Chapter 1

Introduction

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The international background

In their call for the education of ‘earth-literate leaders’, Martin and Jucker (2005, pp19, 21) note that most of the 100 or so world leaders attending the World Summit for Sustainable Development in Johannesburg in 2002 who collectively and conspicuously ‘failed to rise to the challenge of sustainability’ had ‘a higher degree from some of the world’s most prestigious universities’. Recalling David Orr’s oft-cited observation that the threat to the planet is largely ‘the results of work by people with BAs, BSs, LLBs, MBAs and PhDs’ (1994, p7), Martin and Jucker go on to raise serious questions about the world’s universities as they educate future generations of professionals. ‘Why is it so rare’, they ask (2005, p21), ‘that we encounter in our leaders the qualities needed to enable sustainability: humility, respect for all forms of life and future generations, precaution and wisdom, the capacity to think systemically and challenge unethical actions? And, more worryingly on the basis of current performance, what hope of improvement is there for future leaders?’

An earlier gathering of world leaders, the UN Conference on Environment and Development Rio de Janeiro, 1992 (UNCED), had been influential in linking the challenge of sustainability to education and learning. Agenda 21, the programme of action emerging from the conference, identified school-age to adult education as ‘critical for promoting sustainable development and improving the capacity of people to address environmental and development issues’, floating but hardly consolidating the idea that countries ‘could support university and other tertiary activities and networks’ (UNCED, 1992, pp265–266).

A far less tentative role for the tertiary sector was evident 12 years later in the planning for the UN Decade of Education for Sustainable Development
Sustainability Education

(DESID), 2005–14, for which the UN Educational, Scientific and Cultural Organization (UNESCO) became the lead international agency. Higher education was designated as having ‘a particular role to play’ during the decade: Universities must function as places of research and learning for sustainable development... Higher education should also provide leadership by practicing what they teach through sustainable purchasing, investments and facilities that are integrated with teaching and learning... Higher education should emphasize experiential, inquiry-based, problem-solving, interdisciplinary systems approaches and critical thinking. Curricula need to be developed, including content, materials and tools such as case studies and identification of best practices. (UNESCO, 2004, pp22–23)

In fulfilling that role, universities – like all other formal, non-formal and informal education providers – were enjoined by those framing the decade to promote the following ‘underlying values’:

- Respect for the dignity and human rights of all people throughout the world and a commitment to social and economic justice for all.
- Respect for the human rights of future generations and a commitment to intergenerational responsibility.
- Respect and care for the greater community of life in all its diversity, which involves the protection and restoration of the Earth’s ecosystems.
- Respect for cultural diversity and a commitment to build locally and globally a culture of tolerance, non-violence and peace (UNESCO, 2004, p14).

Education for sustainable development (ESD) at all educational institutions, including universities, was, according to UNESCO, to demonstrate a range of key features. It was to be interdisciplinary and holistic, and so embedded across the whole curriculum; explicitly values driven, with the values ‘examined, debated, tested and applied’; built around critical thinking and problem solving, and so confidence building in the face of the dilemmas and challenges of sustainable development; multi-method and participatory, applying different pedagogies and fostering cooperative learning and decision-making between teachers and learners; and locally relevant and grounded in local languages and cultures (UNESCO, 2004, p16).

Internationally, university alliances, consortia and networks have promoted commitment on the part of higher education institutions to a sustainability ethic. In 1990, the US-based University Leaders for a Sustainable Future (ULSF) convened a meeting of university presidents, chancellors and rectors to share their concerns about the state of the world and to create a document spelling out the actions that institutions for higher education needed to take to play their part in forging a sustainable future. The resultant ten-point action plan, The Talloires Declaration (ULSF, 1994), was the outcome. Among the action points, prominent areas to be addressed were identified as curricula, teaching and learning. Signatories of the Declaration commit to establishing programmes for ‘environmentally responsible citizenship’, to teaching ‘environmental literacy’ to all undergraduate, graduate, and professional students; and to developing ‘interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities’. As of October 2009, the Declaration carried the signature of the presidents, chancellors or rectors of some 390 universities in 52 countries around the world.

The Talloires Declaration furnished an international model that has inspired declarations from other university consortia. At the annual International Association of Universities (IAU) Round Table in 1993 in Kyoto, Japan, delegates adopted the Kyoto Declaration on Sustainable Development (IAU, 1993), agreeing to develop university capacity to teach, research and take action according to ‘sustainable development principles’, to increase environmental literacy, and to enhance the understanding of environmental ethics within the university and with the public at large. At the time of writing, IAU has 1200 member institutions, all endorsing the Declaration by dint of their membership. In 1994, the Conference of European Rectors (CRE) of European Universities, the predecessor of the Association of European Universities (AEU), promulgated The Charter for Sustainable Development through its COPERNICUS programme (CO-operation Programme in Europe for Research on Nature and Industry through Coordinated University Studies). Like The Talloires Declaration, the Charter (CRE-COPERNICUS, 1994) emphasizes the importance of embedding sustainability in university curricula, teaching and learning:

Universities shall incorporate an environmental perspective in all their work and set up environmental education programmes involving both teachers and researchers as well as students – all of whom should be exposed to the global challenges of environment and development, irrespective of their field of study... Universities shall encourage interdisciplinary and collaborative education and research programmes related to sustainable development as part of the institution’s central mission.

As of the time of writing, some 305 European university heads from 37 countries have signed the Charter (UNESCO, 2009a).

This impetus was further strengthened by the Bonn Declaration, which emerged from the UNESCO World Conference on ESD, held in Bonn, Germany in March 2009. The Declaration urged stakeholders to mobilise the core functions of universities: teaching, research and community engagement to strengthen global and local knowledge of ESD ... and develop model projects that can respond to the complexity and urgency of ESD’ (UNESCO, 2009b, p4).

