

Title: Integrative Approaches to Environmental Sustainability at Universities: an overview of challenges and priorities

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ABSTRACT

The principles of sustainable development are becoming extremely relevant for organisations. In the case of universities, these institutions can act as agents in promoting these principles within society. The literature contains a wide range of studies which show how universities may play a critical role in disseminating sustainability principles on the one hand, and their translation into practice, on the other.

At present, many Higher Education Institutions are becoming more aware of their impact on the environment, and trying to understand the environmental needs and implications of their operations. Going further, some universities are incorporating sustainability principles into their activities. One of the questions that universities are now facing is how education for sustainable development can be translated into practice so that it can be effective in transforming society.

This paper will discuss the need for and the usefulness of integrative approaches to implement sustainable development in higher education. In addition to a theoretical review of the state of the art, the paper will use case studies from the Hamburg University of Applied Sciences (Germany) and Bournemouth University (UK), to illustrate the effectiveness of integration of sustainable development principles in university research and teaching activities, and the many benefits integrative approaches may bring about.

Introduction

Sustainable development is an area of knowledge which has considerably evolved since the late 1990s, when it was defined and took its place in the international agenda (Pisani, 2006). There are still some doubts and issues about the meaning and the very sustainability of the concept per se (Blowers, Boersema, Martin, 2012), but it is acknowledged that the debate on sustainability should not be confined to the government level, but that both organisations and individuals also have a relevant role to play in the process.

Over the last two decades, many Higher Education Institutions (HEIs) have become increasingly aware of their impact on the environment, and have been trying to develop a better understanding of the environmental dimensions and implications of their operations (Carpenter and Meehan, 2002). Going further, some universities have been actively incorporating sustainability principles into their activities. This is the case, for example at the Polytechnic of Barcelona in Spain, which appointed a Vice-Rector for Sustainable Development in the late 1990s, at the University of Yale (USA) which has set-up a sustainability office, and at the University of Lüneburg, in Germany, which founded a Faculty of Sustainability. These examples and many more, illustrate the emphasis given to sustainability in higher education today. However, despite the increasing focus on environmental sustainability in education at all levels and within countries as diverse as Finland and China (see for example, Holm et al. 2014 for a comparative study of ESD China and Asia), discerning the relation between educational participation and environmental commitment is still very problematic (Cotton and Alcock, 2012); there are also many universities where actions to address sustainable development take a limited form.

One of the key questions that universities are now facing is how education sustainable for development can be translated into practice such that it can be effective in transforming society (Venkataraman, 2009). The role of universities in contributing towards a more sustainable future is assumed as being a positive one and has been repeatedly articulated in policy documents. Universities have a crucial role to play as agents of change (Cortese, 2005) particularly where they adopt an integrative approach to sustainable development that embraces curriculum, campus, community and research. However, despite the obvious necessity of developing more holistic approaches to sustainability, comparatively few universities have to date, successfully embedded education for sustainable development

across the entire curriculum (Shiel and Paço, 2012); there has been considerable progress but universities continue to grapple with the theoretical and practical challenges (Kopnina and Meijers, 2014) as they attempt to shift their approach “*from one of campus greening and curriculum integration to one of innovation and systemic change in the whole university system*” (Wals and Blewitt, 2010, p. 70).

There is an increasing trend towards integrating sustainability as a transversal theme, rather than limiting it to specific parts of the curriculum, hence improving the potential for impact on all university students. Universities are extremely important in the formal delivery of environmental education yet they do not always provide effective environmental and sustainability learning. Sustainability and environmental themes require interdisciplinary solutions that sometimes are hard to achieve in a university setting (Pearson, Honeywood and O’Toole, 2005). Further, environmental education can be key for the formation of an aware society; universities have a leadership role to play in identifying coherent and suitable solutions in the future (Brandli, Frandoloso and Tauchen, 2011).

The above state of affairs suggests that one approach tool which may be used in order to allow due consideration to the economic, social, educational and environmental dimensions of sustainability in higher education, is the use of integrative approaches.

