Towards a framework for the Continuing Professional Development of mathematics teachers; Revised Version – January 2005

A discussion paper from a working group of the Joint Mathematical Council of the UK

In May 2004, in the light of the Smith report *Making Mathematics Count* and the DfES response, a working group was established by the JMC to consider developments in CPD for mathematics teachers. The group was chaired by Professor Adrian Oldknow for the JMC with the following membership:

Association of Mathematics Education Tutors (AMET):	Doug Averis & Dave Miller*
Institute of Mathematics and its Applications (IMA):	Lucy Allen & James Nicholson*
London Mathematical Society (LMS):	Peter Saunders
Mathematical Association (MA):	John Leigh
Mathematics in Education and Industry (MEI):	Michael Ling & Bernard Murphy & Roger Porkess*
National Association of Numeracy and Mathematics in Colleges (NANAMIC):	Joan Ashley
Royal Statistical Society (RSS):	Prof. Neville Davies & Prof. Peter Holmes *

* Where multiple names exist, the professional body is represented by any one of the named representatives.

1. The current national context in support of subject teaching

The Subject Associations (SAs) have for a long time been a major provider of continued professional development (CPD) for teachers of many subjects. The strength of their provision has varied over time reflecting changes in the funding and organisation of education. The SAs have had a particularly difficult time in recent years through, for example, the introduction of the National Strategies, the TTA regulations for award-bearing courses, and the development of an independent CPD structure within the Specialist Schools Trust.

There is a Subject Association Working Group (SAWG) which meets regularly with the DfES and the Strategies. This group includes two JMC member associations: the Association of Teachers of Mathematics (ATM) and the MA. The group welcomed the earlier consultation document by the DfES for a CPD strategy for teachers, and the Department's declared intention to involve subject associations more closely in future policy and developments. One tangible result of this is the refocusing of the ICT in Schools strategy on embedding ICT in subject teaching, and the involvement of SAs in working towards this.

A new five year DfES strategy for teachers' CPD is expected to be published soon.

In the text below we use the terms `mathematics teaching' and `mathematics teachers' to include the teaching of mathematics and/or numeracy at all levels including primary schools and Further Education and by all those helping learners to study mathematics.

2. The current context in support of all involved in the teaching and learning of mathematics

Most, if not all, of the associations represented on the JMC provide CPD opportunities. The JMC group is concerned with an entitlement to CPD for all involved in the teaching and learning of mathematics, including all teaching mathematics in schools and colleges, all concerned with mathematics and mathematics education in colleges and universities and all learning support professionals working in mathematics classrooms. Current CPD opportunities provided by associations represented on JMC span a wide range of types of provision, as reported in the first publication of the Advisory Committee on Mathematics Education (ACME): *Continuing Professional Development for teachers of mathematics(Dec2002)*. ACME's recommendations for a well-planned CPD programme include "broadening and deepening of mathematical

knowledge…" as well as "opportunities to relate theory to practice in the classroom, and to provide time for informed and collaborative reflection…"

The Smith report on mathematics 14-19 has a substantial section on CPD which highlights the need to reward "those teachers of mathematics who make particular efforts to improve their subject knowledge and teaching effectiveness". The DfES response to the Smith report refers both to the expected new framework for CPD for all teachers as well as the specific issues raised by ACME and Smith. However (p.31) the Subject Associations are a significant omission in the list of existing mechanisms for delivering high quality CPD - where specific mention is made of the National Strategies, the Specialist Schools network, Advanced Skills Teachers (ASTs), LEAs, Higher Education Institutions (HEIs) and the TTA.

The DfES and ACME held a joint conference on the CPD issue at the Royal Society on November 19th. The original version of this paper was offered by the JMC CPD group as a contribution to the work of that conference and included in the papers for that conference. Thus a reasonable cross-section of the mathematics education community is aware of the work of the JMC CPD group.

