

# Recruiting, developing, and retaining the mathematics teaching workforce in England: An MEI discussion paper

## Introduction

Mathematics education is more vital than ever, both for individual success in everyday life and work, and national economic success.<sup>1,2</sup>

We know from the Education Endowment Foundation that: ‘*the best available evidence indicates that great teaching is the most important lever schools have to improve outcomes for their pupils*’<sup>3</sup>. The quality of education outcomes for young people is highly dependent on the effectiveness of the teaching workforce, so it is vital that we find ways to improve the recruitment, development and retention of mathematics teachers in our schools and colleges at primary, secondary and post-16 level.

Notably, England has a chronic shortage of secondary school mathematics teachers<sup>4</sup> at a time when the need for young people to use mathematics and interpret data and statistics has never been more important. Furthermore, to meet the skills needs of employers and grow the economy, and to equip our young people with the knowledge and skills needed to play a full part in society, it is vital that we improve participation in post-16 mathematics education. This brings with it additional workforce challenges.

This paper aims to stimulate discussion to inform approaches for improving the recruitment, development and retention of mathematics teachers at all levels. It focuses predominantly on how to make mathematics teaching an attractive career, not only to address secondary mathematics teacher recruitment shortages, but also to improve teacher retention and career progression. The OECD has highlighted the importance of making teaching an attractive career to address teacher shortage.<sup>5</sup>

We have not attempted to cost any of the ideas in this paper. The intention is to encourage thinking that might lead to more detailed work, including costing, to further develop ideas which seem to have the most potential.

The paper has four main sections:

1. Recruiting people into mathematics teaching
2. Professional development for mathematics teaching
3. Career pathways for mathematics teachers
4. Strategic leadership of mathematics teaching

In each section we have included discussion prompts and requests for evidence. Although there is not a section specifically focused on retention, each section explores factors that we believe are important in supporting retention. Readers will have further questions and other ideas on useful evidence. Please let us know your thinking.

We have used the term ‘mathematics teacher’ to refer to all teachers who teach mathematics classes, encompassing secondary school and post-16 college teachers who mainly teach mathematics (specialist mathematics teachers), and those who teach mathematics alongside

other subjects (primary school teachers and ‘out of field’ secondary teachers, who teach some mathematics classes but whose main teaching role is in a different subject). Many other teachers make use of mathematics within their subject and so are ‘teachers of mathematics’<sup>6</sup>, but these teachers are not included in our definition of ‘mathematics teachers’.

MEI’s work and expertise focuses on mathematics education<sup>7</sup> and this paper refers specifically to mathematics teachers. However, the recruitment and retention of teachers is a problem for almost all subjects<sup>8,9</sup> and many of the points raised in this paper are likely to be relevant more widely.

## 1. Recruiting people into mathematics teaching

In this section, we consider routes and incentives for people considering becoming mathematics teachers. This includes those entering the teaching profession as mathematics teachers and those already established as teachers of other disciplines.

### 1.1 Primary school mathematics teachers

#### *The current picture*

Almost all primary school teachers teach mathematics. The recruitment targets for primary school teachers were missed only narrowly (96% met)<sup>4</sup> in 2023/24 and there is no significant shortfall. However, primary school teachers are not normally mathematics specialists and may not be confident with mathematics. This can lead to variable teaching quality and outcomes.

The latest Ofsted mathematics subject report<sup>10</sup> was generally positive about primary school mathematics teaching, stating that ‘Teachers often showed strong subject teaching knowledge in the classroom’. The report highlighted the effectiveness of ‘strong networks of support, such as from the Maths Hubs’. Such subject-specific professional development is crucial in addressing any lack of confidence with mathematics among those recruited as primary school teachers.

Some jurisdictions in the Far East that perform highly in international comparisons of mathematics education have primary mathematics specialist teachers who teach only mathematics. England has many small rural primary schools, which may make it impractical to deploy specialists effectively, but the role of primary mathematics specialist may represent an attractive route for some primary school teachers and could help strengthen mathematics education outcomes.