This paper therefore describes the need for and the usefulness of integrative approaches to implement sustainable development in higher education. In addition to a theoretical review of the theme, the paper uses case studies from the Hamburg University of Applied Sciences (Germany) and the Bournemouth University (UK), to illustrate the effectiveness of integration of sustainable development principles (both vertical and horizontal) in university research and teaching activities, and the many benefits integrative approaches may bring about. Although the normative view is that integrative approaches are the best way to achieve sustainable development within higher education, the paper will also explore the bottlenecks and challenges in taking such an approach forward.

Literature review

The policy aims proposed by the *Europe 2020 Strategy* in the area of environmental sustainability accelerated the reflection on the role of universities and their potential contribution in moving towards a low carbon and resource efficient economy. These institutions are asked to reduce their negative environmental impacts by developing resource efficiency plans, resource management systems and green public procurement policies, to intensify cooperative ecological innovation activities of their research centres, and to introduce awareness training for the students and staff (UNICA, 2011).

Brandli, Frandoloso and Tauchen, (2011) assign two fundamental roles to HEIs as major contributions to sustainable development: (i) to ensure that the educational subject prepares individuals to be more involved in decision-making concerning environmental issues in the future; and (ii) to ensure that the implementation of environmental management systems presents models and practical examples of sustainable management for all society. In the first case, Disterheft et al. (2014) suggest that participatory approaches are an important requirement in order to contribute both to a global paradigm shift towards sustainable development but also to ensure the integration of sustainability into the university culture. In their research, the university community (including students and nonteaching staff), was invited to seek and experiment with new routes towards a culture of participation that would enable the broadening of new ideas about sustainability in higher education. Regarding the implementation of environmental management systems, Disterheft et al. (2012) suggest that universities can contribute to sustainable development by implementing well-conceived and planned models of sustainability; significant attention to developing sustainable campus operations is a usual starting place. Eventually by exhibiting long-term commitment towards sustainable development, the university serves as example to other organisations.

As Lukman and Glavic (2007) suggest, higher education has both a direct and indirect impact on local, regional and national environment, as well as on graduates and their future decisions. Thus, universities perform an important role in knowledge creation and dissemination through education and communication. In regard to students, practical experiences are more likely to result in good sustainability and environmental education creating the opportunities for students to learn about interdisciplinary environmental issues is key to delivering better sustainability education (Pearson, Honeywood and O'Toole, 2005). The aim would be to ensure that graduates in their future professional lives will take social, environmental and economic costs and benefits of sustainability into consideration (Grindsted

and Holm, 2012; Holm et al., 2014). Further, understanding students' evaluations of sustainability practices in universities is also assuming importance; it enables decision-makers to gain a better picture of the university's performance from the perspective of one of their major stakeholder groups (Nejati and Nejati, 2013).

The impact of transformation now acting upon the university sector, in the scope of environmental sustainability, is a global trend of profound significance to both current and future generations. If universities are going to survive into the next century, they must not only respond to this new force, the environmental imperative, but they must also provide leadership for broader society (Sharp, 2002).

Despite that environmental sustainability is such a global challenge and one of the main pillars of sustainable development, the emergence of environmental sustainability in higher education is a relatively new phenomenon. The idea that universities should be models of environmental sustainability has its origin in higher education declarations for sustainability (e.g. The Talloires Declaration, The Kyoto Declaration of the International Association of Universities, The Swansea Declaration, The COPERNICUS Charter of the European Association of Universities and Luneburg Declaration). The focus of universities shouldn't be only on education, research activities, community services and daily practices/technical operations, but also on governance (Faghihimani, 2012).

As Biedenweg, Monroe and Oxarart (2013) suggest, education for sustainability in higher education prepares future professionals to be responsible citizens in a more sustainable society; however little attention is given to instilling a deeper understanding of the ethical principles that provide the base for sustainability. Rather, sustainability education tends to involve students in practical activities such as campus greening initiatives, field visits to learn about sustainable practices, and support to environmental studies courses or workshops.

