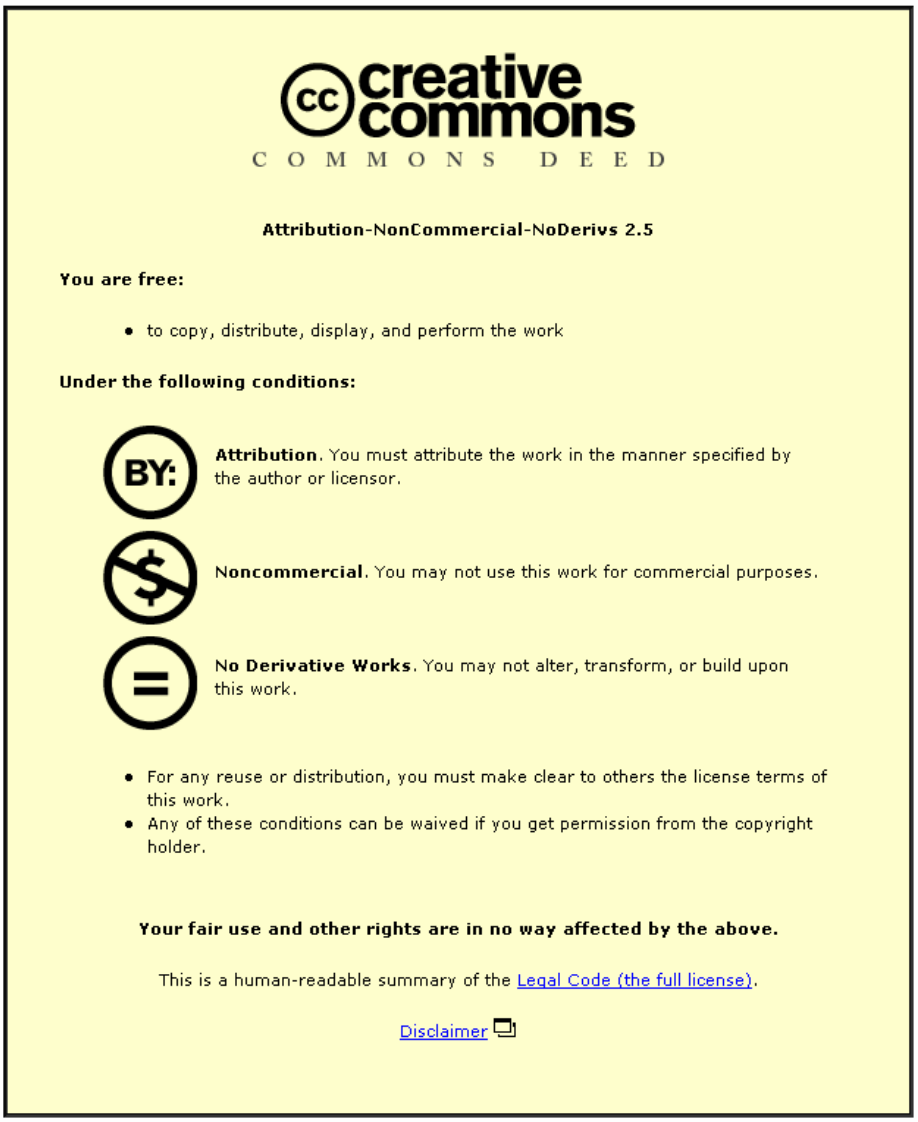

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IN: International Journal of Engineering Education, 15 (2001)[
Available at: http://www.ijee.dit.ie/]

A new network of development for Engineering Education in the UK

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Summary

Many engineering education organisations exist worldwide to enhance the learningexperience of student engineers and to foster an environment conducive topreparing graduates for an ever changing future. Recent developments in UKEngineering Education are presented, together with a brief underlyingphilosophy, exploring a networking model to connect enthusiasts and providesupport for their developments and innovations.

Discipline Specific Education Development

The Higher Education Funding Councils in the UK have recently placed a highpriority on developing schemes to foster and support education developments withthe disciplines.This developed in part from a review published in September 1998 of two major UKlearning and teaching initiatives; the Computers in Teaching Initiative (CTI)and the Teaching and Learning Technology Support Network (TLTSN), (HigherEducation Funding Council, HEFCE 1998). These two initiatives worked alongsideeach other in universities and colleges, both supporting the use of technologyin teaching and learning. The CTI helped academic staff use technology withintheir given subject area while the TLTSN helped institutions and their managersto support such teaching and learning practices and provide academic staff withan institutional environment that allowed for the use of technology. The review acknowledged that academics best appreciate, assimilate and implement apedagogic approach when presented to them within their own discipline andrecommended establishing a subject-based support network to succeed the CTI andTLTSN with a broad focus across all learning and teaching activity.