#### *What’s your view?*

- *Given the success of jurisdictions that use mathematics specialists to teach mathematics in primary schools, should we expand routes for people to enter primary school teaching as mathematics specialist teachers?*

#### *Is there practice and evidence we can learn from?*

- *Are there ways in which mathematics specialist teachers can be deployed successfully to support small primary schools?*

### 1.2 Secondary school mathematics teachers

#### *The current picture*

The severe shortage of secondary school mathematics teachers means that many KS3 pupils are taught mathematics by ‘out of field’ teachers (i.e. teachers not trained as mathematics

teachers). Disadvantaged students are most severely affected in this respect because schools in disadvantaged areas have greater difficulty recruiting and retaining mathematics teachers<sup>11</sup>.

There is a plethora of routes for appropriately qualified people to train to be a secondary school mathematics teacher, and government initiatives to encourage people to apply<sup>12</sup>.

Bursaries and scholarships are available for graduates in mathematics and mathematics-related subjects to enter secondary school mathematics teaching<sup>13</sup> and research suggests they are cost effective<sup>14</sup>. There is also a government funded programme for STEM undergraduates to undertake teaching internships, giving them the opportunity to experience teaching before committing to it as a career<sup>15</sup>. Ongoing shortages indicate that these initiatives are not solving the problem: despite the range of training routes and financial incentives, in 2023/24, only 63% of the secondary school mathematics teacher initial teacher training (ITT) recruitment target was achieved. Targets have been missed each year over many years and under-recruitment has got progressively worse.

Teaching is relatively poorly paid compared to other professions requiring similar qualifications, and pay gaps have been growing<sup>16</sup>. The gap between teacher salaries in the UK and those of similarly educated workers is among the highest in the OECD (6% for secondary school teaching)<sup>17</sup> and this is likely to be higher for secondary school mathematics teaching due to high demand from employers for people with strong mathematics skills<sup>18</sup>.

In April this year, the government announced a new financial incentive<sup>19</sup> of up to £6,000 for teachers of technical subjects, including mathematics and Labour proposes further incentives to attract expert teachers. It remains to be seen what impact this will have on the recruitment of secondary school mathematics teachers.

### 1.2.1 *Recruiting new secondary school mathematics teachers*

There are many factors contributing to the shortage of new recruits to secondary school mathematics teaching, including:

- High demand in the employment market for graduates in mathematics and mathematics-related subjects means that young people who are qualified to train to become secondary school mathematics teachers have many attractive employment options open to them, which pay more and/or offer better working conditions.
- Anecdotally, suitably qualified people who would like to teach mathematics can be deterred by concerns about working conditions, including workload, pupil behaviour, and lack of opportunity for flexible/home working. These issues are also cited as reasons why teachers choose to leave teaching,<sup>20,21,22</sup> although research suggests that the reasons students do not choose to become teachers are not always the same as those for leaving the profession: distinct policies are needed to make teaching attractive to new recruits and to retain existing teachers<sup>23</sup>.
- For many, the prospect of teaching mathematics in secondary schools seems daunting because they may not have knowledge about how enjoyable and rewarding the role can be.
- A relatively high proportion of graduates from low-tariff university mathematics degree programmes go into teaching compared to high-tariff programmes. Unfortunately, lower-tariff degree programmes are now attracting fewer students due to changes in HE funding policy, forcing some departments to close and so reducing the pool of interested suitably qualified graduates.<sup>24,25</sup>

An example of where the recruitment of new secondary school mathematics teachers has improved is Stoke-on-Trent, where suitably qualified young people with a local connection to Stoke, often attending university at Keele, have been attracted to become secondary mathematics teachers.

The Stoke Mathematics Excellence Partnership (MEP)<sup>26</sup> is a partnership of Stoke schools working collaboratively to improve mathematics education. It has played a key role in making secondary school mathematics teaching attractive to new recruits. The Stoke MEP enabled Keele University mathematics undergraduates to spend time in an internship, working in a secondary school mathematics department.

Before the MEP was launched in 2016, a local authority survey found that less than 50% of Stoke's secondary school mathematics teachers had trained as mathematics teachers. Working with local mathematics undergraduates, making them feel valued and nurtured in school, and offering ongoing, mathematics-specific professional development, has led to sustained improvement: by 2020 the proportion of secondary school mathematics teachers in Stoke who are mathematics trained had risen to 88%.

