

Written evidence from the Advisory Committee on Mathematics Education (ACME)

1. About ACME

The Advisory Committee on Mathematics Education (ACME) is an independent committee that develops advice on mathematics education policy. ACME was established in 2002 by the Royal Society and the Joint Mathematical Council of the UK (JMC) with the explicit backing of all major mathematics organisations in order to provide constructive and strategic advice on mathematics education.

2. ACME's work on initial teacher education

2.1 In November 2015 ACME published a report on the initial teacher education (ITE) of teachers of mathematics: *Beginning teaching; best in class?, High-quality initial teacher education for all teachers of mathematics in England.*¹

2.2 In the report ACME set out what is needed to ensure that teachers of mathematics leave ITE equipped with the skills and knowledge to become a high-quality teacher of mathematics.² ACME argues that there are a number of elements that should be consistent across every ITE programme. The principles that ACME sets out are a call for action for ITE providers, senior leaders, trainees, early career teachers and the mathematics community.

2.3 ACME recognised that the quality of education cannot be separated from the acute shortages of teachers of mathematics. It was often highlighted during stakeholder engagement that England faces a great challenge in getting more teachers into classrooms and keeping them there. It was evident there was not a clear picture of the size of the issues faced since data on the recruitment and retention of teachers of mathematics is insufficient. ACME concluded that **there is a need to develop an action plan on the initial teacher education for teachers of mathematics**. This would require collaboration and buy-in from governmental and non-governmental actors.

2.4 Selected recommendations from the report

- **Consistency across ITE programmes:** There is a range of routes into teaching. There is therefore a need for some more consistency across ITE programmes. In mathematics, this means an urgency to consider what ITE for teachers of mathematics should look like and to articulate a shared standard for ITE. This includes the mathematics-specific education during training, mathematics-specific mentoring and the development of critical evaluation skills.
- **Quality assurance:** It is accepted that the pool of teachers of mathematics must extend beyond those with mathematics or related degrees. This means that additional training, through subject knowledge enhancement (SKE) courses and

¹ <http://www.acme-uk.org/media/33228/beginningteachingbestinclass2015.pdf>.

² Teachers of mathematics encompasses all those who teach mathematics through all phases of education, including at primary level.

teacher subject specialism training (TSST) is required. Currently there is no quality assurance of these courses. This must be rectified.

- **Investment in data collection, analysis and monitoring:** To plan for the future a clear picture of the current teaching workforce is needed. Much better information on the recruitment and retention cycles is needed. Continual monitoring of routes and of supply is also needed, and this evidence must inform policy.
- **Mapping initiatives and identifying gaps to develop an action plan:** Many initiatives are underway to recruit more teachers of mathematics.³ All of the current programmes and initiatives to improve ITE must be mapped in order to identify gaps. The mapping exercise and identification of new areas of development should feed into a comprehensive action plan for initial teacher education in mathematics. This should be a long-term programme with all-party buy-in.
- **Development of clear lines of accountability:** Currently a range of actors are involved in the provision of ITE.⁴ An overarching strategy would be most effective if there were clear lines of responsibility and accountability. More clarity is needed about what this means at a local, regional and national level for future mathematics ITE supply. Further consideration needs to be given about who leads on the ITE strategy.

3. The importance of mathematics and mathematics teaching

3.1 Mathematics is central to the Government's aspiration to improve education. To ensure that all students receive high-quality teaching and learning in mathematics there must be a sufficient supply of teachers.⁵

3.2 Recent reforms to mathematics education affect learning in the primary, secondary and further education sectors. More and better qualified teachers of mathematics will be needed to meet the increased requirements of these reforms.⁶ In particular, the reforms to post-16 mathematics have increased the demand for teachers of mathematics.

³ <https://www.gov.uk/government/news/major-push-to-get-more-maths-and-physics-teachers-into-our-classrooms>.

⁴ Some current roles and responsibilities in ITE: The Department for Education is responsible for the teaching and learning of young people (under 19) and supporting the professionals that work with them, including trainees and qualified teachers. The National College for Teaching and Leadership (NCTL) (DfE executive agency) is responsible for ensuring that enough trainees enter ITE to meet the needs of the sector. It manages the allocation of ITE places and related funding to ITE providers. NCTL awards Qualified Teacher Status. It runs the School Direct Programme and is responsible for the allocation of subject knowledge enhancement courses. Ofsted (non-ministerial department) is responsible for inspecting and reporting on ITE programmes that lead to QTS. ITE providers (HEI – and school-led) are responsible for delivering ITE programmes, ensuring applicants have achieved the minimum qualification standards required to enter ITE and for deciding the content of ITE courses.