Given such a significant upsurge in declared commitment to sustainability-related policy and practice at tertiary level, including a commitment to transforming curricula, teaching and learning, is the philosophical and rhetorical embrace being matched by concrete action at national and institution-specific levels?
extent filled by the ESD Project of the Higher Education Academy (HEA). The Academy is a UK-wide organization funded by HEFCE and its sister funding councils in Scotland and Wales dedicated to enhancing the student learning experience. It works with higher education institutions and through 24 discipline-based subject centres at different universities. The ESD Project was established as a 'special theme' in the Academy's overall programme in 2005 with a remit to help institutions and subject communities develop curricula and pedagogy that will give students the skills and knowledge to live and work sustainably (cited in Sterling and Witham, 2008, p401). Its first endeavour was to commission a team to examine the state of the art in sustainability-related curricula, teaching and learning, primarily in disciplinary contexts, by gathering data from 18 of the 24 subject centres. The published outcome, Sustainable Development in Higher Education: Current Practice and Future Developments (Dawe et al, 2005) reports minority but widening engagement with ESD, and identifies potential for, as well as inhibitors of, further and more widespread curriculum development and change. Since 2005, by means of small grants and mini-grants, research, networking events and national conferences (Sterling and Witham, 2008, pp402–406), the Project has promoted and disseminated path-finding disciplinary-based sustainability curriculum development, examples of which are featured in seven of the chapters of this book (Chapters 6, 9, 10, 11, 12, 16 and 17).

In the UK, the Universities of Bradford and Plymouth have been to the fore in taking a more comprehensive and structured approach to sustainability-related curriculum development. In 2006, Bradford launched a strategic initiative known as Ecosensity with the object of embedding sustainable development ‘across the operations and culture of the University’ and within the ‘living and learning experience of all students’. A HEFCE Strategic Development Fund Grant in 2007 provided the resources for staffing and support structures to realize this vision (Hopkinson et al, 2008, p440). The UNESCO DESD’s underlying values and implementation features, as described earlier, provided the framework for the initiative, being deemed particularly appropriate for an institution in a strongly multicultural context (Hopkinson et al, 2008, p442). During 2006, a pilot ESD curriculum review project of four programmes in pharmacy, midwifery, civil engineering and business administration had been undertaken, using a methodology based on documentation review and interviews with staff and students to ascertain the degree of alignment between the programmes and the UNESCO framework. It was concluded that the programmes had ‘clear content, assessment and learning approaches... entirely consistent with ESD (as framed by UNESCO) but are not explicitly recognized or presented as such by the programme leaders’ (Hopkinson et al, 2008, p444). Encouraged by this finding, Ecosensity determined to adopt a more strategic approach. The HEFCE grant and the appointment of a Director of ESD followed, as did the identification of ‘academic ESD pioneers’ for each of the University’s seven schools. The role of the pioneers was to ‘complete a comprehensive and systematic curriculum review (as in the pilot) and develop three-year action plans for embedding ESD in the curriculum of all programmes. Guidelines for incorporating ESD requirements into course approval and review processes were devised concurrently with the development of school action plans (Hopkinson et al, 2008, pp444–445).

In 2004, the University of Plymouth was awarded a five-year Centre for Excellence in Teaching and Learning – Education for Sustainable Development (CETL ESD) by HEFCE for the period 2005–2010 (Dyer et al, 2006). The Centre for Sustainable Futures (CSF), as it came to be known, similarly adopted a systematic and systemic approach to sustainability-related curriculum development. At the whole university level, the Centre facilitated a ‘wide and deep’ consultation in developing a University Sustainability Policy and Action Plan based on an holistic ‘4C’ model in which Curriculum, Campus, Community and (Institutional) Culture are seen as mutually enfolded and complementary foci of the sustainability university (see Figure 1.1). In this way, learning programmes encompass the exploration of campus, community partnerships and initiatives, and university culture from a sustainability perspective, while student experiential and action research can be directed towards campus, community and institutional cultural change. The Policy and Action Plans embrace an holistic notion of sustainability that, while taking the environment as fundamental, melds together economic, health, social justice and other humanitarian concerns (Selby, 2009, p103). At faculty and school level, CSF employed a Fellowship scheme to bring about systematic curriculum development. Some 45 Centre Fellows were brought out from 7 of the university’s academic faculties and 13 of its 18 schools, Fellows and their heads of school committing to taking forward sustainability-related curriculum development and providing associated continuing professional development for academic staff. The Centre Fellows also committed to taking initiatives to further the University-wide sustainability agenda (Selby, 2009, p104).

Their curriculum development involved the infusion of sustainability concepts, themes and case studies into established (undergraduate and postgrad-
Principal inhibitor I

Academic staff, jealously guarding their academic freedom, see education for sustainable development as an imposition, something not commensurate with their discipline or student expectations of their discipline. Steeped in their specialization, they are uncomfortable about the interdisciplinary teaching for which the multi-dimensional concept of sustainability calls. They see no rewards or career advancement in sustainability curriculum innovation.

In response to this, enabling approaches include the following:

- Conveying sustainability as a contested and unfolding idea around which debate and discussion by staff and students alike is encouraged and, even if and when identified as an institutional priority, welcoming of contrary and subversive opinion (Gray-Donald and Selby, 2004, p204).
- Utilizing the process benefits of vagueness, while still being ready to offer a succinct definition of sustainability for those new to it who need a ‘recipe’. As Wals and Bawden aver, vagueness in defining BSD ‘has enormous canvassing and heuristic capacity if it is systematically used as a starting point or operational device to exchange views and ideas. These ongoing discussions may generate fruitful working hypotheses for the concrete formulation of curricula, study programmes, subject matter content and didactical arrangements’ (Wals and Bawden, 2005, p38).
- Offering an holistic explanation of sustainability that, while grounded in environmental concern, brings into play the dimensions of culture, economy, ethics, health, peace and conflict, science and technology, and social justice, thus enabling those who see sustainability as exclusively or primarily ‘environmental’ to more readily discern the connections with their discipline (Gray-Donald and Selby, 2004, p205).
- Nurturing an interdisciplinary ethos by creating arenas and spaces (working groups, seminars, communities of interest) in which sustainability can be a ‘strange attractor’, bringing together academics of different disciplines to explore ‘similarities within differences and differences within similarities around a nebulous but common set of sustainability values’ (Gray-Donald and Selby, 2004, p205).
- Engaging students in sustainability advocacy and change processes.
- Ensuring, enlisting and flagging up-front senior management or top-down support for sustainability initiatives, including the personal involvement of some key senior staff. Using the legitimization so created to develop and enact a strategy for structured and systematic curriculum development, galvanizing sustainability ‘champions’ to make a bottom-up contribution to change through enthusiastic advocacy, role modelling and otherwise influencing peers. Building tangible and intangible rewards into the process.
- Making the process invitational rather than impositional, dialogic rather than prescriptive, participative rather than directive.