### 1.2.2 *Teacher Degree Apprenticeships*

Teacher Degree Apprenticeships,<sup>27</sup> due to start from autumn 2025, may provide attractive opportunities. Apprentices would have their university fees paid and would earn while they are training, providing a significant financial incentive. The Maths Hubs could play an important role in supporting in-school elements of Teacher Degree Apprenticeships for secondary school mathematics teachers. Apprentices might be drawn from people currently acting as teaching assistants, as well as from those new to teaching.

### 1.2.3 *Encouragement from university mathematics departments*

The London Mathematical Society's 'Teaching Mathematics as a Career (TeMaC)<sup>28</sup> initiative aims to support university mathematics departments to encourage their students to consider a career teaching mathematics to help address the lack of suitably qualified secondary mathematics teachers.

### 1.2.4 *Initial training of new secondary school mathematics teachers*

The Initial Teacher Training experience plays a key role in determining how well trainees are equipped for early career teaching and consequently whether they stay in the profession.

Time in the training institution is tight, therefore time allocated to exploring key mathematical concepts is limited. Many trainees do not have opportunities to develop their mathematical understanding as part of their ITT provision.

Whichever route is followed, trainees spend worthwhile periods in school(s) and have school-based mentors to guide them through their school-based experience. Partner schools and mentors play an important role in nurturing participants through their initial training.

Evidence from Maths Hubs suggests that not all school-based mentors are teachers of mathematics and consequently the mathematics aspects of training are not well developed in trainees. Maths Hubs currently play a minor role in working with ITT providers to focus the training and development of subject-specific mentors: this could be further developed.

### 1.2.5 *Training teachers of other subjects as teachers of secondary school mathematics*

Another source of secondary school mathematics teachers is those qualified to teach other subjects who opt to switch to mathematics for some or all of their time<sup>29</sup>. This might include primary school teachers who are confident in mathematics and who may be interested in

converting to secondary mathematics teaching as primary school pupil numbers fall significantly in the coming years<sup>30</sup>. As things stand, in many secondary schools in England, pupils are taught mathematics by teachers who have had no training in mathematics teaching<sup>31</sup>.

Australia similarly faces a shortage of secondary mathematics teachers<sup>32</sup> and universities there offer courses specifically designed to enable ‘out of field’ teachers to become mathematics teachers<sup>33</sup>.

Here, the NCETM has developed fully-funded training programmes<sup>34</sup> to enable secondary school teachers of other subjects to teach secondary mathematics more effectively. The programmes are highly regarded, but the level of teacher shortage across many subjects in secondary schools is such that some schools are reluctant to release teachers to take part in training. The recent Ofsted mathematics subject report recommended that secondary schools should ‘*make sure that non-specialist teachers receive the necessary professional development, including subject knowledge and subject specific pedagogical knowledge, to teach mathematics effectively.*’<sup>35</sup>

### 1.2.6 *Recruiting secondary school mathematics teachers from overseas*

The DfE has published advice to schools on how to recruit teachers from overseas<sup>36</sup>. Government figures suggest greater numbers of overseas secondary school mathematics teachers are being recruited, though overall numbers are still low.<sup>37</sup> It is important that such teachers receive the training and support they need to be effective and thrive in our system. This may not be guaranteed, depending on their route into teaching in England<sup>38</sup> and the support provided by their school. Recruiting secondary mathematics teachers from overseas may exacerbate shortages in their country of origin.

### 1.2.7 *The potential of digital resources to free up time*

Selecting and/or writing lesson resources and marking pupils’ work take up large amounts of mathematics teachers’ time. Digital materials, such as those available free of charge through Oak National Academy<sup>39</sup>, and mathematics learning management systems to support mathematics teaching, such as Sparx Learning<sup>40</sup> and Integral<sup>41</sup>, are already helping to reduce secondary mathematics teachers’ workload. Future developments in education technology could reduce teacher workload. This has the potential to help make mathematics teaching more attractive for new recruits, and may help retain existing mathematics teachers considering leaving teaching because of workload issues.

