Integrating Sustainability into the Curriculum at HKUST

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Sustainability Challenge

- Multi-dimensional environmental crisis, symbolized by climate change
- Sustainability is systemic change integrating improved environmental performance into all activities
- Interdisciplinary: integrating technical, economic/business and social elements to achieve environmental goals

Sustainability Challenge to Universities

- Large institutions with corresponding environmental impacts
- Leadership in social policy and awareness
- Producer of society's leaders
- Competition for faculty and students
- Divided into discipline focused and administrative units

Sustainable Universities

- Global movement (Talloires Declaration; Presidents' Climate Commitment)
- Create institutional culture of sustainability, lead change
- Environmental performance of campus
- Contribute to raising awareness, policy formation
- Environmental research and protection integrated into research
- ***Teaching programs, environmental literacy and responsibility***

This paper

- I. Framework for sustainability curriculum comparing HKUST with benchmarks
- II. Discussion of how HKUST can overcome obstacles to integrating sustainability into curriculum

I. Framework for Sustainability Curriculum: Benchmarks and HKUST

1. Sustainability and trans-disciplinary programs
2. Environmental literacy
3. Sub-disciplines and disciplinary courses
4. Integration into existing courses
5. University and community experience

1. Sustainability and Trans-disciplinary Environmental Programs

Benchmarks

- Span sciences, engineering, social sciences
- Economic, managerial, technical, regulatory, cultural interdependencies
- Undergrad & grad programs
- About 400 programs in EU and NA
- Annex: Colombia, Arizona

HKUST

- Existing MSc in Env. Sci and Eng.
- New undergrad program in Env. Sci. and Eng, with social science and business participation
- Institute of Environment >> Department of Environment

2. Environmental Literacy

Benchmarks

- All graduates
- Environmental awareness and capacity to implement changes
- Systemic implementation lacking
- Eindhoven requires core course (annex)
- CMU online
- Harvard: general ed and extension

HKUST

- No introductory course
- Some general education/discipline oriented courses
- No coordinating system

3. Sub-disciplines and Disciplinary Sustainability Courses

Benchmarks

- Environmental engineering, science, law, sociology, business, accounting, etc. programs
- Related environmental issues to theories and practices of disciplines
- Most disciplines/programs with courses as accepted components

HKUST

- BEng and Environment: Civil, Chemical, Bioproduct
- 7 graduate in Eng & Sci
- Environmental courses concentrated in Eng and Sci

HKUST's Environmental Courses

Atmospheric, Marine and Coastal Environment Program	8	12%
Bioengineering Postgraduate Program	1	2%
Biology	7	11%
Chemical Engineering	14	21%
Chemistry	1	2%
Civil Engineering	33	50%
Economics	2	3%
Graduate Diploma and Msc in Env. Eng. and Env. Sci.	11	17%
High Tech Entrepreneur Project	1	2%
Mathematics	2	3%
Mechanical Engineering	4	6%
Physics	1	2%
School of Social Science	8	12%
Total	93	100%

4. Integration into Courses

Benchmarks

- Critical to relating professional activities to sustainability
- Often done on issue basis without sustainability theory or practices
- Knowledge, inertia barriers to implementation
- Case studies, field work, modules, team-teaching, etc

HKUST

- Courses remain focused on specializations
- Exceptions prove the rule

Business Course Elements of HE 21Proiect

Corporate Responsibility	Environmental ethics and values
	Social ethics and values
	Corp. environm. & social responsibility / corp. citizenship
	Individ. environm. & social responsibility / global citizenship
	Environmental stewardship
	Stakeholders and stakeholder management
Systems Thinking and Methods	Systems thinking
	Environmental systems / natural cycles
	Limits to growth / carrying capacity
	Applic. of systems thinking to the search for solutions
Corporate Strategy and Change	The role of leadership/corporate visions
	Long termism vs short termism
	Converting threats into opportunities
	Contribution of business to sustainable solutions
	The role of lifelong learning
	Sustainable economics

Business Course Elements of HE 21Project

Management Systems, Tools and Techniques	Environmental management systems principles	
	Environm. managem. systems standards (ISO 14001, EMAS)	
	Environmental reporting	
	Environmental impact analysis	
	Life-cycle analysis/input-output analysis	
	Product stewardship	
	Environmental / sustainability indicators	
	Social audit/social reporting	
Managing partnerships and networks	Stakeholder analysis	
	Rationale for external partnerships	
	Managing external partnerships	
	Rationale for inter and intra organisational networks	
	Managing networks	
	Corporate community investments	
Environmental legislation, policy and control	International, European and national environmental policy and law	
	Administration and enforcement	
	Fiscal instruments	
	Economic instruments	
	Integrated pollution control	
	Integrated transport policy	