Towards sustainability curricula in higher education: inhibiting and enabling conditions

Drawing on experiences of sustainability-related curriculum and pedagogical development at universities and colleges, what appear to be the principal inhibitors to wider and deeper curriculum change, and what approaches or factors might pre-empt or circumvent each inhibitor to create the conditions allowing change?
Principal inhibitor 2

Academic staff, both converts and contrarians, consider themselves as lacking the knowledge and skills, expertise and experience to implement sustainability-related teaching and learning. Enabling approaches might include:

• Providing whole university and discipline-specific staff development opportunities (avoiding the often-deskilling one-off event and opting for a cumulative, reinforcing approach), helping academics develop sustainability understandings and giving opportunities to apply their learning to existing and possible new courses (Noonan and Thomas, 2004, p74). According to Rowe (2002, pp86-87), 'professional development opportunities for faculty seem to be a key component for success'.

• Providing print or electronic manuals, case studies of good practice and collections of teaching and learning activities, and creating an electronic forum in which peers can share successful (and not so successful) experiences of sustainability-related teaching and learning.

• Establishing school-based resource people with a track record of sustainability education to whom colleagues can turn for advice and guidance.

• Pointing academic staff in the direction of externally available curriculum development growth points for their discipline, such as those at other higher education institutions, or (in the UK) a network such as the HEA ESD Project and the Academy Subject Centres.

Principal inhibitor 3

Academics and administrators hold that the ethos of the institution is not favourable for successful integration of sustainability across the teaching and learning programmes of the institution. Enabling approaches could then be:

• Developing an overarching institutional commitment through a consultative process, enshrining it in policy and supporting it with a strategic action plan for sustainability, in which curriculum, teaching and learning are linked to the institution’s campus and community-related sustainability goals and attendant initiatives.

• Establishing a high-level and highly visible coordinating and monitoring body for sustainability, representing a multiplicity of interests and with open lines of communication to senior management.

• Having the university or college sign up to an internationally known framework and alliance for sustainability, such as that provided by The Talloires Declaration, and value statements such as the Earth Charter (Miller and Westra, 2002, pp9-16).

• Celebrating success through newsletters, electronic media and events and by instituting a formal recognition and reward system.

• Employing external stimuli to foster change (Sterling and Scott, 2008, p389), and not least external funding for sustainability-related change initiatives as is the case at the Universities of Bradford and Plymouth (large funding) and RMIT (small funding). Grants in aid of sustainability-oriented change add force and momentum to change efforts and help shift the institutional ethos.

Drawing insights from a survey of academics’ views of conditions held to be important for the successful implementation of ESD at tertiary level, de la Harpe and Thomas (2009, p82) summarize factors most likely to secure academic buy-in and achieve successful curriculum change outcomes:

A core group of staff would be identified to work together to lead and oversee the curriculum development and change initiative and to convince others that change is necessary. Key and influential staff would be specifically chosen to include a range of staff involved in curriculum change. They would be charged to work together to form a powerful guiding coalition to ensure that direction and momentum are sustained. They would also work with others to ensure that a vision was agreed to collaboratively or that a project or programme brief was developed to guide the intended change. Sufficient resources would be identified and set aside for project development. A clear implementation strategy would be developed, and most important, resources would be specifically allocated to support implementation activities. Identifying staff professional development needs and providing appropriate and relevant activities, located as close as possible to the change initiative, would also be needed. To embed the change into institutional processes or 'the way things get done around here', administrative systems and structures, as well as individual work roles, would be openly discussed, agreed and modified. Finally, a monitoring programme to assess the degree to which the desired change has occurred would be put in place, and small successes would be communicated often and rewarded along the way. It would certainly not involve a top-down management-led approach to change (italics in original).

What is clear from positive work in this area over recent years is that the 'embedding' of ESD is as much about organizational and institutional learning as it is student learning, and that both arenas of learning are involved and interdependent (Brooks and Ryan, 2008). This process of change is further evidenced by the subsequent chapters of this book, to which we now turn.

About this book

Working with an holistic interpretation of sustainability (i.e. as embracing cultural, environmental, health, peace, social justice, scientific and technological dimensions), prospective contributors to this volume were invited to review and critically and creatively reflect on sustainability-related curricula, teaching and learning in their discipline in response to the following questions:
based approaches to teaching and learning (Fien, 2006; Rasmussen, 2008; Sterling, 2004). It is clear that many of the core principles of integrating sustainability into HE require substantial shifts in thinking and practice that may be out of reach of the individual lecturer and more challenging for some disciplines than others (see Table 3.1).

The difficulty of negotiating transformative changes to curricula – which are themselves within the boundaries of a wider (and largely traditional and conservative) educational system – has been raised by Sterling (2001). However, recent research (Cotton et al, 2007 and 2009), carried out with the the University of Plymouth’s CSR, shows that academics in a wide range of disciplines are making changes to their teaching to incorporate sustainability into the content of their curricula, despite highly variable institutional support for such activities. What is perhaps more difficult is promoting the changes in pedagogies that sustainability seems to require. Tilbury (2007, p119) notes that, ‘more and more we are seeing the word sustainability being added to the titles of programs, projects, activities, departments or units – however, few have actually been redesigned to address new social learning approaches’. This is perhaps simply because the pressures on HE mitigate against such changes – the increasing marketization of HE on a mass scale make participatory, collaborative approaches problematic. However, there may be wider impediments at work: previous research has identified lack of curriculum time, perceived irrelevance of sustainability to some disciplines (see Box 3.1) and lack of a shared understanding of the terminology as barriers to the growth of sustainability pedagogies (see Dawe et al, 2005, for a discussion of some of the issues).