#### *What’s your view?*

- *What can be done to make secondary school mathematics teaching a more attractive career?*
- *How might we provide more opportunities for potential secondary mathematics teachers to experience how rewarding secondary school mathematics teaching can be?*
- *Should it be a requirement that school-based secondary mathematics teacher trainee mentors are themselves secondary mathematics teachers?*
- *How can secondary mathematics teachers trainees have more opportunities to explore key mathematical concepts as part of their ITT training?*
- *How should Teacher Degree Apprenticeships be shaped to provide an effective route into secondary mathematics teaching?*

- *How can we ensure teachers of other subjects are able to teach mathematics effectively – for example, should training programmes lead to formal mathematics teaching qualifications?*
- *How should secondary school mathematics teachers from overseas be supported to be effective and thrive in their role?*

*Is there practice and evidence we can learn from?*

- *Are there international examples of education systems where shortage of secondary mathematics teachers was successfully addressed and, if so, how?*
- *Are there examples of whole school behaviour systems that ensure that teachers can focus on developing their pupils' understanding, rather than spending excessive time and energy on behaviour management?*

### 1.3 Post-16 mathematics teachers

*The current picture*

The aspiration that all should study maths to age 18, to support national economic competitiveness and equip young people for success in work and life<sup>42</sup>, represents a major additional challenge.

The missed ITT targets cited in section 1.2, take no account of the recruitment situation in the Further Education sector, or the additional capacity required to enable all to study maths to age 18.

#### 1.3.1 FE Mathematics teacher recruitment

Arguably, the recruitment of new post-16 mathematics teachers in FE is even more problematic than for other sectors. FE teachers' pay is lower than that for school teachers and the pay gap is widening<sup>43,44</sup>. There is a growing teacher recruitment and retention crisis in FE<sup>45</sup>. A survey of FE mathematics teachers found that: *'It is likely that the mathematics teacher shortage in FE will increase unless there is a downturn in demand or significant interventions to boost recruitment'*<sup>46</sup>. The DfE does not include FE teachers in its workforce modelling<sup>47</sup>.

Condition of funding regulations<sup>48</sup> mean it is effectively compulsory for those students who have not achieved a Level 2 pass (i.e. grade 4 or higher) in GCSE Mathematics by age 16 (around 30% of the cohort<sup>49</sup>) to continue studying maths post-16. Colleges are struggling to recruit sufficient teachers to teach these students effectively.

#### 1.3.2 Initial training of new FE mathematics teachers

There is no mathematics-specific initial training route for FE mathematics teachers and over half of the FE workforce do not hold a subject-specific teaching qualification<sup>44</sup>. New DfE regulations, effective from academic year 2024/25<sup>50</sup>, require FE ITE qualifications to meet the 'learning and skills teacher occupational standard'<sup>51</sup>. These standards mention English and Maths but are general standards for FE teachers which do not incorporate subject teaching.

#### 1.3.3 Increased participation in Level 3 mathematics

A large proportion of those students who achieved Level 2 mathematics by age 16 do not choose to study AS or A level Mathematics. This amounts to roughly 300,000 students each year, around 100,000 of whom progress to quantitative courses at university<sup>52</sup>. If all 300,000

studied mathematics to age 18, around 2,000 more full-time equivalent mathematics teachers would be required.<sup>53</sup>

The mathematical needs of a high proportion of these students can be met through studying Core Maths. Entries to Core Maths have increased each year since its introduction<sup>54</sup>, and entries for AS and A Level Mathematics are also rising<sup>55</sup>. Recently announced funding to encourage schools and colleges to offer Core Maths qualifications<sup>56</sup> represents an important step in raising participation, but it would take time to recruit and train additional Level 3 mathematics teachers needed for a high growth in student numbers<sup>57</sup>.

#### 1.3.4 *Training teachers of other subjects as Core Maths teachers*

Core Maths is generally taught by specialist mathematics teachers, but MEI's Advanced Mathematics Support Programme (AMSP) has worked with the Association for Science Education (ASE), the Association for the Teaching of Psychology (ATP) and the Royal Geographical Society (RGS) to promote Core Maths to teachers of A level Biology, Psychology and Geography and help them teach the mathematical elements of their specialist subjects.