According to Sharp (2002) a crucial aspect of the environmental imperative is that it requires universities to address a number of complex challenges; the environmental sustainability challenges are such that what is required are changes in all areas of university business and that will involve multiple stakeholders (students, alumni, government, administration or faculty) in exerting pressures for change. Usually the response of universities to environmental sustainability has been to establish an environment working group to undertake

decisions and implement and control chosen programmes to address environmental concerns. This in itself may be insufficient. It seems evident that transformation will only come about when a considerable number of individuals set up different priorities in both the small and large scenarios of the university, establishing new routines and structures despite local conflicts and set-backs. To the author, one of the challenges that universities face in generating wide-scale participation is the susceptibility of people to allow themselves to be manipulated or controlled in order to achieve the organisational aims. In universities the challenge of being the change agent, regarding the dynamic complexity within universities, requires a skilful approach to learning through experience and reflection. According to Clark (1983), implementing environmental sustainability in all dimensions of higher education institutions is a milestone for a great change to embody the environmental sustainability in society. The complexity of the sustainability concept implies a systematic approach which should be able to address various aspects of the concept.

There is a clear need for universities to take on leading positions by demonstrating practices that sustain the natural ecosystems, and educating in such a way that approaches a sustainable society. Therefore, universities face a new challenge that is to ensure their own future is sustainable (Lukman and Glavic, 2007).

In a small number of universities around the world it is possible to observe many examples of different environmental initiatives: recycling, energy efficient lighting, water conserving fittings, composting toilets, green building designs, public transportation initiatives, etc. Nevertheless, we have very few cases of universities that have really implemented a systemic commitment to environmentally sustainable campus operation, research and curriculum greening – i.e. have used integrative approaches - achieving high efficiencies and opportunities, and use the development principles in an integrative way. Note that these integrative approaches should be both vertical and horizontal to be effective. To exemplify, the two subsequent case studies here described, from the UK and from Germany, outline some of the means via which this integration may be achieved and the challenges.

A Case Study on Applied Sustainable Development from the Hamburg University of Applied Sciences

The Hamburg University of Applied Sciences (HAW Hamburg) was founded in 1970 and is, with over 18.000 students, the second largest university in Hamburg. One of the main thematic research focus of the university is “Sustainability and Energy”, and consistent with this goal, the University has set-up two units, which assist it in implementing research in these areas.

The first unit is the “Competence Centre on Renewable Energy and Energy Efficiency” whose German acronym is “CC4E”. This unit congregates knowledge and know-how of all Faculties on all matters related to energy, and entails around 50 professors, which cover the whole spectrum of energy efficiency and renewable energy, being the largest infra-structure of its kind in northern Germany.

The second unit is the Research and Transfer Centre “Applications of Life Sciences”, called “FTZ-ALS”. As the name implies, this unit is concerned with applied research and technology transfer, and has a very strong sustainability focus. The Centre is attached to the Faculty of Life Sciences of HAW Hamburg. As a research and development institute, the centre offers local, national and international project-related approaches to solving problems primarily in the field of Life Sciences, as well as superordinate topics such as energy, climate protection and sustainability.

The main objective of the FTZ-ALS is to support fundamental and development research – especially by conducting practice-oriented research projects. Furthermore, the centre contributes to knowledge and technology transfer on matters related to sustainable development a national and international level. Its central tasks are as follows:

- (i) implementation of interdisciplinary research projects in the field of Life Sciences as a whole, and sustainable development in particular;
- (ii) strengthening of international cooperation and supporting the establishment of networks;
- (iii) organization of conferences, symposia and further training programmes;
- (iv) application and adaptation of results from research projects to other regions and countries;
- (v) promotion of the future generations of scientists, by supervising Masters and PhD theses on sustainable development issues and topics.

Moreover, consistent with the need to create the conditions for a sustainable university (Martin and Samuels, 2012), the Centre engages not only on research on sustainability, but also on matters related to curriculum and campus greening.

The Centre also works as the German office of the Baltic University Programme (BUP), a network of about 225 universities across the Baltic Sea Region, especially concerned with and committed towards promoting sustainable development.

BUP focuses on questions of sustainable development, environmental protection, and democracy in the Baltic Sea region. The aim is to support the key role that universities play in a democratic, peaceful and sustainable development. This is achieved by developing university courses, and by participation in projects in cooperation with authorities, municipalities and others.

