Teaching Sustainable Development within Higher Education

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Context

Department of Design & Technology, Loughborough University

BA Industrial Design and Technology

BSc Product Design and Technology.

MSc and MA in Industrial Design

Approximately 360 undergraduates






Issues of Sustainable Development taught across all years of both undergraduate courses in core modules and as optional modules.

Year 1

Simple concepts relating to reducing environmental impact taught as part of core design practice module.

Historical development of sustainable development within design introduced in core design contexts module

Year 2

More in-depth discussion of environmental issues & assessment methods as part of core design studies module

Optional Sustainable Design module






Year 3

Individual support for students who choose to investigate issues of sustainable development in their dissertations

Individual support for students choose to consider issues of sustainable development in their Major Design Project

Optional additional Sustainable Design module (to be introduced 2008)

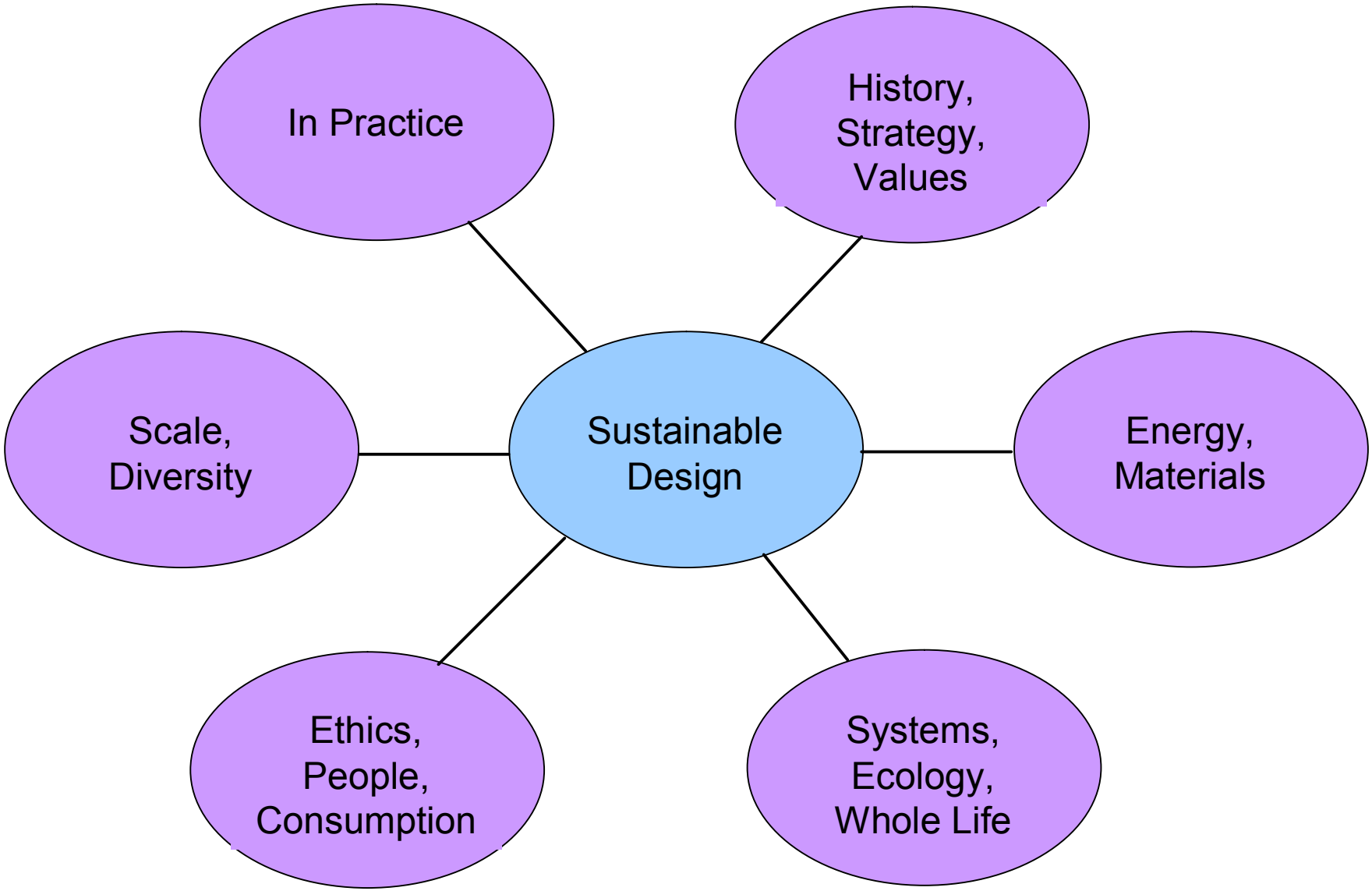





Sustainable Design Module

Year 2 Optional 20 Credit (30 weeks) Module

Currently 60 students on module (increased steadily from 30 in 2003)


