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**INTEGRATING SUSTAINABLE DEVELOPMENT INTO THE HIGHER EDUCATION BUILT ENVIRONMENT CURRICULUM.**

Intended Category: Embedding Sustainability

**Abstract**

Universities play a pivotal role in influencing policies, practices and human behaviour that govern how we live. Historically, the influence of universities in this respect was acknowledged by the Talloires Declaration of 1990 which stated that:

*“Universities have a major role in the education, research, policy formation, and information exchange necessary to make these goals [of a sustainable future] possible”.*

This paper explores the pedagogical and practical questions of how best to embed sustainable development in the higher education curriculum of the built environment disciplines, within the constraints of the current operating environment, in order to provoke a cultural shift in student behaviour. It is a small, qualitative study intended to add to the discussion on how best to embed sustainable development in the higher education curriculum. Interview data were collected from four key informants from academia and one from the professions. These data were supplemented by the analyses of policy and operational matters associated with the institutional promotion of sustainability. The findings of the study were applied to a previously devised, theoretical model for programme-based assessment and the paper concludes with a proposed model for embedding sustainable development in the higher education curriculum of the built environment disciplines. The findings should inform other disciplines.

**Introduction**

University leaders have historically considered the issue of environmental protection and its next evolutionary stage, sustainable development. Research reported in UNESCO (2009, P27) established that two pedagogical interpretations of Education for Sustainable Development can be distinguished. The first may be interpreted as the *transference* of ‘appropriate’ sets of knowledge, attitudes, values and behaviour; i.e. education as *transmission*. The second infers capacity-building to give to people the knowledge and skills to engage with sustainability issues; i.e. education for *transformation*. In the final section of UNESCO, 2009, entitled Key Findings and Ways Forward, one of the proposals for reorienting curricula, teaching and learning is that:

*“...educational policies and support mechanisms that allow for more integrated forms of teaching and learning should be strengthened.”* (p71)

The first official statement made by university administrators of a commitment to environmental sustainability in higher education, the Talloires Declaration, was composed at an international conference in Talloires, France in 1990. This Declaration identified ‘the urgent need for leadership from higher education and a ten-point action plan for incorporating environmental literacy and sustainability into university teaching and practice’, (Talloires Declaration, 1990). It was signed, at the time, by the twenty-two university presidents and chancellors participating in the conference. In December 2002, the United Nations General Assembly adopted a resolution declaring a "Decade of Education for Sustainable Development" to begin on January 1, 2005. As we are approximately halfway through this Decade of Education for Sustainability, it is an appropriate time to reflect on our educational practices. This ‘United Nations Decade of Education for Sustainable Development (2005-2014)’ has the UN Educational, Scientific, and Cultural Organization (UNESCO) as its lead agency. It

*‘seeks to integrate the principles, values, and practices of sustainable development into all aspects of education and learning, in order to address the social, economic, cultural and environmental problems we face in the 21st century’* (UNESCO, 2010).

The question is how best to achieve this integration. The Environmental Association for Universities and Colleges (EAUC) proposed that most courses fall into one of the following categories:

1. SD is fully integrated into the course.
2. SD is mentioned in a particular module of the course.
3. SD is not mentioned but you can see where it might fit.
4. SD cannot be easily integrated within the course.

However, the research carried out by EAUC found that people’s opinions of their courses are polarized. They either believed that SD cannot easily be integrated within the course, or that it was already fully integrated (EAUC, 2010).