There is potential for teachers of these and other quantitative subjects to contribute to Core Maths teaching. This would be a positive development as it highlights, for both students and teachers, how the application of mathematics and statistics pervades curriculum disciplines and improves the teaching of the mathematical aspects of other subjects. Cardinal Newman college in Preston has pioneered this approach to Core Maths teaching.<sup>58</sup>

#### 1.3.5 *The use of online teaching of Core Maths*

The AMSP has investigated online teaching of Core Maths. The model of provision piloted did not prove effective for all students, and it may be that the best mix is a blend of online learning and live teaching, which could reduce teacher contact time for Core Maths. Further work is needed to understand how this might work.

##### *What's your view?*

- *Should pay and working conditions for mathematics teachers in Further Education be aligned with those of secondary school mathematics teachers?*
- *Should there be a subject-specific initial training programme for FE mathematics teachers?*
- *Should there be a mathematics-specific programme for 'out of field' FE teachers to equip them to teach mathematics at Levels 1 and 2?*
- *Could new teachers be recruited and trained as Core Maths specialists to help to address the shortage?*
- *Is providing training to teachers of other subjects, to enable them to become Core Maths teachers as well, a useful way forward?*
- *Should Core Maths form part of the initial training of teachers of other subjects that make use of mathematics and statistics? (This might reinforce the importance of mathematics and statistics in those subjects and enhance the teaching of those subjects<sup>59</sup>)*
- *What role can online and blended delivery play in addressing the shortage of post-16 mathematics teachers?*

##### *Is there practice and evidence we can learn from?*

- *Are there international examples where post-16 mathematics provision has expanded that we might learn from?*
- *Are there international examples of programmes to train 'out of field' FE teachers to teach mathematics?*

## 2. Professional development of mathematics teachers

In this section, we consider support for the professional development of mathematics teachers at all stages of their careers. International research has suggested that: ‘*Continuing professional development (CPD) and early career support could be promising approaches for retaining teachers in the profession*’<sup>60</sup>, but more evidence is required in this area.

Successive governments have recognised the importance of teacher professional development. For example, the ‘Delivering world-class teacher development’ policy paper<sup>61</sup> states that: ‘*Teachers are the foundation of the education system – there are no great schools without great teachers. The quality of teaching is the single most important in-school factor for improving pupil outcomes – and it is particularly important for pupils from disadvantaged backgrounds*’ and refers to ‘*a ‘golden thread’ of high-quality evidence underpinning the support, training and development available through the entirety of a teacher’s career.*’

Subject-specific expertise is crucial to being a successful mathematics teacher and should be continuously developed throughout a mathematics teacher’s career. High-quality, fully-funded, subject-specific professional development is available for mathematics teachers through the AMSP, the NCETM and Maths Hubs, but there is no entitlement of time for mathematics teachers to undertake this, and, other than for primary mathematics, there is no nationally accredited subject-specific professional development.

### 2.1 Early career support

#### *The current picture*

The retention rate for early career teachers is low – less than two thirds continue beyond five years<sup>62</sup>. Starting as a new teacher is demanding and requires strong commitment. The analogy of ‘being thrown in at the deep end’ is often used to describe what new teachers experience during their first teaching position.

#### 2.1.1 *The Early Career Framework and subject-specific support*

Teachers who are engaged with their role are less likely to leave teaching,<sup>63</sup> and nurturing mathematics teachers to develop their passion and expertise for mathematics teaching early in their career is paramount to engagement with their role. The introduction of the Early Career Framework (ECF)<sup>64</sup> is intended to support new teachers through this challenging period. Regrettably, however, the ECF does not emphasise subject-specific support.

Evidence from work undertaken by Maths Hubs suggests that early career secondary mathematics teachers benefit greatly from expert, subject-specific support, which helps to cement their identity as mathematics teachers, provides mutual support and generates enthusiasm for teaching. The generic demands of the ECF mean early career teachers often have insufficient capacity to engage with separate, subject-specific support/mentoring in addition to meeting the ECF’s requirements.

There is no early career support programme for FE mathematics teachers.