In addition, many of University centrally based educational centres have notbeen as effective as predicted due to the ‘service centre‘ approach, whichencourages only the converted to ask for help and advice. It is thought that inpart this is due to their generic nature and the inability to enter into subjectlevel discussions with academics.

There are two major national schemes that provide a subject-based approach totackling educational development issues. The Fund for the Development ofTeaching and Learning (FDTL), which is largely concerned with the disseminationof good practice, has just announced its third phase and has supported manydisciplinary based programmes of education development. Almost 50% of theprojects supported in this phase are in the engineering discipline. Of even morepowerful potential is the Learning and Teaching Subject Network (LTSN) which isa new national initiative for the implementation of 24 subject based centres foreducation support, development and dissemination. Three centres have been fundedthat cover the field of engineering: LTSN Engineering, the Materials Subject Centre and the Centre for Education in the Built Environment. The aim of the LTSN is to promote high quality learning and teaching bystimulating the sharing and dissemination of good practice and innovation inlearning and teaching through the provision of subject-based support. This willbe achieved by creating a national focus for academics through providing aphysical location, library of teaching resources, web-site, publications,workshops, visits, discussion lists and individual support. Most

importantly,there will be the very necessary development of a national network and communityof interested academic staff.

Engineering Education in the UK - LTSN and BEES

The national network of enthusiastic engineering educators that the LTSNcentres are developing will build on, expand, link and involve existing UKnetworks such as the Engineering Education group at Sheffield Hallam University(BEES), and Education ECAD Users Group (ECAD)In particular, the Engineering Education group at Sheffield Hallam Universityhave hosted three international conferences over the last few years and havebuilt up a strong UK presence. They have identified a growing need for thedevelopment of an official UK society with the experience gained from ourcolleagues in the US (ASEE), Australia (AAEE) and Europe as a whole (SEFI).This spring has seen their launch of the new British Engineering EducationSociety (BEES). The LTSN centres and BEES will all be working with the mainobjective of providing a much needed focal point for engineering educators inBritain. They wish to be a point of contact for diverse groups with a commoninterest in engineering education and to provide links between secondary andtertiary education, professional and governmental bodies, and industry. Equallythe needs of individual practitioners will be met by the national and world-widenetworks of detailed contact information. BEES have also presented the first issue of their new publication, the BritishJournal of Engineering Education (BJEE) (Bramhall.Ed. 2000). The BJEE will meet the needs of engineering education researchers with a British perspective.Providing a route to peer-reviewed publication, it will be a forum for theexchange of news and contemporary cutting edge research in the field. Thisprimary focus is reinforced by a strong commitment to the application of ideasfrom the wider field of education and will draw on best practice experience fromoverseas. In addition to such research articles, the journal will include bookreviews and feature articles, disseminating information on the latest techniquesand best practice by reporting on developments and innovations from individualinstitutions. The active collaboration of existing networks with the national LTSN networkwill ensure their mutual success and continued enhancement, together fueling theincreasing society of active individuals working with exciting new developmentsin the UK. Existing networks of enthusiasts working in different areas oflearning and teaching will be linked together by the LTSN centres in order toenable the provision of advice and support for the entire community ofengineering academics. If a lecturer wishes to gain information on a new way ofteaching thermodynamics, for example, they can put out feelers to the LTSNcentres who will in turn link them to knowledgeable academics, papers, orweb-sites. They can also dip into the rest of the LTSN network and connectthrough the other subject centres to staff in different disciplines who mighthave very useful experience to draw on. Each of the centres will in turn besupported by the Generic Learning and Teaching Centre (GLTC) which connects keypersonnel and encourages the exchange of ideas. Two of the three LTSNengineering centres focus on specific subject areas within engineering -Materials and the Built Environment - while the third is more general, coveringeverything else. It is important that these centres do not fall into the servicecentre trap, described earlier. It is normal for subject centres to employpractitioners, with experience as professionals or academics in the disciplinearea. In this way, the community engages in subject level discussions of theirteaching. It is the very community based approach of LTSN that makes it different from other education development activities. It is hoped that it willbe owned by the community and this is certainly one of the key aims of eachLTSN.