The built environment plays a central role in human existence and behaviour. It sets the agenda for such key, sustainable matters as transport, communication, social interaction, housing, social divisions, construction, waste, power and its generation, energy, culture, architecture, conservation, impact on the natural environment and the depletion of natural resources. Additionally and crucially, planning, development and property as an investment asset has had a significant impact on the world’s economic and social well-being in recent years, as reported in the world press. Human activity depends on the built environment. The built environment is expanding and developing at an increasing pace to meet the diverse social and economic needs of human activity. It is unlikely that the current usage of natural resources to meet the demands of the built environment is sustainable. In order to foster innovation and transformation for building products and performance to be sustainable, it is essential that the philosophy and, more importantly, the practices of sustainable development are embedded in the curriculum of the built environment discipline in higher education. Sustainable development (SD) is a global priority and has to be considered in the social, environmental and economic dimensions. The higher education curriculum for educating practitioners and policy makers that govern the built environment must play a key role in the education for sustainable development (ESD) agenda. The study is situated within this context.

This paper explores the pedagogical and practical questions of how best to embed sustainable development in the higher education curriculum of the built environment disciplines, within the constraints of the current operating environment, in order to provoke a cultural shift in student behaviour. A model for integrating sustainable development into the higher education built environment curriculum is proposed.

### **Methodology**

The study is a small, qualitative one. A literature review was conducted to provide a context and background to the active research. Several methods of data collection were undertaken. Semi-structured interviews were conducted with key informants from the built environment discipline to enable a synthesis of the views and suggestions obtained from the interviews on how to embed a culture of sustainability in curricula. Four key informants were selected for interview on the basis of their work on education for sustainable development in the built environment discipline. All four are academics contributing to education for sustainable development. One (KI1) is from the built environment department of an English university. The programmes associated with this department are renowned for their emphasis on sustainability matters and the university likewise has an ethos of sustainability, summed up by the vice-chancellor of that university who states: "...we aspire to be a socially responsible organisation, demonstrating sustainability in all our activities and ensuring our students are aware of economic, environmental, social and ethical issues...". This university is ranked number one out of 133 universities in the annual People & Planet Green League table. The remaining three key informants (KI2, KI3, KI4) are from a sustainability group in a school of the built environment in a Northern Ireland university which professes the importance of sustainability and endeavours to embed sustainability in all of its programmes. The framework for the semi-structured interviews was framed around the following five prime questions:

1. How is sustainable development (SD) embedded in the curriculum?
2. Is there a discernible change in attitude/behavior of students as a result?
3. What, if any, policy change was necessary to facilitate SD in the curriculum?
4. Was any organizational change required?
5. Were there pedagogical or practical impingements associated with the teaching, learning and assessment regime for SD in the curriculum?

In addition, a short interview was conducted with a reviewer (PROFREV) for the professional interview of one of the built environment professional bodies. This professional interview is the final stage for professional qualification. Further data were collected through a simple content analysis of policy documents and analysis of operational matters associated with best accommodating sustainability in the built environment curriculum within the current operating environment of a university the UK. Participant observation informed the study. These data, thus obtained, were informed by an evaluation, made by KI2, of the outcomes of a pilot project to embed the philosophy of sustainable development in the first-year curriculum. A previously constructed programme assessment model was used as a basis for illustrating a suggested approach to embedding sustainable development in the curriculum.

## **The U.K. Higher Education Operating Environment**

The higher education sector is well placed to play a key role in embedding a culture of sustainable development in the current and future population. The key issue is how best to do this in the context of today's operating environment of higher education in the UK. Jones et al (2008) propose that ESD can be expressed as an 'approach to learning that enhances the capacity to cope with the uncertainties inherent in a complex world that is facing unprecedented challenges'. UK Higher Education has changed significantly over, particularly, the last 25 years. The transformation from an elite to a mass system of higher education in the UK brought with it many demands of policy, practice and management that continue to challenge the system. Higher education in the UK continues to progress through a changing operating environment. The past decade has seen particular challenges arising for higher education in the UK that impact on the student experience. These include: funding and top-up fees; students having to work; attracting overseas students to contribute to income; global competition; advances in ICT; on-line provision and competition; blended learning delivery and assessment; virtual learning environments; the teaching-research nexus; teaching quality assessments; the National Student Survey; research assessment exercises and the current Research Excellence Framework; criticisms of standards of UK higher education; and student numbers. Beginning in the late 1980's, UK higher education institutions undertook a process of modularisation. In most cases, the process was carried out in tandem with semesterisation. An analysis of some of the literature associated with modularisation and semesterisation suggests that, in summary, the advantages associated with the processes accrue to the management of higher education, with little or no advantages accruing to the enhancement of educational outcomes to the student e.g. Morris (2000) argued, in relation to business education, that modularity had had limited effects on the experiences of staff and students, but that semesterisation had significantly increased costs without any accompanying benefits. Goodhew (2002) presented several educational arguments against modules and semesters. These included matters such as:

- Over- examining, because each module is individually assessed.
- Surface learning, because the module is taught in a twelve week semester teaching period.
- Putting a straightjacket on programme design, because elements of learning must 'fit' the unit size of a module. If you introduce an additional module, you must drop an equivalent one out.

It is in this context that ESD has to be embedded. In many ways, the current modular system now embedded in UK higher education, mitigates against sound, integrative learning and can create a learning environment in which students have difficulties in making necessary connections.

## **Findings**

### **The Interviews with Key Informants**

The programmes with which KII is involved have a first year module dedicated to sustainable development with its own distinct assessment. This module feeds into all other modules. This module contains generic sustainability matters, technical and applied matters such as energy usage in the built environment, and the personal context by which students question their own values and beliefs and consider economic and social issues. Sustainability is incorporated by application in all other modules in the programmes and assessed within those modules. All tutors include sustainability as a theme to their lectures; e.g. the 'law' module curriculum includes environmental law. In developing the programmes and designing the curricula to incorporate

sustainability, it was found to be much better to start afresh than to attempt to introduce sustainability to the existing programmes. KI1 stated that students “get a passion for it” and discerned a clear change in attitude and interest within the class environment, but that behavioural change was not so discernible. No policy change was required and the institution was supportive. Professional, accrediting bodies were also supportive and did not request changes. No organizational change was required although advertisements for new staff ask for interest / expertise in sustainable development. The main pedagogical and practical impingements related to the vast area covered by the subject of sustainable development. It was asserted by KI1 that one could run a separate degree programme on the subject. This impingement was tackled by a strategy to “pump-prime to get students interested” and thereafter to encourage and require students to present regular papers amongst themselves on a variety of SD themes. A second-year project is centred around ‘BREEAM’ which is the Building Research Establishment Environmental Assessment Method and is described as:

*“the leading and most widely used environmental assessment method for buildings. It sets the standard for best practice in sustainable design and has become the de facto measure used to describe a building's environmental performance”.*

Despite this, KI1 reported that some students had difficulty incorporating SD in their work.

KI2 contributes to the pilot teaching, learning and assessment regime for sustainable development across several programmes in the built environment discipline. In this pilot regime, there is a first year module taken by four different programmes. This takes the form of a 10 credit point module which has a generic core but which is differentiated by specific curriculum inclusions for each of the disciplines of Transportation, Surveying, Environmental Engineering and Civil Engineering. These modules also incorporate Information Technology and Communications. The SD portion of this 15 week module is delivered over seven weeks. Teaching is by a group of specialist lecturers and the curriculum content is sustainable construction, sustainable transport, energy, behavioural change, communities and waste. Assessment takes two forms:

1. An on-line assessment using WebCT by which the student is required to answer 30 questions in a set time period from a databank of 120 questions. The questions are a mix of multiple-choice, true/false, matching-sets and fill-in-the-blanks.
2. A sustainability report on a given topic together with a 3-minute presentation on the report. For this task, students may work in groups, and, where class sizes are large, students are required to work in groups.