#### *What’s your view?*

- *How do we ensure early career mathematics teachers can access subject-specific support to become effective mathematics teachers?*
- *Should there be an early career programme for FE mathematics teachers?*



- *Is there a role for specialist provision such as ‘training schools’ that specialise in developing early career mathematics teachers, along similar lines to how teaching hospitals develop early career medical professionals?*

*Is there practice and evidence we can learn from?*

- *Are there any examples of schools or multi-academy trusts<sup>65</sup> that are successful in providing a mathematics-specific experience to nurture early career mathematics teachers?*
- *What evidence is there on the importance of early career support in improving retention?*
- *How are early career mathematics teachers nurtured and developed in internationally high-performing jurisdictions?*

## 2.2 Professional development – ongoing

*The current picture*

Mathematics is fortunate in that high-quality, subject-specific professional development is widely available, free of charge, throughout England through the NCETM/Maths Hubs Programme and the AMSP. These are well-established government-funded programmes.

The NCETM and the Maths Hubs are establishing a collaborative culture of professional development for ongoing improvement in mathematics teaching informed by education research and practice in successful jurisdictions internationally<sup>66</sup>. This has enabled school mathematics teachers at all levels to work together, within and between schools, to develop effective teaching practice.

Recent research on the mathematics teaching workforce in Further Education colleges suggests that: ‘...there is considerable potential to enhance professional learning for mathematics teachers in FE through a communities of practice approach and that such a strategy for professional development is a key component of a self-improving further education system.’<sup>67</sup> The NCETM has recently expanded its work to include the teaching of GCSE Mathematics resit and Functional Skills Mathematics in FE, and is actively promoting and developing collaborative approaches to the professional development of FE mathematics teachers<sup>68</sup>.

The AMSP provides expert subject professional development to support teachers to develop the subject and pedagogical knowledge they need to teach Level 3 mathematics effectively (AS/A level Mathematics, AS/A level Further Mathematics and Core Maths).

The AMSP, the NCETM and the Maths Hubs work together to ensure a coherent offer of professional development for mathematics teachers, from early years to age 18. They are also increasingly working with multi-academy trusts (MATs)<sup>69</sup> to develop a coherent offer of mathematics-specific professional development across MAT schools.

Professional development provided through the AMSP, the NCETM and the Maths Hubs is highly regarded by mathematics teachers and reinforces their engagement with their role. However:

- The reach and impact of these programmes is limited by the shortage of secondary and post-16 mathematics teachers and the challenging circumstances in schools and colleges.
- School leaders tend to prioritise general learning over subject-specific training and coaching.<sup>70</sup>

Teachers miss out on important professional development opportunities as they are unable to be released to take part, which could contribute to dissatisfaction amongst teachers.

### 2.2.1 Entitlement and responsibility

Undertaking career-long professional development is a requirement of many professions and a feature of teaching in jurisdictions that perform highly in international comparisons of mathematics education. Teachers in England have no ongoing entitlement to professional development, while those in Singapore are entitled to 100 hours of professional development per year<sup>71, 72</sup>. It is crucial for mathematics teachers to have a career-long entitlement to mathematics-specific professional development<sup>73</sup>. By continuously enhancing their specialist skills and knowledge, mathematics teachers can engage students more effectively to develop a deeper understanding and enjoyment of mathematics.

There is also a professional responsibility for mathematics teachers to continue to develop their own specialist knowledge for the teaching of mathematics throughout their career. Although there are government defined ‘Teachers’ Standards’<sup>74</sup>, these are not subject-specific. The recently published Initial Teacher Training and Early Career Framework<sup>75</sup> provides a joint framework for the first time, but lacks any detailed subject specificity. There is no coherent, subject-specific framework for experienced mathematics teachers to structure their own individual learning.

#### *What’s your view?*

- *Should mathematics teachers have an entitlement to ringfenced time to engage with accredited subject-specific professional development? If so, how much time should be ringfenced?*
- *Should mathematics teachers be required to undertake a specified minimum amount of recognised, high-quality, subject-specific professional development each year?*
- *Should we develop a subject-specific national framework setting out the specialist knowledge needed to teach mathematics? Perhaps separate frameworks for different Key Stages/qualifications?*

#### *Is there practice and evidence we can learn from?*

- *Is there evidence of the importance of access to support for continuing professional development in mathematics teacher recruitment and retention?*
- *Are there examples of MATs that provide ringfenced time for professional development and, if so, how has this affected mathematics teacher recruitment and retention?*
- *What international evidence is there of teachers receiving protected time for professional development and how is it used?*
- *Are there international examples of a mathematics professional learning framework that addresses the career-long, ongoing development of specialist knowledge for teaching mathematics in a coherent way?*