Apart from its strong links with BUP, the FTZ-ALS works under the premise that, in order to be meaningful and yield the expected benefits, initiatives in the field of sustainable development need to be very concrete and very focused. This is especially so in respect of teaching (Leal Filho, 2010), but in the field of research as well. In order to reiterate this, the FTZ-ALS has pioneered the concept of “applied sustainable development”. According to Leal Filho (2011), this can be defined as: *“An action-oriented and project-based approach, which use principles of sustainable development and applies them to real contexts and to real situations, yielding the benefits which can be expected when methods, approaches, processes and principles of sustainable development are put into practice”*.

Some of the projects undertaken by FTZ-ALS and which are examples of applied sustainability are as follows.

The EU-project "Inspire School Education by Non-formal Learning" (INSPIRE) was prepared to foster information and learning on renewable energy and climate change. The vision of the project INSPIRE is to improve the quality and attractiveness of in-service teacher training in an extracurricular context and by using new learning places. Inspire was a project funded by the European Commission's Lifelong Learning Programme (2007) by means of the COMENIUS Multilateral Projects budget line. The project's initial period was from November 2007 to October 2009. The main objective of the INSPIRE project was to create synergies and links between out-of-

school places of learning and curricular learning, thus improving the base of knowledge of European pupils on matters related to education for sustainable development. In addition, it aimed at preparing a set of materials which may support teacher training on renewable energy and climate issues, as well as test such materials with a view to a subsequent use in support of sustainability education. INSPIRE's goals were therefore very much in line with the objectives of the UN Decade of Education for Sustainable Development. The project partnership in Germany, Latvia and Poland will develop approaches, methods and materials which may be used in other countries in Europe and beyond.

The other project is designated as JELARE. Renewable Energy is of great relevance for the socioeconomic development of all countries, including in Latin America and in Europe, as both regions to date heavily depend on (imported) fossil fuels to meet their energy needs. Apart from the environmental benefits, the local generation and use of renewable energy offers a great potential for the local economic development (e.g. a wide range of local jobs opportunities from high-skill to low skill, from high-tech to agriculture), foster local investments and reduces the need for energy import). However, the sector of renewable energy cannot develop appropriately, partly due to lack of expertise, especially in poorer countries such as Bolivia and Guatemala. Due to the innovative nature of this field, higher education institutions are very important actors in this sector, especially in terms of research as well as educating future employees in this sector. However, despite the value of the topic renewable energy, it is not as yet prominently featured in the curriculum of Latin American universities (and EU universities) as it could have been or, indeed, as it should be. Therefore, the project JELARE, as an example of applied sustainability, focusing on renewable energy, one of the key issues of modern times.

The last project, named RECO Baltic 21 Net, funded by the Interreg IVB (Baltic Sea) programme, is aimed at addressing the shortage of knowledge, the lack of expertise and institutional capacity, to handle waste management in the Baltic Sea region. One of the major challenges to sustainable development is how to handle wastes in an appropriate way. The ever-growing waste production damages the environment and puts pressures on ecosystems. Yet, much can be gained by finding ways of using wastes intelligently, i.e. exploring their use as sources of energy or reusing materials in order to achieve environmental improvements and use the many business opportunities available.

From a practical perspective, the FTZ-ALS has “practiced what is preaches” by means of a set of initiatives which are summarized in Table 1.

Table 1. Integrative Approaches to Sustainability at FTZ-ALS

Research	Teaching	Extension
Execution of projects focusing on sustainable water, energy and production/consumption	Inclusion of sustainability as a cross-cutting issue across disciplines, as courses, modules or units of modules	Holistic sustainability focus, involving associated issues (e.g. agriculture and climate change; energy efficiency and sustainable energy use)
Work with research themes relevant to developing countries, contextualizing and adapting know-how	Engagement of different Faculties in sustainability projects and in sustainability teaching	Research and know-how transfer events with specific thematic focus
Practical focus, with an emphasis on the problem-solving process	Fieldwork performed regularly as a means to raise awareness and show the real impacts of sustainability	Capacity-building activities on research and development
Creation of a local research base, which can continue to operate even after a project's completion period	A project-based approach where principles of sustainable development are used in practice	Locations predominantly in developing countries, so as to yield maximum benefits

The work of the Centre is not without its bottlenecks. Apart from the fact that it is a self-funded organisation, it constantly needs to convince and engage stakeholders from the University and beyond, about the need for and the advantages of integrative, interdisciplinary initiatives in the field of sustainable development. This is not always easy, since there still is some degree of scepticism as to whether it makes sense to work in an integrative way.