Additionally, there is a voluntary, optional inclusion of a morning dedicated to sustainability when first-year students from across four programmes in the built environment come together in weeks 7 or 8 to work in multi-disciplinary groups to analyse and evaluate a sustainability issue and to produce a poster summarizing their work. The assessment of this task is formative and does not contribute to marks for the programme. KI2 reported that the key formal learning from this module comes from the report and presentation by which the students bring together their knowledge and research. Learning material associated with sustainable development is available in the Learning Resource Centre (Library) as a dedicated provision. Key material in the form of lecture notes, government reports and policies are placed on-line by way of WebCT and included to “help students to think more widely”. KI2’s evaluation of this pilot exercise included the following points:

1. From formal student feedback on module evaluation, students like the module.

2. Students engage with the module and seem to enjoy the module. The majority of students participate in the voluntary, optional morning dedicated to sustainability.
3. They recognize both the currency and the importance of the subject matter.
4. Dissertations on sustainable development are now chosen.

KI2's major criticism was that, with the exception of one programme, there is, at the moment, no clear, explicit continuation of sustainability in the remaining years of the programmes. The exception to this did have explicit sustainability education in second and final years of the undergraduate provision. She felt that this approach helped maintain a focus on SD. At master's level, sustainability is offered as a dedicated optional module to two programmes. KI2 is undecided as to whether it is best to have a curriculum that spreads across the built environment disciplines, or whether it is best to tailor the curriculum to the discipline/programme. On balance, KI2 would "teach the principles and let students make the application of the principles to the discipline". KI2's emphatic final point was that "in programmes where sustainability is scattered around, make it explicit where sustainability is in the modules and in the programme by using clear sustainability terminology".

KI3 is involved in incorporating sustainable development in the assessment of all modules on a programme. At present, sustainable development is implicitly in 50% of the modules on this programme across all years; for example, in one module, the assessment task refers to 'design for the long term'. His prime expectation is to make sustainable development more explicit throughout the programme. The accrediting body which oversees the professional accreditation of the programme and which influences curriculum design recommended recently that strategies for education for sustainable development should be discussed with the Industrial Liaison Panel which is the direct link between academia and the profession. KI3 referred to three examples to illustrate successful approaches to education for sustainable development. The first "...relates to 'green stuff'. It requires students to consider whole-life costing of reinforced concrete structures including embodied energy, waste and disposal. It also requires students to consider renewable energy". The second example related to bridge construction and sustainability. Part of this exercise requires students to work in teams to devise sustainable methods of providing emergency lighting. The complete exercise takes the form of a game and is essentially a problem-based exercise requiring team skills and problem-solving. The third example was a final year module dedicated to sustainable development. Assessment is coursework-based and requires students "to come up with novel, innovative ideas for 'reducing, reusing and recycling'".

KI4's addition to the dialogue favoured a more implicit approach that may be summed up by the following quotation related to the construction discipline:

*"If we teach our modules correctly, the ethos of sustainability will be inherent in that teaching: for example, sound design and construction methods and durable materials for an appropriate life-cycle, will encompass the sustainable development agenda".*

### **The Interview with the Professional Reviewer**

PROFREV revealed that the professional body, which he represents, places a large emphasis for professional qualification on sustainability. The professional body is looking for an ethos of sustainability that encompasses social, environmental and economic matters and particularly

addresses environmental matters such as: renewable energy, renewable resources, reuse of materials, life-cycle costing and sound construction and design. PROFREV has found, generally, that those undertaking the professional interview relate:

*“...only small snapshots of examples of sustainability such as: ‘we took up a bit of asphalt and reused it’, but when asked about the big picture of sustainable development, they find it difficult to articulate a full answer”.*

PROFREV suggested a curriculum approach based on his personal academic and professional experiences and suited to his profession. His suggestion was for a two module structure. The first would be an initial, general module on sustainability but which addressed specific matters such as: transportation costs; an appreciation of the earth’s resources; how much oil is left; what resources there are; how long the resources will last. The second would be specific and directly relate sustainability to construction.

