Progress on development of CPD provision for teaching Mathematics in HE

From 2006 all new staff involved in the teaching and support of mathematics students will be expected to undertake training in these duties. To ensure that it plays a useful role in this the MSOR Subject Centre has been developing its strategy and provision in the area of teacher training and continuing professional development (CPD) [2, 8]. This report describes progress to date, plans for the future and calls for help from the mathematics community.

It is worth summarizing the recent and forthcoming changes that effectively takes us into a new era in teaching in HE. The establishment of the Higher Education Academy (HE Academy) and its Subject Centres provides national recognition of the importance of HE teaching. A recent THES survey (THES June 3 2005) showed that as students begin to pay more from 2006, they will expect to see this reflected in improved teaching quality. And the preliminary report of a March meeting of the UK Mathematics Foundation at Manchester University talks of the UK mathematics community falling short of reproducing itself and calls for reform of mathematics teaching in schools, universities and teacher training programmes (THES July 1 2005). So the importance of teaching in HE is moving up the agenda. At the same time the HE Academy and its Subject Centres, with their networking capabilities, now provide the opportunity to develop materials and provision that harness expertise and experience from across the MSOR community. This allows us, for the first time, to establish mathematics pedagogy in HE on a firm foundation on which to build a comprehensive, coherent and evolving body of evidence-based knowledge, theory and practice. This should see an end to re-inventing the wheel in mathematics HE teaching. The Subject Centre sees it as crucial that mathematics practitioners play the major role in this, and aims to use its production and networking resources to facilitate their input. This aim has guided the establishment of the structure described in this article.

A range of provision for a diverse sector

With such a diverse HE sector as we have in the UK it is to be expected that we have a wide range of different models for professional development. For the overall structure of a teacher training programme we can usefully divide training into three general strands:

- generic principles and practice of teaching that most teachers need to learn, and are not subject specific
- discipline-based principles and practice of teaching aimed at providing the specific skills needed to help students to develop deep understanding of mathematics
- on the job, in service apprenticeship training, in the academic department, through one’s colleagues

The three main agents providing these components are:

- generic institutional staff development, possibly through HE Academy accredited programmes
- discipline-based teacher training provided/facilitated by the MSOR Subject Centre
- in-service mathematics departmental apprenticeship
Different institutions, departments and individuals combine these components in various ways that suit their local needs. For example one mathematics department may send their staff on the institutional staff development course, and provide mathematics input through department apprenticeship. Another might have a pick and mix type strategy where professional activities from all three (and other) components are combined to provide sufficient credit to apply for one or other form of HE Academy membership. One department, the Warwick Mathematical Institute, is experimenting with departmentally-based training under the umbrella of the Warwick Centre for Academic Practice [3].

This wide and healthy variety of provision presents the Subject Centre with interesting challenges in developing its strategy and activities so that it can contribute in a flexible way to all such models.

In addition, the Subject Centre has a wide range of constituencies to serve: postgraduate assistants engaged in teaching; new mathematics teaching staff, experienced staff developing their skills in new areas, mathematics educationalists researching in areas relevant to HE provision, practitioners engaged in teaching development and research, etc. Then we have a wide range of mathematics levels from advanced pure mathematics delivered at research intensive institutions, to teaching basic numeracy as a service to other disciplines [5]. Again, these dimensions mandate a flexibility in professional development materials and activities that is challenging to say the least!

The Subject Centre's response

To assist in steering its own provision, and links with other agencies, the Subject Centre has undertaken extensive consultation across the sector and set up the following:

- A Professional Bodies/Learned Societies Group comprising representatives from the LMS, IMA and HoDoMS to steer/endorse CPD provision.
- A Practitioner Working Group of experienced teachers from across the sector to provide input to materials and a practitioner view of the provision.
- An MSOR Subject Centre mini-project working with Warwick’s Mathematics Institute and the Warwick Centre for Academic Practice (CAP) to explore a tripartite model of academic CPD comprising input from generic institutional staff development (Warwick CAP), from departmental apprenticeship (Warwick Mathematics Institute), and from discipline-based expertise (MSOR Subject Centre) [3].
- Links with generic staff development provision through the HE Academy Accreditation and Registration Division, membership of the SNAS (Supporting New Academic Staff) group of the HE Academy, and extensive contacts among institutional programme tutors.
- New lecturer/probationer representation through a focus group at the Network’s Induction Course for new lecturers, as well as through the other contacts referred to above. See for example [4].
- Student input through departmental activities, facilitated by the Network, in departments represented by the contacts above. This is to be set up, but the Subject Centre has already begun to provide a forum for students’ views – see [6] for an example.