LTSN Materials

The Materials Engineering Community are fortunate to have gained a centrededicated to their subject area. Directed by Professor Peter Goodhew, withDeputy Director Dr Caroline Baillie, this centre was funded to support theunique needs of the degree courses specialising in Materials Science andEngineering. In many other countries these are not separate courses but optionswithin a programme or department. However, within the UK it is considered avery particular discipline with broad

remit. Students need to develop theirability as physicists, chemists, and often biologists or biomedical engineers aswell as applying their training to all other branches of Engineering. To be aMaterials Technologist is to develop a very unique way of thinking. If aMaterials degree is hosted within an Engineering department the necessaryscientific abilities may be lessened unless the course is carefully planned.Engineering skills would in turn be decreased if it were hosted by physicalscience departments. The Materials Subject Centre will therefore have closeliaison with the Engineering centre and also the Physical Science centre. Atpresent, however, Materials programmes in the UK are closing or being subsumedby General or Mechanical Engineering. Largely due to the low numbers of schoolstudents applying for places, the deficit is considered to be due to a lack ofknowledge and understanding about the subject at school level by teachers andcareers advisors. One of the main aims of the new centre will be to maintain and strengthen the existence of Materials as a unique ‘interdisciplinary’discipline!

LTSN Engineering

LTSN Engineering receives £240k per annum and operates as a large single sitecentre with a critical mass of expertise that takes advantage of a central UKlocation and previous experience in this field. The centre is directed by JohnDickens and managed by Fiona Lamb. LTSN Engineering supports a large number ofthe engineering disciplines – approximately 10,000 academic staff spread acrossover 100 institutions and 600 departments! Whilst engineering has some commonthemes there is a wide diversity of subject areas within the discipline. This can be readily identified from the range of courses offered in the UCAS handbookand by the number of Professional Institutions and bodies are affiliated to theEngineering Council. Engineering education draws on a range of underpinningsubject areas and cognate disciplines and is characterised by laboratory basedteaching, industrially based projects and sandwich courses. The majority ofEngineering staff and students are highly computer literate. There is bynecessity a close relationship with industry, as engineering students need toapply their technical, management and business skills in an industrial context.Engineering graduates require Continuing Professional Development (CPD) to copewith the sheer diversity of knowledge required by Engineers and the rapid rateof change in technology and industrial practice. Initial graduate trainingbuilds on the educational base to provide progression towards professionalstatus. LTSN Engineering has a challenging role catering for the specific needsof the Engineering community in the context of the characteristics above. The two critical areas of concern that the Engineering Subject Centre must addressare those of diversity and scale.

The many tiered approach for the national network

The model for the national network will be based on networks used in ImperialCollege and Loughborough University, as well as on the knowledge of theeffectiveness of national networks. The resultant model provides a many tieredapproach to networking the Engineering Education community within the UK. At the
core will be the LTSN Contact, such as a programme tutor or someone with an active interest in innovative methods of teaching, based in each engineering department in the UK (equivalent to Education Development Coordinators at Imperial and Advisory Board members at Loughborough). At IC these academic staff act as the entry point to the Dept and to the culture. They ‘translate’ education development initiatives to the Dept. and also express the needs and concerns of the Dept.s.
The LTSN Contacts will be supported by the staff in their relevant LTSN Centre (equivalent to Education Development lecturers at Imperial and the team in the Faculty of Engineering Teaching and Learning Support Centre at Loughborough). They will receive information and contacts regarding the latest developments and evidence from education research, as well as providing advice about implementation issues. They will be able to provide key contacts of staff in other Depts working on similar issues, references to literature and computer

based resources, and act as the necessary moral support at times.
The next tier will comprise the existing engineering education networks and working groups of the LTSN Centres, linking together larger groups of staff who want to explore, evaluate and develop an active interest in the educational issues of their discipline or a particular cross-discipline topic. An example is the emerging network of academics interested in creativity in engineering (see Forum on creativity, IJEE website).
These staff will in turn link with the next outer tier, those staff in their departments who have a partial interest and wish to be kept informed (equivalent to LINKED at Imperial (London Imperial network for Education Development) and the 'EngTLSC News' system at Loughborough). This will be done by regular newsletters, Email lists and forum discussions, and workshops.
Finally the outermost tier will be all engineering academic staff of the UK. The Materials LTSN serve a small enough community to be able to visit each Dept and to create personal links. LTSN Engineering will run regional workshops to raise general awareness and then follow this up more gradually to create the personal links.

Summary

In summary, suffice to say, 'watch this space'. We are very encouraged by the present climate supporting innovation within the UK and are taking the opportunity to facilitate the growth of the nucleating network of academic staff interested in and developing the future of Engineering Education. This paper is a short introduction to some of the latest UK schemes, which, although in their infancy, hold much potential for our graduates.

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Mike Bramhall is an active practitioner/researcher in engineering education andis Journal Editor of the British Journal Engineering Education which he recentlycofounded alongside the British Engineering Education Society.