**Why do we need different pedagogies for sustainability?**

The need for different approaches for teaching about sustainability (and previously environmental education) has been under discussion for some time and is often linked with the potentially controversial nature of environmental or sustainability issues. However, research on how to teach controversial issues reveals a far from straightforward situation. It has long been assumed that a neutral or balanced perspective is required to avoid indoctrination of vulnerable students, and this belief is still held by many teachers in secondary and tertiary education. For example, research in England (Oulton et al, 2004, p415) suggests that school teachers identify three underpinning beliefs about teaching controversial issues. These are:

- a focus on rationality, reasoning and sticking to the facts;
- presenting a balanced view;
- teacher neutrality.

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**Table 3.1 Integration of sustainability in HE**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
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<tbody>
<tr>
<td>Transmissive learning</td>
<td>Learning through discovery</td>
</tr>
<tr>
<td>Teacher-centred approach</td>
<td>Learner-centred approach</td>
</tr>
<tr>
<td>Individual learning</td>
<td>Collaborative learning</td>
</tr>
<tr>
<td>Learning dominated by theory</td>
<td>Praxis-oriented learning linking theory and experience</td>
</tr>
<tr>
<td>Focus on accumulating knowledge and content orientation</td>
<td>Focus on self-regulative learning and real issues orientation</td>
</tr>
<tr>
<td>Emphasis on cognitive objectives only</td>
<td>Cognitive, affective, and skills-related objectives</td>
</tr>
<tr>
<td>Institutional, staff-based teaching/learning</td>
<td>Learning with staff but also with and from outsiders</td>
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<tr>
<td>Low-level cognitive learning</td>
<td>Higher-level cognitive learning</td>
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Source: Sterling, 2004:58; adapted from Van den Bor et al, 2000

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**Box 3.1 Is sustainability relevant to your discipline?**

Much of the literature on integrating environmental or sustainability issues into higher education focuses on campus greening alongside the possibilities for incorporating sustainability-related knowledge into relevant subject areas (e.g. Heinz Family Foundation, 1995). However, recent research by the University of Plymouth has investigated the ways and extent to which academics incorporate sustainability across all parts of the curriculum, as well as exploring their understanding of sustainability pedagogies (Cotton et al, 2007 and 2009). Throughout this chapter, we will draw on interviews and analysis undertaken as part of this research to illustrate key points.

The Plymouth research findings suggest that although there might appear more plentiful opportunities for incorporating sustainability into teaching in certain disciplines (such as environmental science or geography), there is no obvious correlation between subject area and the belief of staff that sustainability is relevant to their discipline. It seems that tutors who are personally committed to sustainability are likely to see it as relevant to their teaching irrespective of what discipline they work in:

- So with most of the things you do, issues of energy conservation and efficiency and therefore the whole broad issues of sustainability crop up (lecturer in engineering).
- On the surface you would think occupational therapy is about recruiting people for the health profession, primarily, what has that to do with sustainable development? And yet if you look at... all the resources that are required to get them qualified, it does have an impact on sustainability (lecturer in health).
- It does fit in the history of the EU stuff that I teach so I will probably expand it there a little bit (lecturer in humanities).

This research on sustainability suggests that there is potential for its inclusion in all curriculum areas – but only if lecturers can be persuaded that it is important to do so! To some degree, this provides a specific example of a more general rule which is that a lecturer's prior knowledge and beliefs about a subject influence the way in which the subject is presented to students (Prosser and Trigwell, 1999).
All three of these underpinning beliefs, however, are problematic if investigated further. For example, the facts relating to sustainability may be less than clear and depend significantly on the values of the individual describing them. An understanding of the transitory nature of facts, of knowledge and of what can be known undermines this position particularly strongly in the research-led environment of HE. Moreover, the notions of maintaining neutrality and balance may be constrained by a number of practical limitations including: premature consensus, entrenched positions or apathy on the part of students involved in discussion; inadvertent projection of the teachers’ views while attempting to convey a neutral position (see Box 3.2 on the hidden curriculum); and reduction of complex arguments to dichotomies and polarized positions in an effort to provide balance.

Oulton et al (2004) offer a range of possible suggestions for the tutor, including:

- helping students to distinguish between sound and unsound reasoning, developing a respect for evidence and open-mindedness;
- being open about the fact that true balance is an unachievable goal, but helping students develop ‘a critical awareness of bias and make this one of the central learning objectives’ (p 417);
- declaring their own position explicitly so that students can be aware of potential bias in the teaching.

These approaches potentially offer an attractive proposition for higher education across the disciplines, drawing as they do on notions of logic, reasoning and criticality. Alongside an attempt to incorporate sustainability content into the curriculum, it is perhaps helpful to think in terms of developing the knowledge and skills of sustainability literacy — these would include open-mindedness and critical awareness of bias. A set of key questions might help to scaffold students’ critical thinking skills in terms of issues such as:

- Where did this information or view come from?
- Who provided it?
- How are they funded?
- Whose interests do they represent?
- What values are they expressing (explicitly or covertly)?
- What evidence do they present?
- Do they evaluate it?

These questions could be utilized in a range of different contexts to explore the basis of decision-making, including decisions on sustainability issues, as appropriate. In this way, ESD is viewed as a different lens through which to view the discipline that focuses on the implications for economy, environment and society, rather than an imposed set of constructs and beliefs.

**Box 3.2 The hidden curriculum**

Aside from overt impacts on students’ views of sustainability, which might be attributed to curriculum and pedagogy, it is clear that students will also be affected by what is known as ‘the hidden curriculum’ (Jackson, 1968, pp 10–33). This incorporates the messages sent by individual tutors or an institution to students, often unconsciously and covertly, about how they ought to think and behave. A key way in which the hidden curriculum is made manifest is through the ethos and values of the institution. These might be illustrated by the extent of recycling facilities, provision and green travel plans, or by student engagement in decision-making and democratic processes. There is also potential, the Plymouth research suggests, for individual lecturers’ personal beliefs to influence both the content and structure of the curriculum.

As lecturers we have viewpoints that we share with our students in many ways, probably more complexly than just teaching about it. Very simple comments that you slip in in a lecture, about saving trees for instance ... I think that tutors actually influence students in ways well beyond the classroom or the subject ... by choosing texts and cultural products which, while possibly commenting on their structure or contextualization, also provide pawns for discussing issues of sustainability, which is actually what people do all the time (lecturer in art).