The Subject Centre also already has experience of provision and accreditation through:

- A 20 M level credit Teaching Certificate for Statistics, accredited by the HE Academy [1]
- The Subject Centre annual residential Induction Course for new mathematics lecturers in HE

Current activities

Arising from this consultation and experience the Subject Centre is now engaged in a number of activities designed to build its provision for the mathematics community, chief of which are listed below:

- Developing its successful residential Annual Induction Course for new mathematics teachers in HE to align it with discipline-based requirements that might arise in future teacher training in mathematics HE teaching and establish closer links with Institutional staff development and academic departments.
- Preparation of support materials (paper and electronic) for CPD in HE mathematics teaching at all levels. Materials for preparing and delivering mathematics lectures have been drafted with input from the Practitioner Group, and work has started on similar material for Student Assessment. As noted above, we have a broad constituency to serve and so we are adopting an approach of developing a comprehensive ‘master database’ from which bespoke materials may be mined and tailored.
- A project with Warwick Mathematics Institute and the Warwick Centre for Academic Practice to examine and capture the experiences of
departmental apprenticeship, leading to an ‘Apprenticeship Manual’ that will support new lecturers and their departments in providing good quality on the job training for teaching and support functions.

- Proposed Annual Conference – an important aspect of professional development is the opportunity to learn from others, disseminate one’s own experience and ideas, and publish findings and outcomes. The Subject Centre is currently working to develop an Annual Conference that will provide such an opportunity, as well as keeping the community informed on national matters relating to HE mathematics teaching. [7]

**Long term aims and a call for help**

In practical terms the Subject Centre might operate as an MSOR CPD broker. If a department has some need for CPD, say for new lecturers, then they could contact the Network for advice. The Network could then provide an advisor who would liaise with the institutional staff development department and design an appropriate discipline–based component for the CPD. This might include materials and events provided by the Network itself. It could also give advice and materials to support appropriate departmental apprenticeship components of the CPD. Finally, the Network would also be able to advise on aspects of HE Academy registration and accreditation, and how the discipline-based components might fit into the overall schemes. The Subject Centre can also harvest and harness experience and expertise from the whole MSOR community, and identify and initiate key research and development projects. The Subject Centre also has international links and with schools and industry.

Below we list some of the long term aims that the Subject Centre, using its production and networking resources, and with the help of the mathematics community, will work towards:

- establish mathematics pedagogy in HE on a firm foundation on which to build a comprehensive, coherent and evolving body of evidence-based knowledge, theory and practice
- establish a community of practice that can offer robust peer review in mathematics teaching in HE
- survey current position and practice nationally and internationally, e.g. in CPD provision and policy for accreditation of staff
- networking throughout the MSOR community to harvest and disseminate practice and harness relevant expertise from across the HE sector, from schools, industry and other countries
- produce materials that have wide input/authorship and hence authoritative and respected status and gather resources, exemplars, case studies, etc
- evaluation and advisory function on teaching and learning issues across the community and provide synoptic views and assessments on key issues
- facilitate and conduct research, particularly in those areas lending themselves to wide networking and collaboration and strategically linked to key subject-based issues
- archive outcomes of pedagogic research and development in mathematics teaching in HE and provide a repository for an evolving knowledge base
- provide flexible links with generic provision through its HE Academy location

As noted above, the Subject Centre regards practitioner input as a top priority in its work. It hopes soon to establish a Practitioner Forum whereby anyone will be able to access materials on the web and comment on/contribute to them. But there is no need to wait until then to get involved. If these initiatives excite you and you would like to be involved please contact us – there is plenty to do!

**References**