3. The future context of CPD for mathematics teachers and others involved in the teaching and learning of mathematics

Whatever structures are decided on, there will be important principles about entitlement to, and provision of, CPD for mathematics teachers and others involved in the teaching and learning of which need to be debated and agreed. The JMC group has identified a number of these which it holds to be important.

3.1 There is a clear need for CPD which addresses both subject knowledge and subject pedagogy.

3.2 CPD should be interpreted in its widest sense. Teachers, and others, should be encouraged to participate in, for example, courses and higher degrees and supported in the carrying out and dissemination of action research.

3.3 Those organising opportunities for teachers to learn mathematical subject knowledge need to ensure that these provide a model of how mathematics can be effectively learnt, including support through ICT.

3.4 CPD opportunities and support must be inclusive and supportive – and not be threatening - so that teachers can have the confidence to discuss their own perceived needs and problems.

3.5 Mathematical subject associations have experience and expertise in provision of CPD and peer support which needs to be drawn into any future framework.

3.6 There have been good models of mathematics CPD developed in the past e.g. through GEST-funded courses, in the use of Area Training Organisations (ATOs), through the DES Raising Achievement in Mathematics Project (RAMP). These need to be reviewed to ensure that lessons from the past are not lost.

3.7 Means should be found for teachers to accumulate successful CPD experiences towards an extended professional qualification.

3.8 While CPD needs to be promoted and funded nationally, the framework should guard against a `one-size fits all' approach. It needs to ensure that there is provision for local and regional needs to be addressed, within a structure of providers who contribute from acknowledged strengths, whose work is subject to quality assurance assessment (QA) and which avoids duplication.

3.9 CPD opportunities should be open to all teachers of mathematics, and those supporting mathematics teachers, including those in post-16 institutions.

4. Suggestions for particular forms of CPD development

The working group identified a few areas for particular attention. These include:

4.1 Specific needs in pedagogy, subject knowledge enhancement and exploitation of the full potential of ICT for effective teaching and learning. Examples include, developing: mathematical thinking skills such as geometric reasoning; innovative

ways of teaching functional mathematics; enhancing teaching with an interactive whiteboard; and an improved ability to handle and teach solutions to real world problems, such as in the context of data and information.

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4.2 There are interesting moves to improve the status of teachers, such as the proposed Chartered London Teacher award, which could be extended e.g. to a Chartered Mathematics Teacher award.

4.3 Many professions provide recognition for CPD accumulated in a variety of forms including participating in courses, passing examinations, publishing articles, portfolios of ongoing work etc.

4.4 The Association for Science Education (ASE) has an interesting model for CPD accreditation for science teachers which includes evidence under the headings of Subject Knowledge, Pedagogy (Knowledge, Skills and Understanding), Evidence of development of skills, Theory of Teaching and Learning, Professional attitude (self), Professional skills (others).

5. Towards a common framework for CPD for all involved in the teaching and learning of mathematics

The working group would welcome the development of a common, flexible CPD framework. Teachers and others across all phases must understand the process of communicating mathematics. In terms of the CPD offered to teachers and others in all phases of education and at all stages in their career, the common framework must include elements of subject knowledge, enrichment, pedagogy and the opportunity for action research. Thus the common framework must be structured to meet a diversity of need; to ensure input suitable for all audiences, through a variety of CPD types. Supporting this overarching position, it is proposed that a framework be explored that includes entitlement, recognition and acknowledgement and incorporates the potential to achieve an extended professional qualification. This qualification should allow for recognition of all forms of CPD in the final award, be built upon what is widely considered to be best practice and potentially incorporate all forms of current accreditation systems.

The working group suggests that, in the absence of physical regional centres, it is important that the constituent groups of JMC individually and collectively recognise the potential for contributing to the regional offer. Furthermore, that these constituent groups make specific the offer to support and work alongside the National Centre for Excellence in Mathematics Teaching providing responses, input, expertise and resources as appropriate.