This lecturer suggests that comments in a lecture or use of resources may send messages about the tutor’s underlying values. A surprising finding of our research on ESD in HE was the extent to which lecturers talked about sustainability ‘creeping’ into the curriculum through informal or subconscious means such as this (Cotton et al 2009). Research in schools also indicates that it is extremely difficult to maintain a neutral position when teaching about controversial issues such as those pertaining to sustainability. A detailed analysis of classroom discussions on environmental topics reveals that the teacher’s viewpoint was expressed covertly (and often unintentionally) via control of participants’ turns in discussion and use of rhetorical questions to indicate disagreement (Cotton, 2006).

While it is impossible to avoid such unconscious messages to students, a critical awareness of the different ways in which the hidden curriculum might be at work both within and beyond the classroom is essential to understanding the impact of teaching about sustainability. Encouraging student participation in classes, and in making decisions on assessment and other academic issues, is one way in which lecturers can model good practice to set the tone for sustainability in higher education.

**What kinds of teaching methods have been advocated for sustainability?**

The literature includes a wide range of suggestions for appropriate approaches to teaching about sustainability and also for specific teaching methods. Underlying many of these approaches is support for active, experiential learning, interdiscipli-
narity and use of the local (and regional) environment for educational purposes. Potential learning approaches are participative inquiry/action research, where students investigate an issue which is of importance to them personally (Tilbury, 2007); transformative sustainability learning (TSL), where tutors attempt to use the three domains of learning – cognitive, psychomotor and affective, or head, hands and heart as they have been described – to engage students in a transformative educational experience (Sipos et al, 2008); and action competence, where students are encouraged to envisage alternatives and solutions to unsustainable practices (Breitling and Mogensen, 1999).

Specific teaching strategies advocated for environmental education or ESD include those listed below (examples of how some of these are used in practice are given in Box 3.3). It is likely that utilizing a range of these strategies would be most appropriate.

**Role-plays and simulations**

Role-plays have long been recommended for teaching about environmental issues and sustainability, although there is a surprising lack of evidence in terms of effective outcomes (Oulton et al, 2004). Potential advantages of role-plays are that they provide an opportunity for students to gain an in-depth understanding of another person’s perspective and to empathize with others; disadvantages are the amount of time and organization required to enable effective role-playing and the difficulties of managing the role-play, particularly with large groups. Role-plays are used rarely in university education, possibly because of the practical difficulties or because the pedagogy is poorly aligned with the learning culture of HE.

**Group discussions**

Group discussions were frequently mentioned by both school teachers and lecturers when asked to describe an appropriate pedagogy for sustainability (Cotton, 2006; Cotton et al, 2007). The use of a discussion may be an attempt to counteract the risk of the tutor taking a transmissive or authoritarian approach, thereby enabling students to discuss their own and others’ views. Discussions potentially enable a range of perspectives to be aired, but they may be confrontational and prove difficult to control, especially if the topic is a controversial one. The tutor needs to be able to encourage listening and self-reflection rather than argument and should be clear about their own role in the discussion (see Box 3.2 for some of the difficulties of neutrality as a tutor position). Structured questions to scaffold students’ learning may be helpful, as may explicit meta-cognitive instructions as to the purpose of the discussion and the rules of engagement. Without such guidance, many students – accustomed to the transmissive nature of much of their educational experience – may be uncertain how to respond.

**Stimulus activities**

A stimulus activity might involve watching a video or looking at photos, poems or newspaper extracts to initiate reflection or discussion (Oulton et al, 2004). Students may even be involved in producing their own work such as photos taken around the campus to stimulate a discussion on campus greening. Use of videos or externally-produced documents potentially enables the tutor to bring in a wide range of viewpoints for critical analysis, and this approach is feasible even with very large groups.

**Debates**

Debates in which two groups of students put forward opposing arguments on an issue are often recommended as a method of teaching about sustainability since they encourage students to gather information about the topic and develop an argument. However, they can become confrontational and students may be discouraged from engaging or empathizing with others’ views. Authors such as Oulton et al specifically warn against asking students to vote on an issue as this may lead to them making up their minds too soon, hardening their attitudes and leaving them feeling committed to the stance that they have taken (Oulton et al, 2004).

**Critical incidents**

The use of critical incidents to teach about sustainability is described in a paper by Nott and Wellington. Students are given an example and asked what they would do, what they could do and what they should do (Nott and Wellington, 1995). This allows them to consider their personal perspectives and actions in the light of a moral or ethical stance. The approach can also be used with groups to promote awareness about multiple perspectives on sustainability.

**Case studies**

Another popular choice of pedagogy for teaching about sustainability described by lecturers in our research was the case study approach. Tutors described using case studies to bring ESD into areas of the curriculum that had not traditionally involved a clear focus on sustainability (Cotton et al, 2009), and to provide students with an holistic view of an issue. Case studies enable students to investigate issues that affect their local area, to work with private enterprises and community groups and to work together in finding solutions to local issues. They may take a variety of forms, but one possible approach is to place strong emphasis on ‘reflection, research, participation and action’ (Junyent and de Ciurana, 2008, p769).

**Reflexive accounts**

Considering their own position in relation to new knowledge about sustainability can help students understand how individual actions contribute to sustainability. Although contentious in HE (Knight, 2005), behaviour change is a cross-cutting priority of the UK sustainable development strategy (DEFFRA, 2005) and education is identified as a core vehicle for achieving this. Therefore, pedagogies that provide opportunities for students to reflect on personal roles, attitudes and responsibilities in relation to a range of sustainability issues are potentially advantageous.
Personal development planning (PDP)

PDP has been embedded in UK HE since 2000 (Quality Assurance Agency for Higher Education [QAA], 2000). "PDP is a structured and supported process undertaken by a learner to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development. It is an inclusive process, open to all learners, in all HE provision settings, and at all levels" (QAA, 2009, p.3). PDP can provide an opportunity for students to learn about and reflect on sustainability (John Forster Associates, 2006). Sustainability literacy may be a set of skills, development of which is encouraged throughout the student experience of HE and recorded through the PDP process. Students may also be able to integrate relevant informal learning activities and volunteering into the PDP record.

