

REVIEW OF MATHEMATICS TEACHING IN EARLY YEARS SETTINGS AND PRIMARY SCHOOLS: INTERIM REPORT

UCET Response to Interim Report of Williams Review

Introduction

1. UCET welcomes the opportunity to comment on the Interim Report of the Williams Review of Mathematics Teaching and commends the practice of publishing an interim report, which permits the discussion of provisional findings and recommendations, thus providing the educational and wider community of stakeholders with the opportunity to play a genuinely formative role in the work of the review panel.

2. Before offering comments on the four provisional recommendations in chapter 6 on initial teacher education and continuing professional development, UCET wishes to make a general observation on the Interim Report as a whole. We wholly applaud the Interim Report's fundamental stance: the quality of mathematics teaching in early years settings and primary schools is to be enhanced pre-eminently by securing further improvements in the quality of teaching. There has been a tendency over recent years for it to be assumed that qualitative improvements in pupils' learning are to be secured by further central prescription of the content of what is taught. In our view, while the case for strong central leadership in the development of the school curriculum was fully justified, the current apparatus of central control through curriculum guidelines, testing, and rigorous inspection is unlikely to yield the further improvements that are sought. The Interim Report commends the National Numeracy Strategy, but maintains that what is now required is not radical curriculum restructuring but even more resourceful and imaginative teaching. Indeed, even the important intervention to address under-achievement, *Every Child Counts*, is considered to require the professional involvement of a qualified teacher. We congratulate the review panel on affirming the centrality of effective teaching in fostering learners' mathematical understanding and for placing such prominence on the steps that are now required to strengthen the quality of teaching still further.

Recommendation 1 : the teacher and subject knowledge

3. It was predictable that the review should give careful consideration to the knowledge base in mathematics from which the teacher operates. We endorse the review's claim that what is required for the effective teaching of mathematics is a "deep subject knowledge" and pedagogy: each of these is necessary but each, on its own, is insufficient. The accomplished mathematics specialist who lacks pedagogical expertise, like the competent teacher whose grasp of mathematics is tenuous, will prove an ineffectual teacher in early years settings or the primary school. The key question concerns what constitutes "deep subject knowledge", of the kind that inspires confident and effective teaching. The Interim Report acknowledges that the current minimum entrance requirement- grade C at GCSE – represents a fairly modest level of mathematical understanding, but is forced to conclude that the supply position would be adversely affected by any change to a higher entry requirement. The expectation is that the current revision of assessment in mathematics, leading to GCSE Mathematics I and II, would provide a more appropriate admission level for ITE. How sound is that expectation?

4. The report is predicated on the assumption that entrants into primary teaching are under-qualified in mathematics, and that few graduates have a STEM degree. Unfortunately, data relating to participation in mathematics post-16 is not maintained, and so nationally we have no idea how many students, let alone how many potential primary teachers, start an AS or A-level course in Mathematics. We do know, however, how many are entered at the end of year 12 for AS examinations, and this amounts to approximately 10% of the numbers currently taking GCSE, a figure which contrasts strikingly with English, in which approximately 25% of those sitting GCSE are entered for AS level.

5. Thus the issue is not only attainment at 16, but participation post-16. We recognise the Review's concerns that requiring some post-16 mathematics experience might compromise the numbers of potential entrants into primary teacher training. However, to raise the bar in this way might not only signal a serious intention to improve the status of mathematics for impending primary teachers, but might also increase mathematics participation. We would also urge that consideration be given to the lacuna in progression and participation data post-16, for it is against that background that the requirements regarding Mathematics I and II should be examined.

6. Mathematics I and II are currently being piloted, along with Functional Mathematics. As developments now stand, candidates will need to pass Functional Mathematics in order to obtain GCSE Mathematics. Consequently, candidates taking Mathematics I and II must take three components: Functional Maths, and then Maths I and Maths II. That this might introduce an additional hurdle is recognised, and consideration is now being given to the possibility that Mathematics II could become an alternative to mathematics I. If Mathematics II becomes the stretching, problem-solving end of the GCSE programme of study, then for primary teachers to have Mathematics II, in addition to Functional Mathematics, would strengthen the cognitive base of the early years and primary teacher.

7. While the Interim Report carefully considers the level of mathematical understanding required in early years settings and primary schools, it is also necessary for teachers to *enjoy* mathematics and this means that they should be part of a supportive and pleasurable community of practice, ideally in school as well as being part of a wider network with HEI and the LA.

8. Research suggests that there are dispositions towards mathematics that go beyond actual subject knowledge. Both teachers and teaching assistants should be encouraged during initial training and CPD to explore perceptions of their own performance in mathematics, and how this relates to their own experience of learning; relationships between teaching and learning mathematics; the enjoyment that comes from dealing successfully with difficulties, and the pain of failure; the impact of role models in their learning of mathematics; their attitude to competition; their own self-motivation; and their capacity to take responsibility for their own learning.

9. It is especially important when considering subject knowledge in the primary school to resist the temptation for "advanced" mathematics to cover higher mathematics as currently specified by exam boards and universities. Instead, regardless of what new teachers may have "missed" by not doing A-level or degrees in mathematics, study of mathematics should focus entirely on deepening and enriching understanding of mathematics in school. It is true that those with STEM degrees have the strong mathematical background that is sought, but UCET rejects the suggestion that such applicants, on the strength of limited exposure to teaching in the course of their degree studies, should be admitted to abbreviated PGCE programmes. Such a measure has the effect of diluting the quality of the degree programme as well as the PGCE programme at a single stroke.

