

Mainstreaming Sustainable Development into Engineering Education?

The Starting Points:

1. Civil Engineering is changing and needs to change more – and Sustainable Development is at the heart of it.
2. Civil Engineering is increasingly about managing complexity (rich in structure) as opposed to things which are just complicated (rich in detail)



*.....urban regeneration and development is complex;
finite element analysis is complicated!*

ICE/IStructE Education and Training Task Group

Established by ICE Council in December 2002 to examine implementation of sustainability principles into education, training and professional development.....

including:

- Input into the revision of JBM accreditation guidelines on environmental issues.
- Input into scheduled revision of Core Objectives.
- Liaison with key stakeholders to promote importance of sustainability principles.
- Assistance with implementation (both within HE & CPD)



Mainstreaming Sustainable Development into Engineering Education?

5. Summary of main work to date;
 - Drafted a revised annex on sustainable development issues for the JBM which was issued to departments in Sept 2003
 - Presented to ACED committee (and general meeting) and the Annual Meeting of Moderators
 - Helping to generate case studies from industry and by linking up with the Royal Academy of Engineering's Visiting Professor Scheme



Mainstreaming Sustainable Development into Engineering Education?

- Future work includes;
 - Supporting the Royal Academy of Engineering's Summer School aimed at assisting heads of department to implement new guidelines
 - Proposal for sustainability knowledge map for academics and trainers
 - Work aimed at implementing the change in emphasis into graduate training and CPD.

ICE/IStructE Sustainability in Education, Training and CPD Task Group

Assertions

- 1 Civil and Structural Engineering is changing and needs to change more – and Sustainable Development is at the heart of it.
- 2 Civil and Structural Engineering is increasingly about managing complexity as opposed to things which are just complicated. Urban regeneration and development is complex, finite element analysis is complicated!
- 3 Civil and Structural Engineering – as practised – is increasingly ISSUES/PROCESS driven, not TECHNIQUE driven. Issues such as Quality of Life, EU Legislation Transport/Travel.
- 4 Civil and Structural Engineering – as taught – has been largely driven by TECHNIQUES and not by PROCESSES or ISSUES.
- 5 If Sustainable Development is to be embedded into Engineering Education then it needs:
 - To be generic
 - To encourage a questioning of perceived wisdom
 - To be open ended and encourage out of the box thinking
 - Team focused
 - Embrace new approaches to learning and teaching

Upgrading the Joint Board of Moderators Guidelines for Environmental Issues

not shoving more material into it...but pulling relevant material into it!

Awareness/Attitudes

An overarching approach to engineering problems in the context of environmental, economic and social issues

Skills

- Ability to work with complex ill defined problems
- Team work and communication skills
- Ability to evaluate the merits and demerits of options

Knowledge

- Broad and Deep
- Technical
- Social processes
- Legal
- Disciplined Body of General Knowledge



19th Century Definition of Civil Engineering
 "Civil Engineering is the art of directing the great sources of Power in Nature for the use and convenience of man..."
 Thomas Tredgold



A 21st Century Perspective on Civil Engineering
 "Civil Engineering is the art of working with the great sources of Power in Nature for the use and benefit of society"
 Prof Paul Jowitt, Heriot-Watt University and ICE Environment and Sustainability Board

New JBM Guidelines for Sustainable Development Issues

"The JBM believes that sustainable development needs to be embedded into engineering education at the outset and that this will be best achieved by a teaching and learning process that:

- Provides an interdisciplinary perspective on the problems that engineers will tackle in practice
- Develops an understanding of the interaction between Engineering, the Environment and Society
- Develops an ability to use technical engineering knowledge to help solve complex problems.

"The JBM will look for evidence in terms of outcomes that these guidelines are being implemented..."

So what do we do now?

Implications for the teaching and learning process

- Use of Case Studies
- Studio Based
- Issue Driven
- Process Based
- Team Based
- Design/Delivery Focused

Conclusions and Drivers

- Knowledge of Sustainability and its implementation is essential for our engineers
- We should include it in our education and training
- Guidance for all will be needed
- The practice of Civil and Structural engineering is increasingly about helping to deliver a sustainable future. Key role for JBM to take the time to drive these changes through to ensure that graduates have the necessary tools to respond to future legislation and societal change that will affect the profession.



Contact details
 Andrew Cradington • Group Manager • Environment, Management, Safety and Research • Institution of Civil Engineers
 Tel: 020 7665 2215 Email: andrew.cradington@ice.org.uk