Critical reading and writing

Reading and writing are often downplayed in favour of more interactive pedagogies. However, these are important social practices and the key to progressing sustainability and literacy. Sutcliffe suggests students can gain from deconstructing destructive, alternative or counter-discourses to identify the possible motivation of the author. They may also be able to envisage alternative futures, and write a contrasting account based on a differing set of values (Sutcliffe, 2008).

Problem-based learning

Problem-based learning is an iterative learning process that can be used to teach a whole range of subject matter. In the context of ESD, a sustainability-related issue may be identified and students asked to research this to generate a body of knowledge. They can then develop a vision of alternative actions and potential solutions to the problem, which they use to devise a plan of action. The action may then be carried out, followed by a period of reflection and evaluation. This process can be extremely useful because it promotes both the conceptual and practical aspects of sustainability literacy. Brunetti et al. (2003) describe a specific example of the use of problem-based learning to teach about social, economic and environmental sustainability issues.

Fieldwork

Fieldwork is an example of experiential pedagogy that can influence students' emotions (Sivek, 2002) and help develop the critical thinking skills so essential to understanding the complexity of sustainability (Jones, 2003; Scott and Gough, 2003). Fieldwork for sustainability can be based on issues in the local community and environs, linking theory to real-world examples (Hope, 2009), which can help students to understand multiple stakeholder perspectives in situ. There is also evidence that outdoor experience is an important precursor to understanding sustainability (Palmer and Suggate, 1998) and that fieldwork promotes broader benefits for learning by encouraging active and reflective learning among students (Hope, 2009).

Box 3.3 Examples of sustainability pedagogies in practice

Role plays

Through role-playing is the way forward. I often ask the room if any of them have a feeling on this … and then I'll flip their role. So for the ones who say I don't think fishing should kill dolphins, I'll make them research on the side of the fishermen. So instead of leaving them with their preconceived idea, stick them in the other one. So I say, "Right, you guys are going to be the environmental lobby, you'll be the industry lobby and in both cases one will lead and the other will defend." So when the conservationists are leading, the industry will defend, and [the others] will be the audience. And at the end of that discussion, see which one they think is going to get the public's vote (lecturer in marine science).

Discussions

I feel in some ways education should equip young people to be able to make up their own minds about their futures… I think there is an interesting thing about how we view excess at the moment, which is worth having a discussion with students about. In some ways, I think they get mixed messages on the one hand, I think they get the kind of Pepsi Max society — it's all possible. There is this sort of idea of choice; and on the other hand, they possibly run into some surprising constraints if they choose to do some other things … that's why I think we need to keep an impartial position (lecturer in media).

Stimulus activities

I do encourage critical thinking. So I will present an article to the student. This is a very old article from the Ecologist on recycling and reuse, which you can tell is something I feel very strongly about. I think anybody who really thinks for two minutes about recycling has to ask questions. I think the more in favour of recycling you are the more questions are coming up. So I would use this article with them, which does have questions of sustainability in it, because ultimately it is promoting a culture of durability, as opposed to a culture of throughput and reprocessing. It's obviously not my remit to actually teach sustainability. But I prefer to use texts with some kind of ethical value (lecturer in business).

Case studies

We are doing some teaching on a project called Ecohouse looking at ecological development … It is like a design project where students are given a plot and design buildings on that site and look at things such as energy use and their aim is to build something that is sustainable. The site is near the railway and in an area that has social problems and it's interesting to see the students take on things and not just looking at the environmental issues (lecturer in engineering).

Modelling good practice

I think at a personal level there is a huge amount we can do, and I've always felt that in the position where you have a teacher and students … you set an example, it's not just what you say, it's what you are. And if you stand up in front of a group of students and say you should be going by public transport and every evening you go out to your car and drive home … Students are very perceptive, and they understand this (lecturer in health).
refers to a university’s attempt to re-orient teaching, learning, research and university–community relationships in such a way that sustainability becomes an emergent property of its core activities. We do so by teasing out some didactic and pedagogic stepping stones for re-orienting teaching and learning towards sustainability. We will draw on exemplary initiatives from Europe, North America and Africa. First, we will provide a brief sketch of the evolution of sustainability in HE.

Sustainability in HE is no longer novel. Across the globe, national, regional and trans-regional networks for what might be termed sustainable HE have been set up, the number of international meetings and networks focusing on this area continues to grow, and several declarations on sustainability in HE have been signed in the past ten or so years by university provosts, deans and rectors. Earlier, in 1990, The Talloires Declaration became the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The Declaration is a ten-point action plan for incorporating sustainability and environmental literacy into teaching, research, operations and outreach at colleges and universities. It has since been signed by more than 350 university presidents and chancellors in over 40 countries (ULSF, 1990). At a more concrete level, the Tufts CLEAN initiative from Tufts University’s Environmental Center in the USA became one of the first university attempts to reduce the environmental impact of a higher education institution (Hammond Creighton, 1998).

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Whereas such declarations tend to be oriented towards ‘Northern’ or ‘Western’ HEIs, more recent declarations and cooperative agreements between universities also involve institutions in other parts of the world (UN Environment Programme [UNEP], 2008).

Perhaps the most visible changes and commitments lie in HEIs’ efforts to reduce their ecological footprint by improving environmental management of their estates. An analysis of the International Journal of Sustainability in Higher Education (IJSHE) reveals that during the first nine years of its publication (i.e. up to 2009), the overwhelming majority of articles focus on issues such as environmental management, university greening and reducing a university’s ecological footprint (see Table 4.2). In the more recent volumes there are more articles on pedagogy, learning, instruction, community outreach and partner-

### Table 4.1 Common principles of sustainability in HE declarations

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<th>Moral Obligation</th>
<th>Public Outreach</th>
<th>Sustainable Physical Literacy</th>
<th>Development of Interdisciplinary Curriculum</th>
<th>Encouragement of Interdisciplinary Research</th>
<th>Partnership with NGOs and Industry</th>
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ships. Not surprisingly, earlier volumes contained more articles on the meaning of sustainability and SD and the integration of sustainability into disciplines such as chemistry, engineering, architecture, natural resource management, accounting and industrial design. Indeed, many natural scientists continue to argue that the lack of precision in the concept of sustainability remains a distinct problem. Schultz, Brand, Kopfmuller and Ott from Berlin’s Wuppertal Institute for Climate, Environment and Energy insist that it is the responsibility of science to build a coherent theory of SD. Only a strong theoretical and normative conception of sustainability, based on an ‘enlightened anthropocentrism’, can really provide the necessary clarity that will allow progress to be scientifically measured and thus inform politics and the policy-making process effectively. They believe a sound theory will offset the confusion and diffuseness of much public debate and misunderstanding (Schultz et al, 2008, p477).