## 2.3 School or college culture and leadership

### *The current picture*

Ofsted’s ‘Education Inspection Framework’<sup>76</sup> for schools, and ‘Further education and skills inspection handbook’<sup>77</sup> for FE colleges both mention the importance of subject-specific professional development and there is an expectation that school and college leaders ensure that teachers’ subject knowledge is continually developed. School and college cultures and

practices play a vital role in supporting and developing mathematics teachers. A positive culture, that values collaboration and continuous improvement, fosters an environment where mathematics teachers are empowered to develop as specialist teachers of their subject. This supports improved pupil learning and greater job satisfaction and retention for teachers.

The recent Ofsted Mathematics report<sup>8</sup> reported there has been a shift in secondary school mathematics departments towards more collaborative working that focuses on the teaching of mathematics, but this is still not a universal experience for teachers, and not all subject leaders are equipped to establish and sustain effective collaborative cultures. Research on mathematics teaching in FE colleges highlights that ‘Colleges benefit from mathematics being an institutional priority, with well-defined sharing of responsibility and good collaboration between those with leadership responsibilities for mathematics at different levels’<sup>78</sup> There is still insufficient shared understanding in schools and colleges of how leaders can foster collaborative professionalism.<sup>79</sup>

*What’s your view?*

- *What support is required for school and college leaders and mathematics subject leaders to establish and sustain strong professional learning cultures for mathematics teachers?*

*Is there practice and evidence we can learn from?*

- *Are there examples of schools, colleges or MATs that actively encourage their teachers to undertake mathematics-specific professional development? If so, how do they achieve this and is there evidence of impact?*
- *Is there evidence of schools, colleges, or MATs that enable and expect teachers to spend time working collaboratively to support subject-specific development?*
- *What evidence is there regarding the importance of a school, college or MAT working culture in supporting teacher retention?*

### **3. Career pathways for mathematics teachers**

In this section, we consider what role opportunities and career pathways are available to mathematics teachers and how they could be developed and strengthened.

Clear career progression pathways for expert mathematics teachers have potential to improve both recruitment and retention.

#### **3.1 Career pathways and role opportunities**

*The current picture*

The Head of Maths role in secondary schools is a vital middle management role, but there is no nationally accredited, subject-specific training for the role. There is a generic National Professional Qualification (NPQ) in Leading Teaching<sup>80</sup>, but no specific framework for leading mathematics teaching. At primary school level there is a subject-specific NPQ in Leading Primary Mathematics<sup>81</sup>, developed with the NCETM. It would seem sensible to also have a subject-specific NPQ for secondary Heads of Maths, and for Heads of Maths in FE colleges.

Current career progression routes into leadership in education in England tend to be whole school, rather than subject-specific, leading ambitious expert mathematics teachers away from their crucial role as mathematics educators into more general management/leadership roles where their highly important mathematics teaching skills are not used.

In England the previous ‘Advanced Skills Teacher’ (AST) role was designed to address this issue, and, prior to withdrawal of the national programme in 2023, the ‘Specialist Leader of Education’<sup>82</sup> (SLE) role included subject specialists. AST designation provided status and higher salaries for expert subject teachers who supported the development of other subject specialists, both in their own school and in other schools. As the AST Guidance said: *‘We need to recognise and retain the best teachers. Until the introduction of ASTs, promotion into management was the typical career route for most excellent teachers. The AST pathway offers teachers who want to stay in the classroom an alternative career route with the potential to earn a salary equivalent to that of many leadership posts.’*<sup>83</sup> The AST role was recognised as being effective but was discontinued when funding was withdrawn in 2013<sup>84</sup>. Singapore and Shanghai, jurisdictions that consistently top the international tables for mathematics education, have well-developed ‘career ladder’ progression tracks for subject specialists<sup>85,86</sup>.

People with the potential to be effective mathematics teachers have many other career options available to them. The recruitment and retention of high-quality mathematics teachers in England could be enhanced if our education system provided a clear structure of attractive, appropriately rewarded mathematics-focused career opportunities and pathways.

