

## **ACME's response to:**

### **The National College for Teaching and Leadership's consultation on pre-ITT subject knowledge enhancement – proposal for 2013/14 and beyond**

June 2013

#### **1. About ACME**

- 1.1. The Advisory Committee on Mathematics Education (ACME) is an independent committee, based at the Royal Society and operating under its auspices, that aims to influence Government strategy and policies with a view to improving the outcomes of mathematics teaching and learning in England and so secure a mathematically enabled population.

#### **2. About this response**

- 2.1. The ACME response to this consultation has been developed by the Committee and in addition informed by ACME's Outer Circle of advisers and discussions with JMC members. The focus of this response is the subject of mathematics and the likely impact of these proposals on the quality and number of specialist mathematics teachers.

#### **3. Summary**

- 3.1. There is a continued and important need for 6-week, 13-week, and, we currently believe, 26-week Subject Knowledge Enhancement (SKE) courses in mathematics. These need not be linked with specific ITE providers, but should be centrally coordinated, and developed with due attention to quality assurance, geographical spread, and economies of scale.
- 3.2. The chronic undersupply of competent and confident mathematics teachers will not be addressed without provision of SKE courses, nor will effective and consistent delivery of new, demanding curricula and qualifications be possible.
- 3.3. ACME fully acknowledges the pressure the NCTL is under to reduce spending; however, we urge them to reconsider the current proposals, which if implemented would significantly reduce this very cost-effective route to increasing the supply of well-informed and committed teachers of mathematics.

#### **4. Why is subject knowledge enhancement important?**

- 4.1. ACME is pleased that the NCTL has acknowledged the very important role subject knowledge enhancement courses are playing in enhancing the numbers and quality of entrants to ITE in shortage subjects, which include mathematics and physics-with-mathematics.

4.2. Teachers' subject knowledge influences the mathematics achievement of their students, but not in a straightforward way.<sup>1,2</sup> Boosted mathematics subject confidence can enhance job satisfaction and hence retention.<sup>3</sup> The Teach First evaluation shows their (often non-specialist) teachers frequently lack active learning and metacognitive skills, which are both important for deep understanding.<sup>4</sup> Non-specialist teachers are also less likely to act in some ways which promote best deep conceptual understanding, including analysis, synthesis (connection-making), rigour and objectification.<sup>5</sup>

## 5. Mathematics teacher supply

5.1. There is a longstanding and ongoing shortage of specialist mathematics teachers. Each year, there are approximately 10,000 students graduating from mathematics courses. The Higher Education Statistical Unit analysis in 2012 showed that approximately only 1 in 5 mathematics graduates choose to go into teaching.<sup>6</sup>

5.2. At present, SKEs provide a route into secondary mathematics teaching for those without mathematics at degree level, or with very limited mathematics content. SKE courses have the potential to play a significant role in boosting the subject knowledge of high proportion of prospective mathematics teachers. They also play an important role in boosting the number of those entering mathematics teaching. In 2010/11, there were 1,251 registrations for SKE courses in mathematics and in 2011/12, there were 2,635 places allocated for mathematics ITE.<sup>7</sup>

5.3. Any reduction in the availability of SKEs therefore needs very careful justification if mathematics teacher supply is not to be jeopardised at a time when there is increasing, not decreasing, need for mathematics specialist teaching, with an aspiration for universal participation to age 18 and many Key Stage 3 classes still without a specialist mathematics teacher.

## 6. Effectiveness of SKEs

6.1. The final report of the evaluation commissioned by the Teaching Agency has only just been published, and there is no other systematic in-depth review of the effectiveness of SKEs.<sup>7</sup> This makes it difficult to comment on the likely impact of these changes on the effectiveness of the programmes under review. These SKE programmes typically are designed to build deep

<sup>1</sup> Baumert, J., M. Kunter, W. Blum, M. Brunner, T. Voss, A. Jordan, U. Klusmann, S. Krauss, M. Neubrand, and Y. M. Tsai. 2009. Teachers' Mathematical Knowledge, Cognitive Activation in the Classroom, and Student Progress. *American Educational Research Journal* no. 47 (1):133-180

<sup>2</sup> Hill, H. C., S. G. Schilling, and D. L. Ball. 2004. Developing Measures of Teachers' Mathematics Knowledge for Teaching. *The Elementary School Journal* no. 105 (1):11030.