### **Policy and Operational Matters**

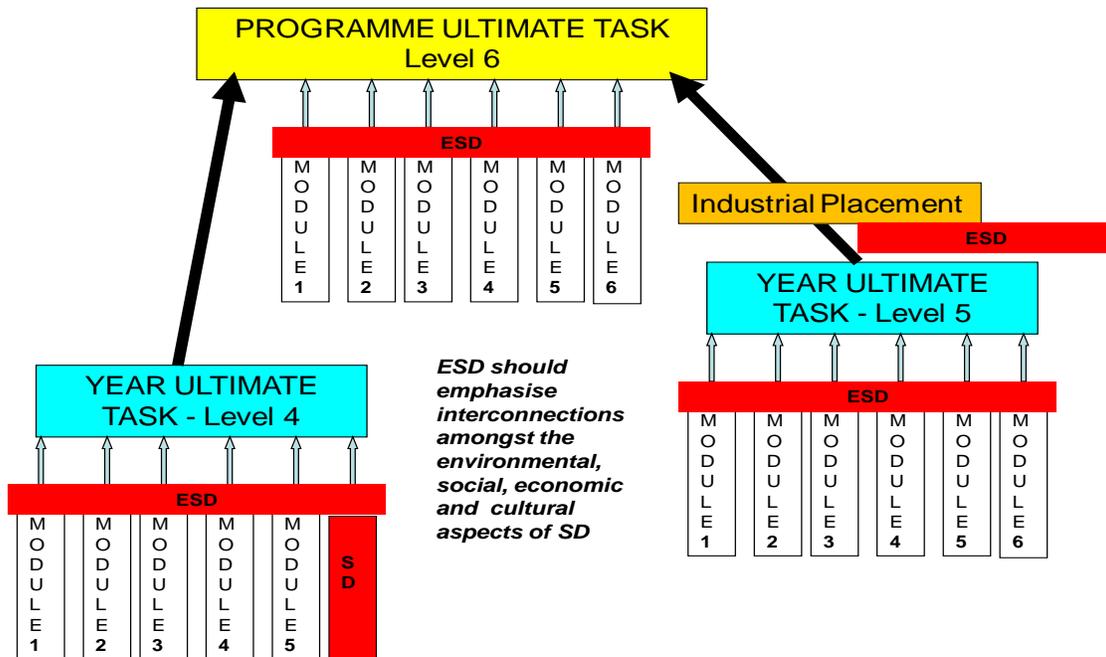
A content analysis of some key institutional policy documents was carried out using word-frequency count. The assumption made with this method is that the words that are mentioned most often are the words that reflect the greatest concerns. The content analysis of the corporate plan of the institution was conducted to look for the express use of the terminology of sustainability or sustainable development. It was used four times. The most powerful usage is in its Introduction, in which it is stated: “[I]n all of these activities **sustainability** will be a common theme for us to address...”. To achieve its Vision and to ensure that it is enshrined in the day-to-day operations of the University, the institution has set five core strategic aims. Underpinning these core strategic aims are five cross-cutting supporting aims. One of these is to “[E]nsure financial **sustainability** and work towards the achievement of environmental **sustainability**”. Strategic Aim 2 of the Corporate Plan is to “[U]ndertake excellent research in selected areas of activity”. One of the Key Supporting Objectives of this strategic aim is “[To] focus research funding to ensure financial **sustainability**...” (author’s emphasis added in all cases). The university’s core values implicitly address the ethos of sustainability, albeit limited to the institution, there is no express usage of the terminology. The institution publishes a five-year teaching and learning strategy. Whilst the institution consistently refers to and emphasises sustainability, the teaching and learning strategy of the institution, whilst driven by the core values of the institution, does not expressly contain the term sustainability or refer to education for sustainable development. The organizational structure of the institution is divided into educational Faculties. Each Faculty develops its own strategic plan. The strategic plan of the Faculty in which Built Environment resides clearly expresses, in a variety of ways, the attainment of sustainability outcomes from its educational operations. There are four cross-cutting themes to the mission of the Faculty: one of these is sustainability, indicating the express importance attached to sustainability at this level.