As far as the achievements of the Centre are concerned, there are a few which can be listed. First and foremost, the FTZ-ALS is the most successful research centre at HAW Hamburg, mobilising academic staff from all Faculties in the joint execution of projects. This has led to a mobilisation of substantial sustainability-related project income, which exceeds Euro 15 million since its foundation. In addition, the Centre has unique expertise on German and European funded programmes, and is thus able to successfully bid for national and international projects. Furthermore, the staff has a good record of academic outputs,

publishing regularly in peer-reviewed journals and books. Finally, it frequently organises high calibre conferences, attended by national and international guests.

The role of champions is played by the Centre's staff, all of whom are very active and interested in the interdisciplinary sort of work performed at FTZ-ALS. Consistent with the philosophy of the Centre, its staff consists of biologists, geographers, engineers and economists, all sharing a common interest on matters related to sustainable development.

Bournemouth University (BU) Case Study: a holistic approach which embraces curriculum, campus, community and research

Bournemouth University (BU) is a medium-sized UK university, inaugurated in 1992, with around 17000 students, including 1800 from non-EU countries, 650 academic staff and 800 professional and support staff. The vision for the university includes the aim of 'inspiring our students, graduates and staff to enrich the world' and the bold statement: 'we will ensure our environmental credentials are held in high esteem' (BU 2018). The 2012-2018 Strategic Plan refers explicitly to 'a holistic approach to SD' (p30), the need to 'ensure that graduates develop a global perspective and understand the need for sustainable development by seeking to embed sustainable development across the curriculum' (p19) and the need to 'ensure BU operates an affordable, sustainable and secure estate' (p53). A holistic approach to sustainable development and a journey towards becoming a sustainable university (in the sense used by Sterling, Maxey and Luna, 2013) has been pursued at BU with varying degrees of success since early 2000. The approach arose from an ambition to develop graduates as 'global citizens who understand the need for sustainable development' (Shiel and Bunney, 2002; Shiel, 2007). It was led by a group of champions who wanted to inspire a vision whereby the university might make a better contribution to a globalised world, where unsustainable development required new solutions, futures-thinking, and a better educative response. Early initiatives sought to engage the support of senior leaders in transformative change, and to inspire students and staff to engage with an agenda that would impact upon curriculum, campus and community - an approach which is not dissimilar to the '4C' model at Plymouth University (Jones, Selby and Sterling, 2010, p7) and has been taken forward by other UK universities.

At the heart of the 'working model' (Bourn and Shiel, 2009) at BU was an articulation that while developing a curriculum and skills for globalisation and sustainable development was an urgent requirement, the University itself would be accused of hypocrisy if it did not ensure that all operations and ways of working, were a role-model for sustainable development, environmental management and social responsibility. A group of staff had already started to conserve energy; the 'Energy Group' had begun to introduce measures to monitor consumption which led to campaigns such as 'switch off' but the driver was to reduce the institutional spend on utilities, rather than as part of a holistic approach to sustainable development.

Developments until 2005 were largely piecemeal and opportunistic; further momentum would be triggered by a UK Leadership Foundation Fellowship award (with funding) which enabled the development of a strategic and inclusive approach to change, across the institution. 'Participative evolution' (Dunphy and Stace, 1993) embracing a collaborative and consultative approach, was a key goal of the challenging change agenda. The 'strategic report' which was an outcome of the project, was endorsed by Senate; the inclusive approach to change not only increased awareness but inspired others to begin to engage with action. Subsequent progress was still slow but resulted in changes across the curriculum, raised the profile of sustainable development research (but in pockets) and triggered inspiring new initiatives related to environmental sustainability within the local community. The latter, has been one of the most rewarding aspects of engagement (Shiel, 2011) and has included helping the local Council implement the Earth Charter (Bournemouth Borough Council is the only UK Council to have done so), organising a symposium on the Air Festival and carbon, and more recently, contributing to 'Fairtrade Town' and work to become a 'Sustainable Food City'.