⁵ The Carter Review of Initial Teacher Training noted that there is a challenge to maintain a supply of outstanding teachers.

⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/399957/Carter_Review.pdf.

⁶ Targets that have been set by these reforms include:

- All students who do not achieve a grade C in GCSE Mathematics are now required to continue with the subject post-16;
- New post-16 'Core Maths' qualifications have been introduced as part of the Government's aim of almost all

3.3 The reforms come at a time when there is already a shortage of teachers of mathematics.

At secondary level, an estimated 5,500 extra specialist teachers are needed to teach the mathematics lessons currently taught by non-specialists who do not hold an A level in mathematics;⁷

Many primary schools have no access to a mathematics specialist teacher. Only 3% of the primary workforce hold a specialist degree and teaching qualification in mathematics.⁸

The vacancies as a percentage of teachers in post for secondary mathematics teachers in 2014 was 1.4%. This is above the percentage for all teacher vacancies of 1.1%.⁹

Schools are finding it difficult to fill their teaching vacancies. Ofsted conducted a survey of teacher recruitment in schools which showed that less than a third of schools had a good choice of well qualified entrants for all teaching posts advertised in 2013 – 14.¹⁰

3.4 More teachers of mathematics are needed every year.

Approximately 3,000 entrants to secondary mathematics teaching are needed each year and it is acknowledged that the Department for Education needs to look beyond the 8,000 mathematical science graduates per year¹¹ to fulfil these needs.

Additional teachers will be required to meet the needs of the growing school population. By 2023 there will be 900,000 more primary learners (9% more than in 2014) and 480,000 more secondary learners (17% higher than 2014).¹²

3.5 There are not enough teachers in all areas in England.

Ofsted has noted geographic inequities in the provision of initial teacher education and has warned that good and outstanding schools have the opportunity to ‘cherry pick’ the best trainee teachers, which could increase differences in local and regional school performance.¹³The Government has acknowledged that some areas struggle to recruit and

students studying mathematics to 18 within a decade;

- Standards set in the new mathematics curriculum at both primary and secondary level are considerably more challenging than previously;
- The new GCSE Mathematics is set at a higher standard than the previous GCSE Mathematics and the content has been broadened to include more problem solving and mathematical reasoning.

⁷https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/335413/sfr11_2014_updated_july.pdf.

⁸ <https://royalsociety.org/~media/education/policy/vision/reports/vision-full-report-20140625.pdf>.

⁹ <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2014>.

¹⁰https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/384707/Ofsted_Annual_Report_201314_Schools.pdf

¹¹ <https://www.hesa.ac.uk/>.

¹²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330261/SFR23_2014_Main_Text.pdf.

¹³https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/384699/Ofsted_Annual_Report_201314_HMCI_com_mentary.pdf.

retain teachers and has launched the National Teaching Service to deploy outstanding teachers and middle leaders to underperforming schools.¹⁴

4. Retaining and upskilling teachers of mathematics

4.1 The retention of good teachers is essential to the profession. Many teachers of mathematics leave the profession within three years of completing their initial training, and across all subjects almost one in four teachers leave teaching within five years.¹⁵ In the 12 months prior to November 2014, almost 50,000 qualified teachers in England left the state sector.¹⁶ Ofsted has highlighted the issue of teacher retention. Ofsted Chief Inspector of Education, Children's Services and Skills Sir Michael Wilshaw stated that "It is a national scandal that we invest so much in teacher education and yet an estimated 40% of new entrants leave within five years."¹⁷ In *Beginning teaching: best in class?* ACME points out that far too little is known about why teachers leave the profession.¹⁷ More data on this issue are required if cost-effective remedies for early departure are to be developed.

4.2 The issue of teacher supply cannot be solved by recruitment of new teachers alone. There is a need to invest in the development of the current workforce. This has to be a major factor in achieving and maintaining a sufficient supply of mathematics teachers. Professional development has a significant role to play in strengthening the subject expertise and knowledge of existing teachers. There is a need to create a map of formal professional development activities in order to establish what is available to whom, where, of what quality and for what cost.¹⁸

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¹⁴ <https://www.gov.uk/government/speeches/nicky-morgan-one-nation-education>.

¹⁵ <https://data.gov.uk/dataset/the-database-of-teacher-records>.

¹⁶ <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2014>.

¹⁷ <http://www.theguardian.com/education/2014/jan/15/ofsted-chief-teachers-quitting-scandal>.

¹⁸ <http://www.acme-uk.org/policy-advice/teacher-education-and-development/professional-development/professional-development-learning-journeys>.