The more fundamental challenge of re-orienting teaching, learning and research in a way that will lead to new mental models and competencies appears more problematic. Firmly established empirical and analytical frameworks are invariably reductionist and mechanistic and have come to characterize ‘higher’ education. Although the sector is notoriously resistant to change, we are currently witnessing the emergence of a ‘third wave’ of sustainability in HE, following the environmental and greening the campus waves. This third wave focuses precisely on the teaching and learning implications of sustainability; it resonates with Stephen Sterling’s observation that the nature of sustainability requires a fundamental change of epistemology, and therefore, of both education and learning. He writes that ‘the process of sustainable development or sustainable living is essentially one of learning, while the context of learning is essentially that of sustainability’ (Sterling, 2004, p52). The analysis of IJSHE articles does reveal 31
on climate change (Stern 2006), writes in the foreword to the HEFCE action plan on sustainable development in HE that the world 'needs minds capable of creating new possibilities', that we need to 'transform our current ways of thinking and operating', and that the HE sector offers a 'vital platform' for undertaking the transition necessary to 'safeguard a secure future' (Stern, 2009, p1). It's quite a challenge. It requires learning within educational systems, not just learning through educational systems, as the chapters of this book demonstrate. And as our correspondent above suggests, it raises questions of purpose.

Sustainability requires HEIs to become less centres of transmission and delivery and more centres of transformation and inquiry, less teaching organizations, more learning organizations critically engaged with real-world issues in their community and region. It requires, too, that they be less engaged in 'retrospective education', following on from past practice, and more involved in 'anticipative education': that is, in Scharmer's words, 'learning from the future as it emerges' (Scharmer, 2009). For now, there is a difference between those who see ESD as a necessary add-on that leaves most current practices otherwise unaffected, and those who see it as representing a shift of culture that changes policy and practice at a whole institutional level. The two are not exclusive: one can, in time, lead to the emergence of the other, although there is the ever-present danger that adding on reform could be used to buttress resistance to more fundamental, cultural change. There is evidence of a strong upwelling of interest in sustainability in HE that manifests both perceptions, but given the insistence and dynamism of this movement, we think deeper change has a winning chance. It will need to win if Stern's challenge is to be met, and we hope this book contributes to that end.

References


List of Contributors

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Conclusion

The question of sustainability's place in HE curricula is slowly shifting from one of campus greening and curriculum integration to one of innovation and systemic change across the whole university. With this shift, space emerges for transformative learning and research emphasizing 'learning and research for knowing, doing and, indeed, being' (Wals and Bawden, 2000), echoing in some ways the 1996 Delors Report on lifelong learning, which speaks of learning to do, to be, to know and to live together. The resulting third-wave sustainability requires permeability between disciplines, the university and wider community and between cultures, along with the competence to integrate, connect, confront and, as much as possible, reconcile multiple ways of looking at the world.

To create pathways towards such systemic redesign will require healthy opportunism, such as taking advantage of current trends in education (competence-based education) and society (the rise of corporate social responsibility and the green economy, increased concern about global warming and so on), but also a healthy dose of creativity (building unlikely partnerships and coalitions, creating space for innovation) and risk-taking at all levels (teachers, researchers, management, higher education policy and others). For instance, it makes sense to advocate 'sustainability competence' and to develop ways of fashioning such competence. Conceptualizing and applying sustainability competence can become a useful exercise in embedding sustainability in many bachelors and masters degrees, which in turn requires a parallel process of reconceptualizing teaching, learning and research and reconfiguring university–community relationships.

At present, most universities are too often still advancing the kind of thinking, teaching and research that leads to unsustainability and ignoring alternative ways of knowing and being, that are not rooted in Western (scientific) traditions. As HE becomes globalized, globalization needs to be contested politically in the academy. As the Indian scholar M.G. Jackson (2003) argues, the ideological dominance of globalization, together with its corollary, a Westernized model of HE practice, must itself be challenged in that globalization and internationalization are inexplicably linked with a notion of progress that is tied to Western notions of economic development, growth and the fiduciary interests of corporate business. Additionally, Jackson argues that the idea of progress is entirely Western and lacks deep historical or cultural roots in non-Western societies. The need, then, is perhaps to de-Westernize higher education.

Despite the early signs of a transition in some parts of the academic community, sustainability is still by and large largely external to the HE student, academic faculty member and administrator. Too often, 'sustainable development' is just another course or research project as expendable as anything else if it does not pay its way. To overcome this, we academics need to reshape deeply entrenched routines, structures and practices by taking advantage of the privileged position universities have in our society. We need to confront our own assumptions and probably stand outside our systems to gain a clearer view of how this necessary systemic change can occur.

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Environmental Education Research (2008) 'Special issue: Sustainability in higher education research', vol 14, no 6
refers to a university's attempt to re-orient teaching, learning, research and university–community relationships in such a way that sustainability becomes an emergent property of its core activities. We do so by teasing out some didactic and pedagogic stepping stones for re-orienting teaching and learning towards sustainability. We will draw on exemplary initiatives from Europe, North America and Africa. First, we will provide a brief sketch of the evolution of sustainability in HE.

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Box 7.1 Potential ideas for curricula in pre-registration nursing programmes (levels 4, 5 and 6) leading to qualifications and entry onto the nursing register

Biology modules
- Introduce a common heritage and shared chemistry of living things.
- Discuss evolutionary conservation of some genes, compare homeostasis in the body with the concept of planetary homeostasis.

Pathology modules in nursing programmes
- Epidemiology of diseases such as HIV and bird flu.
- Role of migrations and travel in spread of disease.
- Discussion of the documented effects of lifestyle changes on health to give an insight into changes now happening in our own population. For example, increasing rates of skin cancer due to popularity of sunbathing.
- Discussions about possible effects of climate change on disease distributions (e.g. malaria).

