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Sustainability education, or educating sustainably?

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Abstract

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Introduction

The concept of sustainability across many facets of life poses complex and bold challenges to universities and other institutes of higher education. Many are actively rethinking their goals and missions, which are filtering into courses, research programs and policies. Sustainability of our energy supply, environment and cultures are not only outcomes, but should also be interwoven within the teaching and learning processes. This should not be seen as an obstacle to education, but as stimulus for change and innovation. But do we teach sustainability courses, or "teach sustainably"? Our graduates will be constantly extended and challenged by a rapidly changing world, from political, cultural, economic and scientific perspectives. Are we giving them the right tools to enable them to confront the issues of the future? The prospect of institutionalising sustainability within higher education can be daunting.
This paper will briefly explore this prospect from the perspective of the biological/medical sciences and propose some strategies for integration of sustainable-life theory into curriculum delivery.

Is Sustainability Within Higher Education a New Concept?

Sustainability is not a "fad" or "nouveau trend" in education, but should be regarded as an intrinsic way of life if we are to survive on this planet for future millennia. The incorporation of concepts of sustainability within the higher education sector was first introduced in 1978 at an International Environmental Education Program, (Corcoran and Wals, 2004). Following this initiative, there have been established multiple programs both nationally and internationally to position declarations that define environmental sustainability within a higher education framework.

A landmark example is the Talloires Declaration of 1990, which as of the 31st of July, 2009, had 408 signatories, of which 15 represented Australian Universities. (See Table 1). In October, 1990, Jean Mayer, the President of Tufts University, convened a conference of

twenty-two high-level university representatives in Talloires, France. The purpose was to express their mutual concerns about the environmental state of the planet and to prepare a series of fundamental actions whereby research and teaching institutes could formulate a future that was sustainable. This amounted to the first official statement made by any university administrator that was a commitment to the principles of sustainable growth. The Talloires Declaration is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. Of the 408 signatories, approximately 350 are from university presidents and chancellors in over 40 countries. Interestingly, the country with the highest number of member institutions is the United States, with 153, followed by Brazil, with 52. Australia is ranked 5th overall for its participation rate.

Table 1: Australian University Signatories to the 1990 Talloires Declaration.
(Association of University Leaders for a Sustainable Future, 2008, para 1)

Australian National University, Canberra
Bond University, Queensland
Canberra Institute of Technology, Canberra, ACT
Charles Sturt University, Bathurst, NSW
Monash University, Victoria
Royal Melbourne Institute of Technology, Melbourne
Southern Cross University, New South Wales
University of Canberra
University of Melbourne, Victoria
University of Newcastle, Callaghan, NSW
University of New England, New South Wales
University of New South Wales, Sydney
University of Technology, Sydney
University of the Sunshine Coast, Queensland
University of Western Sydney, Hawkesbury

What is Sustainability?

It is no secret that a clean, healthy environment is mandatory for human habitation. Humans are not a very resilient species. We can live for about 5 minutes without air, a few days without fresh water and a few weeks without food. Oxides, nitrates and heavy metals in our immediate environment will poison us. We share our ecosystem with plants and animals we use to provide us with food. The planet and its living organisms supply the raw ingredients for human activities. Economic activity is regarded as the fundamental human benchmark of success, for which we turn natural and physical resources into goods and services. Therefore it is fundamental that a healthy economy is dependent on a pristine environment in which to thrive.
This holds true for all human activities, from health care to housing, industrial manufacture to recreational pursuit. Irreversible contamination of our environment would trigger a catastrophic impact on our future existence.

However, the concept of sustainability not only applies to the environment and our energy supplies, it can refer also to “cultural sustainability” – the fostering and maintaining of

heterogeneous cultures and languages within a complex societal structure. Here universities are well placed to make a difference, by active community engagement, participating in government policy formulation and research and teaching.

The Role of Universities in Sustainability

David Orr (1992, p4) has stated "Our greatest challenge lies in rethinking what kind of education is appropriate for a species whose standards of success threaten its ecological foundations."

