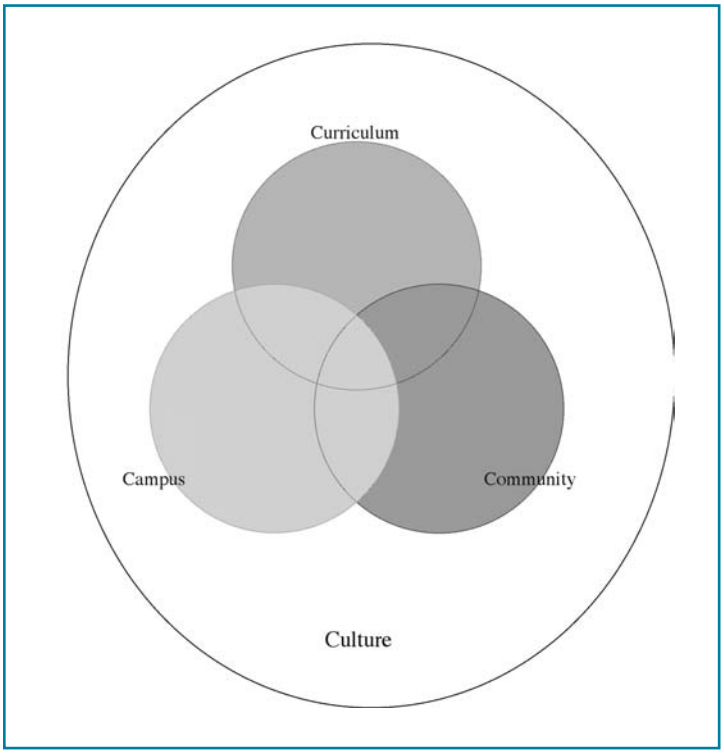
## Trans-disciplinary avenues for ESD

Trans-disciplinary learning experiences neither fall within the province of one or more disciplines nor are they necessarily informed by, or require, an exchange between disciplines (although they can be drawn upon within either disciplinary or interdisciplinary settings). They include:

- ***The place-based avenue.*** Advocates of place-based environmental or sustainable education argue that place is seamless (neither divisible into disciplines nor requiring a dialogue between disciplines for its knowing) and that, likewise, the relationship between higher education (or any education) and place should be seamless so that learning arises from ongoing engagement with communities, environments, organizations, businesses and networks within the university's hinterland. These insights lie behind the Centre for Sustainable Future's embrace of the trinity of campus, community and curriculum (Fig.1) in its remit to transform the University of Plymouth into a sustainability university. (Encircling the trinity is a fourth 'c', culture, indicating that a process of transformation will involve deep challenge to perspectives and paradigms and existing modus operandi.) As the campus goes through a greening process, students are actively engaged in decision-making around, enacting, evaluating and interpreting changes made to landscape and buildings. Under the community heading, students are being encouraged to undertake placement and immersion experiences, involving action research, with sustainability-mindful communities, organizations and businesses in the South West region. "Learning and knowing," write De Lind and Link (2004, p.127), "should not be a passive experience. Daily life is not a backdrop to education but education itself. ... Before losing themselves in the virtual or plunging head long into the international, students need to examine carefully and critically what exists under their feet and outside their front (and back) doors." In the parlance of bioregionalism (Traina and Darley-Hill, 1995), university study encompassing a sustainability agenda needs to offer opportunities for students to re-inhabit place (to experience a grounding in place that is at one and the same time ecological and cultural).
- ***The pedagogy-based avenue.*** There is no clear and final dividing line between curriculum (what we teach) and pedagogy (how we teach). How we teach, with its inevitable hidden or shadow agenda, becomes, like it or not, part of what we teach. Sustainability, embracing goals such as ecological mindfulness, equity, social justice, peaceful relationships, and action for change/transformation, its advocates often say, should translate into a pedagogy that: is learner-centred (horizontal, dialogic) rather than teacher-centred (vertical, transmissive); has a real issues orientation developing skills and understandings within real life situations; puts praxis (the dynamic interlinking of practice and theory) at its heart; embraces skills and socio-affective learning as much, if not more than, cognitive abstract learning. Such a shift in the learning process itself carries the potential for curriculum, in or outside the classroom, to become more of a negotiated or emergent affair not necessarily constrained by disciplinary or interdisciplinary imperatives, indeed cutting across the disciplinary map and, hence, offering more fertile ground for both third-order learning within which the interrelated dimensions of sustainability can more easily come into play.

Sustainability could become the significant catalyst whereby an easy permeability and dynamic synergy comes to exist between disciplines. To paraphrase Parker Palmer (1998), 'We have been great at thinking the world apart; what we need to do now is to think it back together'.

**Figure 1. The four C model**

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**Professor David Selby: david.selby@plymouth.ac.uk**
**Director, Centre for Sustainable Futures, University of Plymouth, Plymouth, PL4 8AA.**