<sup>3</sup> Tikly, C. and Smart, T. 2006 Career Patterns of Secondary School Mathematics Teachers The Mathematical Association, Leicester

<sup>4</sup> [http://www.teachfirst.org.uk/web/FILES/TeachFirstMaximumImpactEvaluationReport15980\\_833.pdf](http://www.teachfirst.org.uk/web/FILES/TeachFirstMaximumImpactEvaluationReport15980_833.pdf), accessed 27.06.2013

<sup>5</sup> Watson and De Geest (2011). Learning coherent mathematics through sequences of microtasks: making a difference for secondary learners. *International Journal of Science and Mathematics Education*, 10(1) pp. 213–235

<sup>6</sup> <https://www.gov.uk/government/news/quality-maths-graduates-flock-to-teaching> accessed 27.06.2013

<sup>7</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/208348/DFE-RR301A.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/208348/DFE-RR301A.pdf) accessed 28.06.2013

conceptual understanding around an intensely collaborative and discursive framework that models current understanding of best-practice pedagogy.

- 6.2. A range of current ITE (not SKE) providers, including those involved in school-based routes such as SCITTs and GTPs, tell us that substantial SKEs typically build up a well-founded confidence in Key Stage 3 and 4 mathematics and a deeper commitment to the profession: these are both valuable (and cost-effective) outcomes.

## 7. **SKEs in parallel to ITE**

- 7.1. Trainees need to access deep subject knowledge in order to develop and use appropriate pedagogy, from day one of the course, but an ITE course is typically highly demanding physically, mentally and emotionally, with many trainee teachers already working 60+ hours every week. If students are expected to complete a lengthy SKE course in parallel with their ITE course, either the core training or subject knowledge development would inevitably be significantly compromised.

## 8. **SKE course length**

- 8.1. In times of economic constraint, it is reasonable that **1- and 2-unit SKEs** (2 and 4 weeks) are no longer funded, provided the range of ITE providers are required to demonstrate the effectiveness of their in-course provision of subject knowledge enhancement. It should be noted that this would be a considerable challenge for those routes where trainees have a heavy teaching load from the beginning of their training.
- 8.2. The **8 week SKEs** (4 units) are a difficult length to undertake prior to starting a course. Introducing **6 week SKEs** (3 units) should be considered. These could realistically be fitted into the summer prior to embarkation on an ITE course.
- 8.3. For many ITE applicants, a confident and effective entry to secondary mathematics teaching depends on at least a **13-week SKE** (6+ units) course. Any changes to the system which result in the loss of such provision would cut off routes into the profession.
- 8.4. The need for, and benefits accrued from, **26-week courses** (14+ units) over 13-week courses, should be evaluated urgently before a decision is made as to their future.

## 9. **Online and distance learning**

- 9.1. There is mixed evidence about the effectiveness of **online and distance learning methods** for such purposes. However, the experiences of the NCETM and the Further Mathematics Support Network (FMSN) suggest that, for mathematics, these approaches are more effective in developing further the knowledge of learners already embedded in a mathematics (and mathematics education) culture, than they are in inducting learners into that culture in the first place.

9.2. Part of the effectiveness of current SKEs seems to be precisely their modelling of teaching and learning through approaches which can very profitably be transferred into the classroom, including very active and practical approaches. We therefore suggest **a largely online approach is inappropriate**, but that the affordances and constraints of distance learning should be monitored.

## 10. Allocation of SKEs

10.1. Allocating SKE provision in proportion to the size of ITE provision is not a good model since it ignores variable demand. In fact, there is no need for upfront **allocation of SKEs**.

10.2. An alternative model would be to maintain a central register of available 6-, 13- and possibly 26-week courses, with ITE providers directing appropriate applicants to it and making offers of places conditional on successful completion of such a course. Uptake would then be on a first-come, first-served basis, with longer courses of course requiring early application if ITE course participation is not to be delayed. Provision should be allocated by formal tender.

10.3. In the proposed model, there is a risk that areas of the country will have no access to SKE courses. Provision should be allocated with regard to **geographical reach**.

10.4. All ITE providers should be expected to demonstrate their effectiveness at analysing, evaluating and addressing prior subject-specific knowledge. It would be helpful for **subject-specific needs assessment** guidelines to be developed to support this.

## 11. Quality assurance

11.1. SKE courses, whether from current or new providers, should be subject to both accreditation and rigorous no-notice inspection, since they are publicly-funded. It is unlikely, though not impossible that, for example, an individual Training School or School Direct provider will have the necessary specialist expertise or scale of demand for teaching an SKE effectively. However, there is no a priori reason why provision should be restricted to current providers.

## 12. Professional development

12.1. ACME's current work on the mathematical needs of teachers is evidencing the need for continuing subject-specific professional development of all teachers of mathematics throughout their careers. For many secondary teachers, SKEs are, and should remain, the appropriate first step of this journey.

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