Substantial work has also been implemented in relation to the Estates, with early activities focusing on three target areas: energy efficiency, travel planning and waste management and recycling. The environmental management agenda now embraces a wider range of impact areas including carbon management, water reduction, biodiversity management, sustainable construction and sustainable procurement. Significant investment has been made in carbon management projects including investment in a 'bio-mass boiler' and building management systems. It was fortuitous that one of the first Research Assistants on the 2005 strategic project went on to become the institutions Environment and Energy Manager; her success in

this new role enabled greater co-ordination in taking forward sustainable development across the academic (curriculum and research) and professional service domains (estates) than might otherwise have been possible. This meant that progress in developing environmental sustainability across the Estates proceeded in parallel with developments in research, the curriculum, and the extra-curricular sphere. The institutional 'Environment Strategy Group' has led the environmental agenda; the Environment & Energy Manager ensured that the academic champion was included in the membership, albeit that the group primarily focuses on Estates issues and does not incorporate the research agenda. An academic champion on a group whose remit is 'estates' is important to ensure that the group considers the academic perspective, which can sometimes be forgotten, but also acts as an access point to other academic colleagues and the academic agenda.

Over time, an integrative approach to sustainable development (although never as fully integrated as originally conceived), has meant that BU has been perceived as one of the greener universities in the UK (with a 'first-class' award, four years in a row in the UK Green League Table), and as one of the early adopters of a holistic approach, where environmental concern is just one part of a broader agenda. Initiatives at BU have been rewarded by external recognition both locally and nationally, and include:

- AIBEAT Earth Charter Award – Engagement in Sustainability 2013
- EcoCampus Gold Award 2011
- Gold Sound Impact Students Union Award
- Green Gown Awards: Transport 2005; Energy Efficiency 2004
- Finalists (nationally) in the following: Green Gown Awards – Sustainable procurement 2011; Green Gown Awards – Promoting Positive Behaviour 2011; Times Higher Education Awards – Outstanding Contribution to Sustainable development in 2007 & 2011
- Dorset Business Awards – Environmental Excellence – 2007

Such recognition has been welcome and not only suggests a degree of success but has been useful internally, where it has raised the profile of champions and served to reinforce the value of an agenda that is too often seen as 'low priority', in a context where so many other pressing concerns demand the attention of higher education leaders.

It was a concern that senior management needed to reinforce commitment for the agenda and ‘walk the talk’ that gave rise to a further initiative: ‘Developing Leaders for Sustainable Development: enabling behaviour change’ (Shiel, 2013a). The project increased awareness of sustainability and in particular the need for carbon reduction. It enabled all senior managers and Board members (whatever their domain of responsibility) to consider their own contribution to sustainable development and the extent to which their own behaviour contributed to the goals of BU, as a sustainable university and as an institution committed to reducing its environmental impact. The project was reasonably successful in raising awareness but unfortunately since delivery, real success has been under-mined by staff turnover and the departure of key supporters in the senior team. Reflecting on the project it would be fair to concede that senior managers still do not prioritise sustainability; their ‘world-views’ (on leadership and sustainability) are a huge barrier to change. A positive and unanticipated project outcome however, was the whole-hearted support for sustainable development given by the Chair of the University Board and her agreement to a very practical initiative: all papers appearing at the Board (whatever their scope) should have considered sustainable development and required sign off to that effect (see Shiel, 2013b, p125 for the Chair’s perspective).

So while on the one hand this case-study illustrates an institution that has achieved quite a lot in its contribution to sustainable development (through education, research, estates management and community engagement), from the perspective of internal champions who have advocated the need for holistic and transformational change for a future that needs to be sustainable, then the institution has not gone far enough. Nevertheless, as Table 2 shows the current state of play reflects a number of initiatives that cut across the institution.