Nursing practice modules
- Investigation of what happens to clinical waste — how it contributes to climate change through being burnt or added to landfill.
- Investigation of whether tap water can be used for wound irrigation rather than sterile containers of 0.9 per cent saline (brining in toxicity, impact of manufacture and transport of plastic containers and their disposal).
- Discussion of the pros and cons of electronic vs paper records in nursing practice — carbon dioxide emissions, data storage, paper manufacture and disposal, security and so on.

to come by. However, as a direct response to the development of the CSF, the University of Plymouth’s Faculty of Health has begun to address sustainability in its nursing curricula. It is fair to say that without CSF input and support, the examples shown in Boxes 7.1 to 7.3 may not have addressed climate change and sustainability so readily. The work was facilitated by some fellowships offered to members of Faculty to begin the development of this work.

Recognizing that there is little of an ecocentric paradigm underpinning curricula, we may still be able to design modules and courses by using one or more of three approaches that have been suggested (CSF 2009) to engage students with concepts of sustainability during their university courses. Briefly, these can be described as the ‘infusion’ model (sustainability issues are woven into existing curriculum), the ‘generic’ model (a generally available framework module is customized by individual disciplines) and the ‘common’ model (a common cross-disciplinary sustainability module is available as an option for all students).

Box 7.2. A module example for infusing sustainability into the curriculum

This module is offered to registered nurses and other health professionals as part of continuing professional development.

Module title: Public Health: Promoting health through policy

Level 5. University of Plymouth. BSc Community Specialist Public Health programme, BSc Health Studies.

Module aims
The module aims to develop students’ critical awareness of broad political and public health frameworks driving processes of health needs assessment and health promotion, thereby enabling them to promote the health of individuals, groups and communities in an empowering and ethical manner.

Learning outcome 1: Discussion of contemporary policy and public health frameworks
Sustainability is addressed by introducing students to contemporary policy and public health frameworks and emphasizing that it is an important value underpinning current global and national policy. Systems theory is used to critically analyse relationships between environment and policy because environmental issues become a driver for ‘inputs’ to policy-making and resulting policy decisions have ‘outcomes’ or consequences that, in turn, affect the environment.

Learning outcome 2: Analysis of health needs using epidemiological data and exploring determinants of health
Sessions on health needs assessment and epidemiology explore the determinants of health and enable students to consider how factors such as traffic pollution are detrimental to health and must be addressed in public health policy. Sustainable transport policy is discussed to address improvements in health and reduced demand on health services, thereby conserving resources for use elsewhere.

Learning outcome 3: Examining health promotion models and applying them to working with individuals, groups and communities
By examining health promotion models and applying them to work with individuals, groups and communities, students are introduced to concepts such as community development, which illustrates that communities can be mobilized to tackle issues such as healthy eating at a collective level. By encouraging use of highly processed fast foods and encouraging communities to consider growing food or learning to cook healthily, sustainability is clearly addressed. Issues such as consumerism and patient involvement in healthcare are also linked to sustainability because by creating expert patients who can support themselves and others, reliance on costly health service staff is reduced. Also, patient involvement should lead to development of more responsive services, thereby avoiding duplication or repetition and helping to eliminate waste.
Learning outcome 4: Discussing the importance of consumer involvement and empowerment in promoting health

Issues such as consumerism and patient involvement in health care also link to sustainability since by creating expert patients who can support themselves and others, then reliance on costly health service staff is reduced. Also, patient involvement should lead to the development of more responsive services, thereby avoiding duplication or repetition and helping to eliminate waste.

Learning outcome 5: Identifying and addressing ethical issues in health promotion

Finally, in exploring ethical issues such as justice and equity, the module clearly addresses the DH's strategy for delivering SD, emphasizing the need to address diversity, social cohesion and equity as central issues in the government's sustainability agenda.

Box 7.3 Example from a pre-registration nursing module at the University of Plymouth. BSc Nursing

Module title: Management for quality care. Level 5.

Example of learning outcome: Demonstrating the need to set priorities in clinical care through effective decision-making.

This module is aimed at year three students preparing for leadership and management roles. Although sustainability and climate change are not explicit in the module learning outcomes, an online lecture and discussion was developed to highlight to students what priorities for clinical care will be at national and international level. The DH and NHS agendas for sustainability were used as a vehicle to get students to think about the context of clinical care and address responses to climate change as nurses at individual, group, organizational, national and international level.

Nursing along with medicine has a public health core. Both professions are well placed to provide directions to improve public health at both social and individual levels. Given the seriousness of the health threats posed by climate change, we suggest:

- The professional bodies responsible for nursing education should take a lead. For example, the NMC's review of standards of proficiency for pre-registration nursing education should explicitly address the sustainability/climate change/health triad. This would inform universities' development of nursing programmes.
- There should be national nursing statements made and leads taken on sustainability, climate change and health from a chief government adviser (where this post exists) for nursing in each country.
- National nursing organizations could host an activists' forum as one of their communities or networks. For example, the RCN should submit a position statement in line with other national nursing organizations such as the Canadian Nurses Association.
- Nursing academics and nursing departments should get involved in any sustainability projects organized by their HE-wide organizations (for example, the HEA in the UK).
- All interested stakeholders should network, connect and communicate through various interprofessional channels as the Nursing, Midwifery and Health Professionals connection on the Climate Connection 2, the Campaign for Greener Healthcare 3 and the Climate and Health Council 4 and ISHE 5.
- Universities and the buyers of education (for example, the NHS) should address sustainability and climate change during the pre-purchasing negotiations. Discussions about what is required for the professional development of nurses should highlight sustainability and climate change. HEIs should respond to workforce development requests but, in partnership with education buyers, outline what the professional nurse of the future should be in terms of the context of sustainability and climate change.
- Universities and other education/training providers need to be creative in developing research-based learning resources on this subject as well as in modes of delivery, and the development of modules and programmes.
- National and international nursing organizations should be urging universities, professional bodies and their national departments of health to place climate change and sustainability explicitly on the nursing curricula.
- Nurses at national level must be involved in developing national action plans and policies and be part of disaster-preparedness teams to mitigate the impact of climate change on health (Hunt, 2006).
- Curriculum planners could review current programmes and modules and reinterpret learning outcomes so sustainability concepts could be introduced.