10. UCET therefore supports the provisional recommendation I. It will be important however, that the TDA undertakes a careful analysis of the supply implications of such a change. In addition, we agree with the review panel that, since there is no scope for increasing the mathematical content of programmes of initial teacher education, other means have to be found to equip teachers with the level of mathematical and associated pedagogical understanding that is required.

Recommendation 2: renewed stress on CPD

11. It is clear that one of the main lines of investment has to lie in the CPD that is provided for teachers. Fortunately, no one any longer accepts that initial teacher education, however comprehensive and thorough, can equip teachers with all the skills and understandings they will require throughout a full career: they will require continuing access to opportunities which enable them to revitalise their skills, deepen their understandings and extend their professional range. UCET therefore strongly supports the second principal recommendation that a “renewed emphasis on CPD is required”. Our support for that recommendation assumes that four conditions can be met.

12. Firstly, CPD provision must be differentiated according to need, or stratified in accordance with the interventions that the teacher is expected to make. A blanket one-size-fits-all form of CPD provision is anathema, and, fortunately, the Interim Report shows no sign of invoking any such measure.

13. Secondly, CPD provision should be closely tied to a professional master’s degree award. UCET has been greatly encouraged by the recognition, made explicit in the *Children’s Plan*, that the MTL should in due course become the key professional award for the career teacher. Independent studies by OFSTED and others have pointed to the ways in which the holders of master’s degrees have contributed significantly to the educational progress of learners and to the educational effectiveness of schools. We have no doubt whatever that the MTL can constitute a powerful means of strengthening mathematics teaching in the early years and the primary school.

14. In that connection we urge the review panel to consider what financial incentives might be provided to encourage teachers to undertake the kind of professionally focussed programme which the MTL will exemplify. The Interim Report makes favourable reference to the Chartered Teacher development in Scotland. We encourage the review panel to take a bolder line and to recommend that the achievement of the MTL should bring some form of financial recognition.

15. Thirdly, CPD provision should seek to enhance communities of practice, or professional learning communities, in schools.

Studies of various occupational groups have identified several aspects to learning at work. A common finding is that in work-based settings there is little evidence of formal learning taking place. Instead, mastery was not located in particular individual experts, but in the organisation of the practice. Other features of learning in such contexts were:

- New participants drawn in to helping more and more, gradually taking on increased responsibility whilst the “expert” gradually withdraws.
- Specific tasks are learned by being practised immediately.
- Learners observing practitioners generates conversation and interaction about the observations, and critical feedback.

- Learners produce a new personal narrative that changes their sense of self with respect to the practices.
- Learners need access to the community of practice: they must come to terms with the technology of a community of practice and do so by more direct participation in its way of life.

If we see CPD in mathematics pedagogy in this way, then subject knowledge is important in the sense of learning the technology of mathematics. It becomes crucial that the environment provides opportunities also for teachers to engage at a high level with the other noted aspects of learning at work. This suggests that the proposals for high-level practitioners in each school will be critical, and that networks of high-level practitioners will be as important as the in-school community.

16. There are enormous benefits in drilling down into pupil work, and we recognise and applaud the suggestion that at least some teachers should be specifically trained in diagnostic assessment and careful methods of discriminating between individual children's needs. We consider this to be critically important and the review might reconsider whether it should be more than a minority occupation.

17. Fourthly, we urge that closer collaboration between LEAs and HEIs. There are clear advantages in locating responsibility with schools for the ordering of their CPD activities and we welcome the support which the review panel provides for a market in CPD, believing that HEIs have an important contribution to make. At the same time, we wonder if the school is always the most effective unit of analysis for planning CPD provision. The LEA is surely more able to adopt a strategic view on CPD, and indeed has a responsibility to do so. UCET maintains that there should be as close collaboration between schools, HEIs and LEAs in CPD as there is at the stage of initial teacher education. Indeed, it is significant that the CPD initiative highlighted in the Interim Report at paragraph 40 of Chapter 6 is the Hampshire *Developing Mathematical Thinking* programme, which exemplifies the very kind of collaborative partnership involving LEAs and HEIs that we are keen to see widely established.

Recommendation 3: mathematics consultants

18. UCET supports the third recommendation that local authorities should strengthen the field force of mathematics consultants. These consultants should be in the front line of the development of the teaching of mathematics. They should be strong subject specialists, operating from a deep understanding of the subject; and they should be experts in mathematical pedagogy, pioneering research, CPD, and consultancy in their field.

Recommendation 4: one specialist in each school

19. Finally, UCET agrees that within five years every primary school should have in post a mathematics specialist "with deep mathematical subject and pedagogical knowledge. Such specialists will have a profoundly important role to play in sustaining the kind of professional learning community to which we have already drawn attention. An appropriate intermediate objective might be to recommend that, as a step to the realisation of recommendation 4, that each school has access to a mathematics specialist, which would oblige LEAs to consider how mathematics specialists might be most effectively deployed.

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23rd April, 2008