In Practice
History, Strategy, Values
Scale, Diversity
Sustainable Design
Energy, Materials
Ethics, People, Consumption
Systems, Ecology, Whole Life

Different perspectives on sustainability

Reducing Unsustainability	is measurable ; can be managed; and an be incrementally reduced
Creating Sustainability	is aspirational; uncertain; and complex

linking design and sustainability = a **wider** context for design

Issue	Conventional Design	Sustainable Design
Materials use	High-quality materials are used clumsily and resulting toxic and low-grade materials are discarded in soil, air and water	Restorative material cycles in which waste from one process becomes food for the next; designed-in reuse, recycling, flexibility, ease of repair and durability
Pollution	Copious and endemic	Minimised; scale and composition of wastes conform to the ability of ecosystems to absorb them
Toxic substances	Common and destructive, ranging from pesticides to paints	Used extremely sparingly in very special circumstances
Ecological accounting	Limited to compliance with mandatory requirements like environmental impact reports	Sophisticated and built in; covers a wide range of ecological impacts over the entire life-cycle of the project, from extraction to final recycling of components
Ecology and economics	Perceived as in opposition; short-term view	Perceived as compatible; long-term view
Design criteria	Economics, custom and convenience	Human and ecosystem health, ecological economics
Sensitivity to ecological context	Standard templates are replicated all over the planet with little regard to culture or place; sky-scrapers look the same from New York to Cairo	Responds to bioregion; the design is integrated with local soils, vegetation, materials, culture, climate, topography; the solutions grow from place
Sensitivity to cultural context	Tends to build a homogeneous global culture; destroys local commons	Responds and nurtures traditional knowledge of place and local materials and technologies; fosters commons
Biological, cultural and economic diversity	Employs standardised designs with high energy and material throughput, thereby eroding biological, cultural and economic diversity	Maintains biodiversity and the locally adapted cultures and economies that support it
Knowledge base	Narrow disciplinary focus	Integrates multiple design disciplines and wide range of sciences; comprehensive
Spatial scales	Tends to work at one scale at a time	Integrates design across multiple scales, reflecting the influence of larger scales on smaller scales and smaller on larger
Whole systems	Divides system along boundaries that do not reflect the underlying natural processes	Works with whole systems; produces designs that provide the greatest possible degree of internal integrity and coherence
Role of nature	Design must be imposed on nature to provide control and predictability and meet narrowly defined human needs	Includes nature as a partner: wherever possible, substitutes nature's own design intelligence for a heavy reliance on materials and energy
Underlying metaphors	Machine, product, part	Cell, organism, ecosystem
Level of participation	Reliance on jargon and experts who are unwilling to communicate with public - limits community involvement in critical design decisions	A commitment to clear discussion and debate; everyone is empowered to join the design process
Types of learning	Nature and technology are hidden; the design does not teach us over time	Nature and technology are made visible; the design draws us closer to the systems that ultimately sustain us
Response to sustainability crisis	Views culture and nature as inimical, tries to slow the rate at which things are getting worse by implementing mild conservation efforts without questioning underlying assumptions	Views culture and nature as potentially symbiotic; moves beyond triage to search for practices that actively regenerate human and ecosystem health

Ecological Design

by Sim van der Ryn and Stuart Cowan, 1996

Loughborough University

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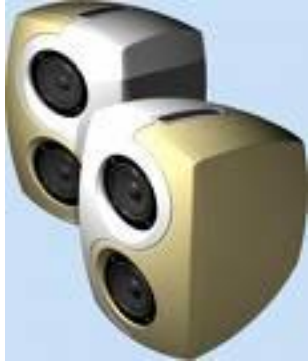