Table 2. Initiatives under a holistic approach to sustainability at BU

Research	Curriculum	Campus & Community
Execution of projects focusing on sustainable forestry, energy conservation, sustainable food, bio-diversity, sustainable design, sustainable tourism.	Inclusion of sustainable development as a cross-cutting issue across all programmes plus specific u/g, p/g and research degrees in environmental mgt.	Impact areas: energy efficiency, travel planning, and waste management and recycling now extended to include carbon management, water reduction, biodiversity management, sustainable construction and sustainable

		procurement.
The development of two cross – institution research themes: Bio-diversity, Conservation and Green Economy; Sustainable Design.	Engagement of different Schools in sustainability projects and in sustainability teaching (core modules and options)	Investment in carbon management projects: a biomass heating project, voltage optimisation and building management systems. ‘Bio-dome’ to enhance learning.
Practical focus, with an emphasis on the problem-solving process and ‘making a difference to the world’.	Curriculum guidelines to ensure that sustainable development is considered by course teams embedded within quality assurance & enhancement processes.	Capacity-building activities: Sustainable Food City; Fairtrade Town; implementation of Earth Charter etc.
	Development of focused provision e.g. MSc Green Economy delivered via e-learning, multi-disciplinary and with units available as CPD	Research and consultancy engagement across the world

Discussion

It is widely accepted that, as we seek new and more environmentally friendly sources of energy and as we work more intensively in order to promote the protection of the physical and natural environment, applied approaches to sustainable development are becoming more and more important. Here, it is noted that a crucial role is played in reaching the right learning outcomes (Svanström, Lozano-García and Rowe, 2008), i.e., making sure that the appropriate tools and methods are used, to make sure that skills to be built (i.e. writing, theorising), and abilities to be fostered (e.g. problem-solving) are indeed developed as expected. The analysis of these two illustrative case studies may develop understanding of how these outcomes have been achieved in practice, and how the learning processes can be improved.

The first case presented (HAW) proposes the theme of applied sustainability, as an approach and also as a way of thinking. According to Leal Filho (2011) this concept differs from conventional approaches to the promotion of sustainable development in three main ways:

- a) It is a practice-based approach, which bears the long history of sustainability and its principles in mind, but which is also concerned with its applications in real situations;
- b) It uses the body of theoretical studies and discourses available, but ensures they are put to use in specific, well defined contexts and
- c) It is concerned with measurable, tangible results and not only with subjective issues such as raising awareness or consciousness, even though these elements are certainly part of the formula.

The contribution of FTZ-ALS therefore, will continue to be towards the promotion of integrative approaches to sustainable development, and to link topics in a way that their sustainability dimensions are clearly outlined. In this context, a strong emphasis is also given to sustainability ethics (Biedenweg, Monroe and Oxarart, 2013), since this is an important tool in fostering skills and a global view of the world. In turn the case study of BU suggests that integration has been achieved through a holistic approach but is challenging to maintain:

- a. The Corporate Strategy demonstrates quite clearly the importance of sustainability and much has been achieved by working across the professional and practitioner domains but such synergy is not always acknowledged by senior leaders. The latter have a key role to play in leading culture change but also in establishing the enabling structures that allow integrative approaches to flourish. The BU approach gives rise to questions which the champions for sustainability are currently seeking to resolve. It continues to be challenging to hold the separate parts of an agenda into an integrative whole, but does this matter as long as action is taking place across all areas?
- b. Success at Bournemouth has come about because of close links between the Environment & Energy Manager and the academic champion but the synergy of such relationships is maintained sometimes at personal cost; within many institutions academics and professional services staff have very different identities, role demands and budget constraints which serve as barriers to this type of collaborative working.
- c. It is not always easy to capture and coordinate the research endeavour; there are many areas within the university that address sustainability and many academics engaged in sustainability research (theoretical and applied) but these are largely separate endeavours dispersed across the university rather than part of an integrated whole. The question remains as to whether this is the best way to proceed? Are there better ways to co-ordinate research efforts without stopping the ‘thousand flowers blooming’ – how do we balance encouraging everyone to own the agenda with some degree of

control? Perhaps an answer might suggest that we need to transcend the ‘capture and control’ approaches that are part of university life and seek alternatives?

- d. Success is more difficult without strong support from senior champions but how is this maintained in a context where leadership at the top keeps changing, and each new leader has their own agenda which may not be sustainability)? How do we continue to challenge the mental models of leaders (both on leadership and sustainability), which are a hurdle to making progress but also encourage them to support new ways of working which might be more integrative?
- e. How do we devise new strategies to inspire an already interested student body to lead action in their own spheres of influence?