Corcoran and Wals (2004, p87) further argue that "The higher education community is called to respond to times of disastrous anthropogenic environmental crises, failing political systems, religious intolerance, and unsustainable and inequitable economic development. The scope and range of the negative impacts of university-educated people on the natural systems that sustain Earth area unprecedented." Thus a principal aim of all higher education should be to engender the scientific, cultural and political platforms to support a sustainable future. Higher education can be a powerful tool in societal change, and can instill, promote and perpetuate sustainable living in a modern, economy-driven world.

Cortese (1992, p1113) has encapsulated this position perfectly, "Colleges, universities and professional schools educate most of the people who develop and manage society's institutions and train the teachers who educate children from the kindergarten through high school, vocational schools and community colleges. For these reasons, universities bear profound responsibilities to increase the awareness, knowledge, technologies and tools to create an environmentally sustainable future. Universities have all the expertise necessary to develop the intellectual and conceptual framework to achieve this goal." Therefore universities must play a pivotal role in fostering the appropriate education, scientific and social research, policy development, information exchange and community engagement to initiate and promote a truly sustainable future for our planet.

The Value of the Graduate.

The graduate attributes that Edith Cowan University staff aspire to engender in our students are worthy of any institution of higher education (see Table 2), however it would set ECU at the forefront of sustainable education if we could include an additional attribute such as:

"The ability to discuss the sustainability problems associated with energy use and how they might be resolved by technological, political and social measures."

So where to begin? For many years now, some European universities have effectively been integrating case studies on regional, urban, and organizational sustainable transitions into pure research and the taught curriculum (Muhar, Vilsmaier, Glanzer and Freyer, 2006; Posch and Steiner, 2006). This has lead to a two way dynamic, whereby not only the faculty and students benefited, but also the industry and commerce partners involved gained new knowledge to implement in their own practices. Such an approach could be rolled out across

many universities using appropriate national and cultural contexts to create a vehicle for the institution to act as an agent of change.

1. Ability to communicate	Clarity of written and spoken expression, including in public fora, and through appropriate use of technology.
2. Ability to work in teams	Collaborating and contributing effectively in diverse settings.
3. Critical appraisal skills	Planning, organizing, problem solving and decision making.
4. Ability to generate ideas	Having the courage and confidence to be creative and innovative.
5. Cross-cultural and international outlook	Engaging productively and harmoniously with diverse cultures.

Table 2: Graduate Attributes at Edith Cowan University.

Case Study: The Embedding of Concepts of Sustainability Within the K05 BSc Biomedical Science Program

As a starting point, the K05 program at ECU was chosen for the embedding of selected concepts of sustainable growth and development. The integration of sustainability and coursework would require a multiple level approach, i.e. cross-wiring concepts within units (between practical laboratory sessions and theory) and also between units (e.g. mapping concepts in sustainable environmental living between a cultural studies unit and a pharmacology unit). Such are the challenges faced.

Strategy 1 - Mapping and Linking Concepts of Planetary Sustainability to Course Content.

For this strategy, the unit SCH1105 Introduction to Pharmacology is being chosen as a starting point. As the name implies, this is a first year unit which introduces the student to the concepts of how drugs are discovered, manufactured, delivered into and transported around the human body. Mechanisms of action of the commonest pharmaceutical agents are discussed along with their clinical uses.

The following concepts are being integrated into the syllabus:

1. The discovery of drugs and active compounds in various plant species and the impact of their commercial harvesting on the loss of these native species and their habitat and (where relevant), the concomitant loss of local knowledge of such medicinal plants.
2. The impact of the numerous metabolic breakdown products of drugs in the humans and other animals and their potential effect on our environmental ecosystems (e.g., increasing levels of hormones and antibiotics in ecosystems).
3. The effects of pollutants (e.g., lead, mercury, sulphates and nitrates) on human hormonal, cellular and nervous systems and the increasing use of prescribed drugs to ameliorate these conditions.
4. The change of pharmaceutical packaging from the 1950s to the present day. Drugs in tablet/capsule form used to be shipped to pharmacies in bulk, were they were dispensed in recyclable containers. The packaging industry today is a multi-million

dollar business with a vested interest in maintaining heavy levels of elaborate packing and advertising for relatively small quantities of pharmaceutical agents that are dispensed.