Additional elements of HE 21Project

Balance between personal and organisational demands
Methods of managing change
Environm. influences on consumer behaviour; implications on marketing strategy
Consideration of corporate image: marketing / PR
Role of Quality Management in reducing waste in organisations
Neg. influence of leisure on environment: overuse of pop. areas, countryside erosion
Unsustainable tourism
Planning effects of urban tourism
Organisational support for learning, e.g. mentoring
Gaia theory
Deep ecology
Rural issues
Sustainable tourism operations & International Hotel Environment Initiative
Environmental influence on R&D
Environmental influence on technological innovation

Additional elements of HE 21Project

Green agenda
Major threats to planet
Ecodesign & manufacture
Energy efficiency
Waste management and waste minimisation
Green marketing & purchasing
Environmental communication & awareness-raising by campaign groups
Product & process design
Recycling
Transport economics
ISO 14001: due for incorporation in 1999
Environmental reporting, SMEs and environmental management, individual environmental and social responsibility
Environmental marketing, environmental communication
Perspectives on change: incremental, transformational, and a critique of these

5. University and Community Experience

Benchmarks

- Venues for students to put sustainability into practice
- Interviews, internships, etc.
- Sustainable Toronto links class and planning
- UBC's SEEDs and Harvard's GCI develop projects with faculty, staff, students and community

HKUST

- HSEO and FMO drive student awareness campaigns and projects

HKUST in Comparison

- Sustainability program/department initiated
- Environmental literacy limited
- Concentration of sub-disciplines and courses in Science and Engineering
- Limited integration of sustainability into course content and theory
- University and community experience limited and administration driven

II. Overcoming Obstacles

- How can the university develop sustainability across the curriculum?
- What breadth and depth of sustainability might be introduced into the curriculum?
- What factors will influence the adoption of sustainability?

Key Issues

- Trans-disciplinary nature of sustainability
- Faculty and student receptiveness
- Leadership
- Fit to existing norms and work practices of the institution

Integration Scenarios

	Low Student and Faculty Acceptance	High Student and Faculty Acceptance
Low Leadership Involvement	• Few discipline-specific courses • Little to no coordination across curriculum • No systematic development	• Student and faculty led development • Many discipline-specific courses • Little coordination across disciplines • No systematic development
High Leadership Involvement	• Discipline specific courses • Few cross-disciplinary programs • Limited coordination across disciplines • Some systematic development	• Breadth and depth within and across disciplines • Interdisciplinary coordination • Systematic development

Student Perspective

- Low awareness
- Somebody else's problem (the government)
- Lack of obvious commitment in university and some discipline leadership
- Disparity of awareness among disciplines related to course offerings

Faculty Perspective

- Great discretion over courses, but…
- Incentives follow disciplinary boundaries
- Topics enter teaching through disciplinary consensus
- External imposition of sustainability runs contrary to discipline

Discipline Perspective

- Disciplines engaged in sustainability more receptive to initiatives
- Synergies with existing practices and topics face little resistance

Three Paths to Integration

- Faculty led change
- Crisis driven institutional change
- Persuasive external force

Way Forward for HKUST?

- Some evidence of faculty and student interest
- Expectation of government led action
- Strong discipline norms on teaching and research

Way Forward for HKUST?

- Appeal to faculty based on interest and discipline
- Incentives to develop teaching materials for discipline and university
- Cross-discipline materials and courses
- Develop trans-disciplinary language, topics and materials

Way Forward for HKUST?

Leadership

- Develop awareness generally among students and faculty
- Trans-disciplinary discussion for common language and understanding
- Funding and incentives
- Provide interface between disciplines and external community

Sustainability, Anybody can do it!

- Sustainability is not necessarily a subject, rather the teaching of a holistic way of thinking and acting on human-environment issues
- Sustainability is no-one's domain
- There are flexible approaches to teaching sustainability
- Sustainability needs to be practical
- Curricula need to be changed if universities are going to succeed in promoting sustainability
- Anyone can do it, indeed everyone can incorporate sustainability concepts and specialists are the best ones to do it in their own field.
  - Walter Leal Filho (Filho 2002)