Four Main Concepts of Sustainable Design

Efficiency – Resources & Energy

Systems – Life Cycle & Ecology

People – Ethics & Consumption

Scale & Appropriateness

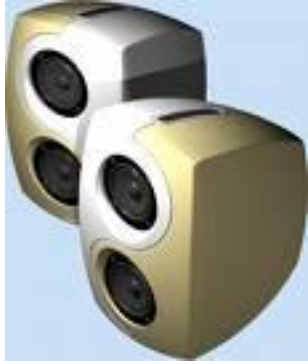
introduced through:

1 hour lecture *and*

2 hour design activity







Design briefs set are very different from those the students are used to and not particularly focussed around products

1) More resource efficient transport system
2) Sustainable design of a system within the home (ie hot water, heating, food etc..)
3) Manifesto for Responsible Design
4) Development of proposal to regenerate a market town though creating a local “food hub”

NO ONE OWNS THEIR OWN CAR!
- NO FUSS
- HOP IN - DRIVE OFF
- HOP OUT - LEAVE CAR
} SIMPLE
- EFFICIENT
VOLKSWAGEN PROVIDE A SERVICE THAT IS SUSTAINABLE
- THE WHOLE COMMUNITY BENEFITS

CITY HOPPER

SOLAR PANNEL FOR BATTERY POWER.

ELECTRIC POWER
- REDUCES EMMISSIONS.

- Walk to roadside city hopper parking bay
- Use swipe card to activate car - hop in!
- drive to your location and park nearby in a city hopper parking bay.
- System in car, shows user where the nearest bay is.
- leave car for next person to use or reserve it (if you will need the car again in the next 30 mins).
- Next user hops in, swipes card, drives off.

SERVICE

- Volkswagen provide a service, no one owns their own car.
- 2 Volkswagen vehicles - 2 person, 3 wheels
- Parked in roadside - 4 person, 4 wheels
parking spaces throughout the country / city
- Electric charger in parking spaces - docking / refueling stations.
- Cars are periodically rounded up and taken back to central depot for repair + servicing.
- swipe cards with credit on are provided with membership for customers

TRAM - SPORT

TRAMSPORT GYM.

STORAGE

KINETIC

SOLAR

PROS

- TRANSPORT REMAINS INDEPENDANT.
- USE OF RENEWABLE RESOURCES.
- PROMOTES A HEALTHY LIFE STYLE.
- TRAM-STYLE TRANSPORT ELIMINATES - SPEEDING ACCIDENTS