Developing curriculum guidelines at BU has been important to ensuring that sustainability is addressed across the curriculum; developing leadership ability to role model sustainable development have also been important endeavours however the BU approach has less emphasis than HAW on practical outcomes, and unlike HAW does not have a specific unit to control the over-arching agenda.

At BU, as it is the case in Hamburg, integrative approaches are being pursued, but in both cases there is still a long way; such approaches are not without challenges. The important thing is that steps towards becoming a more sustainable university have been taken.

Unfortunately, it cannot be said that the experiences from Hamburg and BU also hold for traditional, more theoretically oriented, universities. This is so for two main reasons:

- a) Hamburg and BU have invested both time and efforts to build a sustainability profile based on working across the professional and practitioner domains. This is not an area where ‘traditional’ universities might normally engage;

Even though synergies across these two universities are not easy to achieve, the usual demands and budget constraints are not used as excuses for not performing collaborative work. On the contrary, the working environment present at these two universities provide a good setting for cross-Faculty activities, a trend seldom seen in traditional universities where a discipline focus often dominates.

Both universities do not operate from a ‘wish-list’ of sustainability issues to address. Rather, their work is based on perceived needs, and this provides a good insight into how to overcome institutional barriers: to have practice-based work, addressing societal –and not only merely

academic- needs. In so doing, integrative efforts are not only expected to last longer, but yield tangible benefits to the communities surrounding the universities.

It is evident that there is no single ideal administrative or organisational approach that may help the cause of fostering integrative approaches towards sustainability. Indeed, it would be unreasonable to expect this, in a working environment as diverse and as challenging as universities. What is needed however, is an institutional willingness to strengthen the internal capacity in the field of sustainable development as a whole, and to establish and develop a framework which encourages –and not hinders- the research and practical work performed by members of staff.

Conclusions

This paper has demonstrated that integrative approaches to sustainable development are not only needed with a view to consolidating the potential contribution of each institution, but that they are also effective. But does this mean that we have got it right and that an integrative approach has been fully achieved? An honest response would have to acknowledge that success is sometimes far easier to market than it is to sustain on the ground. That is not to deny that sustainable development has been taken forward across both institutions described in this paper and indeed, it is becoming increasingly pivotal to delivering efficiency measures (decreasing consumption of energy/water or reducing waste generation, for example) but to note that sometimes initiatives have been separate endeavours, led by champions, rather than fully coordinated from the top as part of a strategic whole.

This is evident when the research agenda is considered: academics are engaged in environmental and sustainability research across the university but not necessarily in a co-ordinated way; examples of trans-disciplinary working (something vital if we are to devise solutions to the problems of unsustainable development) are few. Would someone in the Faculty of Science and Technology (which is strong in environmental research) know what academics in Tourism, Business, or Health and Social Care are researching in relation to sustainability? The answer would most likely have to be no – but then would this be very different in any other university? The challenges of implementing interdisciplinary

approaches to both research and education in universities on the one hand, but also policy and operations on the other, are widely recognised (Holley, 2009; Richter and Paretti, 2009; Wade and Stone, 2010); a lack of resources to support interdisciplinary working, lack of supportive academic reward systems, contrasting discipline cultures, departmental policies and procedures, and decentralised budget strategies, are just some of the hurdles to be overcome. Unless senior managers put in place the structures and mechanisms to enable trans-disciplinary working then it is unlikely to happen. The same could be said for any agenda that requires an 'integrative' approach.

As Sharp (2002) states, (and something that continues to hold truth) the environmental imperative requires a rapid and broad response from the university sector; unfortunately many universities fail to recognise the urgency, or the breadth of actions required. The ultimate vision of an environmentally sustainable campus should be a vision of a learning organisation and a living laboratory for the practice and development of environmental sustainability.

Thus, in order to better define priorities and face the challenges that HEIs are facing, these organisations should allow teaching staff the flexibility to develop formal and extra-curricular resources for sustainability and employability skills important to their discipline and work with employers and entrepreneurs to identify the capacities and knowledge needed for business opportunities in the green economy. In turn government and policy makers should support the higher education sector in responding to the student demands for sustainable development to be promoted in their institutions and provide guidance to ensure that learning and teaching resources on employability include the issue of sustainability.

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