### **Discussion**

There is a divergence of opinion as to whether SD should be explicit or implicit within modules. The emphasis in this small study was on being explicit. There is no consensus on whether distinct SD modules should be incorporated in the curriculum or whether SD should be incorporated in all modules. Whilst there is apparent awareness by students of SD as a result of the various approaches to teaching SD, there are no clear indicators of behavioural change as a

result of undergoing SD education. However, this is a matter that is not easily discernible and a trait that relies on personal responsibility and nurture. As regards institutional policy and operational matters, education for sustainable development is seen as an imperative requiring a more flexible approach to the development and teaching of academic disciplines. Strategic priorities refer to “sustainable practices”: there are clear targets for Sustainable Development in research and academic enterprise and there is express reference to the priority of sustainability with the promotion of sustainability in its teaching and learning practices at undergraduate and postgraduate level. Validation of new courses and revalidation of existing courses now require that sustainability is attended to in the design of individual modules and programmes. How this is done is left to curriculum designers and continues to present a challenge for innovative design.

In order to alleviate the perceived educational inadequacies caused by the disconnections inherent in the modularised and semesterised programmes, McLernon (2010) proposed an assessment model as a method of making learning connections in the programme. The theory driving the model is that, rather than assessing each module separately, the programme should be assessed holistically at each level using an ultimate task. The ultimate task, at each level, would be designed to incorporate the intended learning outcomes of each module, thus provoking the student to make the necessary connections amongst the learning elements. Such an assessment regime, it was proposed, should induce deeper learning, should encourage flexibility in the curriculum and would reduce the assessment load. Using this model as a basis, the author proposes a teaching, learning and assessment regime for built environment education that explicitly addresses sustainability and facilitates the institutional, operational matters associated with a policy of education for sustainable development. In this model, SD would be explicitly addressed at level 1 using a discrete, bespoke module to prepare and equip students with the necessary underpinning skills, knowledge and attitudes for the programme. SD would be explicitly spread across the remaining modules and would feed into the ultimate task at that level. SD, at level 5, would similarly be explicitly spread across all of the modules and feed into the ultimate task at that level. The programmes in the School of the Built Environment at the University of Ulster are sandwich programmes incorporating, in the third year, a period of industrial placement for that year. Sustainable Development would be incorporated through the assessment regime for that industrial placement period during which the student would reflect on and apply the principles of SD. In the final year, level 6, SD would be explicitly spread across all of the modules and feed into the programme ultimate task which would incorporate the learning outcomes from levels 4 and 5 and including those from the industrial placement period. This model is illustrated below in figure 1.



**Figure 1: Model for embedding ESD in the curriculum**

**Conclusion**

The evidence demonstrates that there is a clear drive towards education for sustainable development in the two institutions used in this study. The mechanisms for embedding sustainable development are still experimental. Employers like to employ graduates with an understanding of sustainability matters but do not, generally, make it a priority in the selection process. This factor is important in the built environment disciplines because the programmes are vocational in nature and are designed, in the main, to link directly to employment in specified professions. The educational agenda of the priorities attached to curriculum has to be qualified with the views of employers to ensure that programmes are suitable for the ultimate professional vocation. The indicators show that amongst the higher education community-of-practice, there is a clear conversation about sustainability that permeates every level of decision-making and of education. There is a constant push towards awareness of sustainability issues. Overall, sustainable development is implicitly addressed in a large proportion of the curriculum. It is also explicitly addressed in particular areas. Students also have firm views on sustainability. It is difficult to establish to what extent these views are informed by the higher education programme and how much influence the media and other sources of information have on informing their views. Furthermore, it is difficult to establish how much this awareness translates into active, individual behavioural and practical change towards meeting the sustainability agenda. This could be the subject of further research. The research favours a more explicit identification of SD in the curriculum and the proposed model for embedding ESD in the curriculum might suitably produce graduates with the necessary understanding, skills and professional attributes necessary for advancing sustainable development in the twenty-first century.

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