Strategy 2 - Blending the lectures and tutorials with a sustainable theme

In at least one tutorial, a paper with an environmental / sustainability theme in relation to the pharmaceutical industry will be presented and discussed. Students will break in to focus groups, discuss the article and present and exchange views and findings. Possible topics might include: The accumulating medical waste situation generated by disposable drug delivery system, the use of drugs and drug-like compounds in the manufacture of cigarettes, the cost to society (cultural, social and economic) from abuse of drugs of addiction. Many journals including *Australian Prescriber*, *New Scientist*, and *Scientific American* have environmentally-themed papers and appropriate articles to initiate discussion.

Strategy 3 - The report Card

At the beginning of semester, students will be given a "report card" for them to use in relation to their laboratory/practical sessions. This is being developed in conjunction with the laboratory and technical staff who service the area. The idea is that during each session, the students will take note of the materials and processes used and judge them according to their environmental impact. The questions posed will include:

- Are solutions and buffers being made up in bulk and are solvents recycle? Are all containers clearly labeled and dated to wastage is minimized?
- Can plastic glassware and tubes be reused with minimal cost for washing?
- What is the use of disposable items per student/per class?
- Are the heating/cooling equipment items in the lab the most appropriate for the job?
- Are recycle bins available to recycle paper and cardboard waste from laboratory sessions?
- Is water and electricity use being managed responsibly during each session?

A series of such questions will be prepared along with a numeric value scale, so an overall score and value judgment can be made. This "report card" process can conceivably be extended into other teaching strategies such as tutorials and lectures, with the students being given an instruction sheet as to what to observe and document. These can be collated at the end of the teaching semester, with an incentive being that this is integrated into the assessment plan for the unit.

Strategy 4 – Sustainable Study

Student involvement is important as they can take ownership of this process and understand that they are making a difference. Students should be encouraged to study in a sustainable way for example by: using less paper and, in lectures, taking notes on reused or recycled paper / notepads; recycling any waste at the end of a lecture, e.g. scrap paper and drinks cans; borrowing library books rather than buying new and giving or selling on

purchased books to the next set of students after finishing the course; and traveling to lectures by foot, bicycle, motorbike or on public transport.

Future Directions

So where to from here? The “greening of the curriculum” is an involved process that requires the cooperation of academic, administrative and support staff, and the students.

At the institutional level, ECU can further promulgate and actively encourage sustainable practices such as energy awareness, the availability of recycled stationery and waste recycling.

Consideration of joining the Talloires Declaration will bind ECU with an international network of colleges and universities committed to a sustainable future. The Declaration can provide inspiration and motivation to pursue environmental and sustainability initiatives on campus and provides a comprehensive framework for shaping steady progress toward sustainability.

Promote awareness of the Earth Charter Initiative (commenced at the 1992 Rio Earth Summit). ECU can actively disseminate the principles of the Charter at a local and global level to individuals and organizations. These include: To foster awareness and commitment to a sustainable way of life; to promote the educational use of the Earth Charter in schools, universities, faith communities, and other settings; to develop supporting materials; to encourage the use, implementation and endorsement of the Charter by civil society, business, and government at all levels (Clugston, Calder and Corcoran, 2002).

At the course/curriculum level, concepts in sustainability can be introduced into many disciplines and units in both undergraduate and postgraduate degrees. There are many new journals that are specifically addressing the nexus between higher education and ongoing sustainability. When appropriate, these can become incorporated into the reading and reference lists for coursework. Sustainability: Science, Practice, & Policy (SSPP) is a peer-reviewed, open access journal that provides a platform for the dissemination of new practices and for dialogue emerging out of the field of sustainability. The International Journal of Sustainability in Higher Education (IJSHE) is the world's first fully-refereed journal on the theory and practice of sustainable development in higher education.

Higher education institutions must accept their responsibility for social and economic development and must be prepared to play a pivotal role in making the transition to sustainability, through technology transfer, policymaking and science and research.

The world urgently needs a universal vision of fundamental life-values to provide an ethical framework for our future community.

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