INNER CITY

CARS MADE

SEATS ADJUSTABLE FOR DIFFERENT USERS

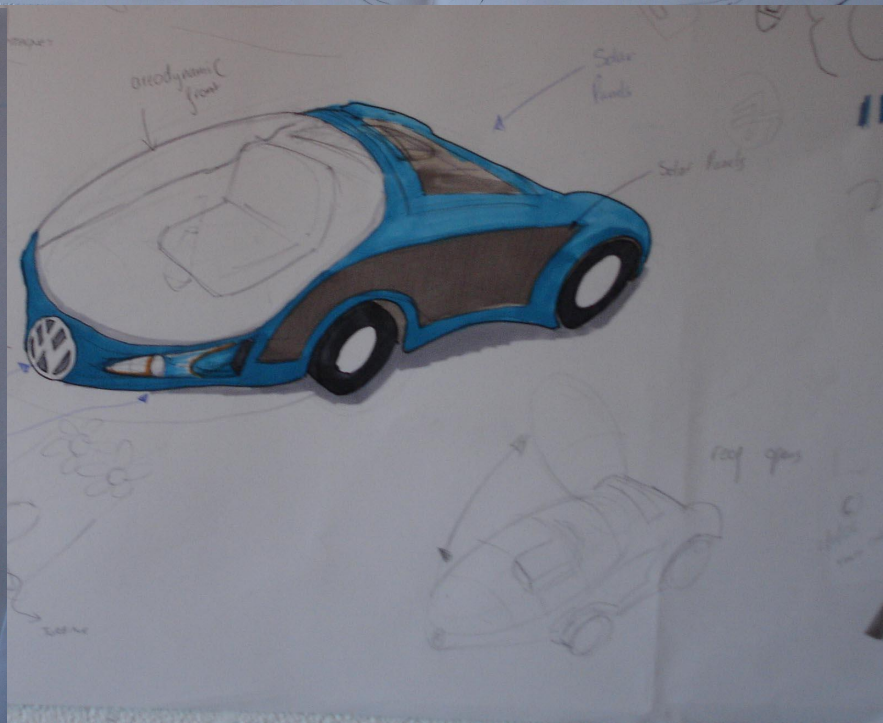
SLOT TO SWIPE TICKET + START SAVING

PEDALS CAN BE HIDDEN IN SEATS

MEANS PEOPLE DON'T HAVE TO PEDAL IF THEY DON'T WANT TO

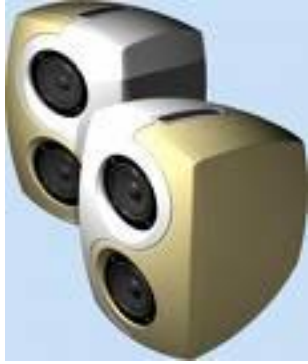
ENCOURAGES EXERCISE TOO

MONITOR DISPLAYS SAVING FOR JOURNEY









Semester 1 ends with an overview of how Sustainable Design is being applied

Semester 2 focussed around practice

Design projects set by external organisations

Students have a free choice to select whatever project they want

Other issues, subjects, methods and tools introduced through the project work

Students learn by applying them to their particular design project


ISOTONIC

Skeleton Case Application

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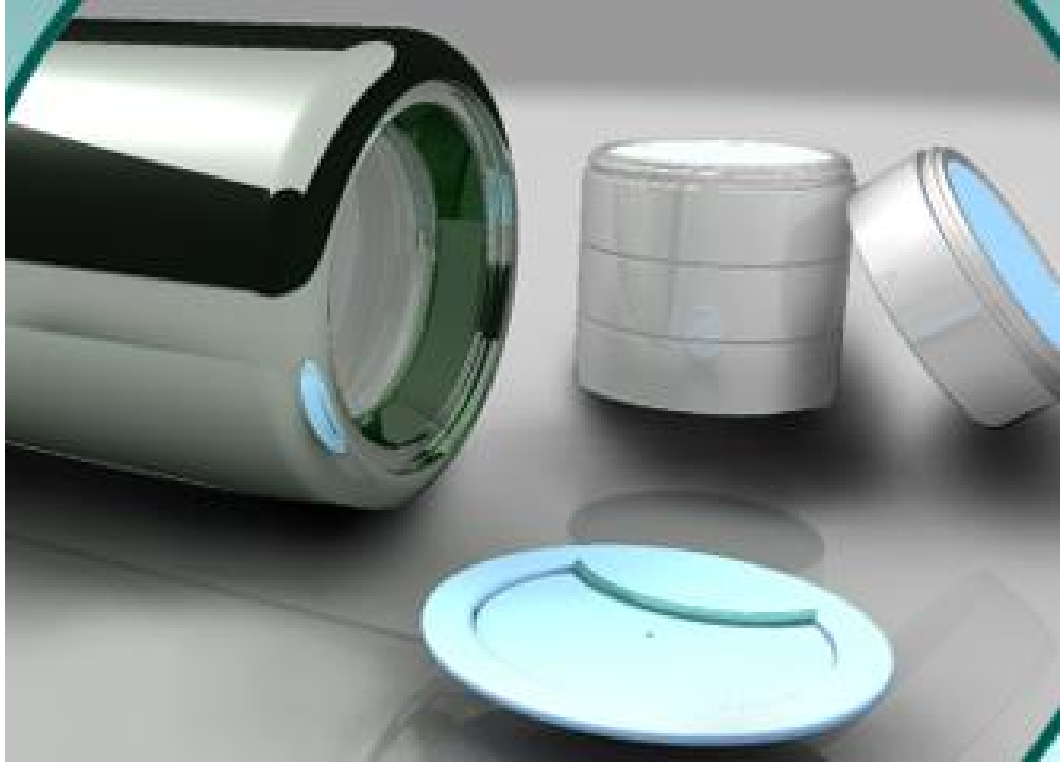






Limitations

Not yet an explicit part of **all** final year design projects.

Most will consider sustainability if marks are attached to it!

Viewed by many as a “take it or leave it” approach to designing.

Many still think it is all about recycling!






Final Thoughts

Majority of students who take the optional module become very enthusiastic about the subject.

Messages about sustainable development spread by enthusiastic students.

Students are developing material to promote sustainable design in their own time.

Learning through practice is invaluable & essential

Showing students how sustainability gives new opportunities for design