Mathematics-focused career opportunities already exist:

- Leadership roles within schools and MATs and professional development leadership roles.
- System leadership roles through the NCETM, the Maths Hubs and the AMSP.

However, there is no clear pathway, recognition, or consistent remuneration scale for people fulfilling these different mathematics education leadership roles.

Recent years have seen the emergence of leaders of mathematics for MATs, as the MAT system has become established. These MAT mathematics leaders coordinate the work of other mathematics subject leaders within primary and secondary schools. Subject leadership within schools and MATs is recognised internally and rewarded through additional remuneration, but there is no national structure or pay-scale.

With the increasing role of school-based ITT and the development of the Early Career Framework, there is a growing need for ITT and ECF mentors, with mathematics teaching expertise, who can support the early professional development of mathematics teachers. This professional development work is often bolted on to busy teachers’ work schedules, with no framework for mentor development or time allocation. Alongside these roles there is an increasing number of teachers who are paid as Leading Practitioners<sup>87</sup>, whose primary purpose is modelling and leading improvement of teaching skills within their own institution. When given appropriate time to carry out these professional development leadership roles, teachers often report enjoying the role and find it supports their own ongoing professional growth.

The establishment of the Maths Hubs Network has seen high levels of growth in the number of people fulfilling mathematics system leadership roles, in particular:

- Maths Hubs’ Local Leaders of Mathematics Education (LLME) working across schools in their area and with expertise in leading pedagogy, professional development, and school development in mathematics;
- Maths Hub Leads and Assistant Maths Hub Leads providing regional and national mathematics system leadership.

Between 1,500 and 2,000 people fulfil these kinds of roles in the Maths Hubs Network for part or all of their time. Though employers receives funding, there is no consistent remuneration structure for taking on these significant leadership roles. Teachers in these roles find the work fulfilling and these roles are increasingly seen as a desired career progression.

*What's your view?*

- *Should all primary schools have a mathematics lead teacher with an NPQ in Leading Primary Mathematics?*
- *Should there be subject-specific NPQs in Leading Secondary Mathematics and Leading Mathematics in FE?*
- *How might we establish clear career pathways and remuneration for mathematics teaching leadership roles?*
- *Should we re-establish a model similar to the AST, that enables mathematics leaders to have dedicated time (for example, one day/week) fulfilling professional development or system leadership roles, while continuing as expert classroom practitioners?*
- *Would clear career pathways for mathematics teachers improve recruitment and retention?*

*Is there practice and evidence we can learn from?*

- *Could we emulate Singapore's career ladder teaching track<sup>88</sup> for our mathematics teachers?*
- *What evidence is there regarding the relationship between increased opportunity for career progression pathways and mathematics teacher retention?*

### **3.2 Professional recognition**

*The current picture*

Teachers of mathematics can achieve professional chartered status through the Institute of Mathematics and its Applications (IMA)<sup>89</sup>, but this currently has low uptake.

Gaining professional recognition as an expert specialist mathematics teacher signifies a high level of expertise and competence in mathematics teaching. This recognition can both enhance a mathematics teacher's credibility within their community of practice and validate their commitment to excellence in teaching mathematics. Furthermore, achieving professional recognition of their expertise can boost a mathematics teacher's confidence and motivation, reinforcing their commitment to mathematics teaching and continued professional growth.

*What's your view?*

- *Would the opportunity to achieve professional recognition improve mathematics teacher recruitment and retention?*
- *What challenges and barriers do teachers face in gaining professional recognition, such as Chartered Mathematics designation, and how might these be addressed?*
- *Should Chartered Mathematics Teacher status be recognised through enhanced remuneration, as it is for other chartered professionals?*
- *Should there be formal professional recognition of mathematics subject leadership roles such as the Maths Hubs Local Leaders of Maths Education (LLME)?*

*Is there practice we can learn from?*

- *Is there evidence that formal professional recognition increases recruitment and retention of mathematics teachers?*

- *Are there examples of schools, colleges or MATs that actively promote and encourage their staff to achieve Chartered Status?*

## 4. Strategic Leadership of mathematics teaching

In this final section, we consider the system support structures that are needed to enable both professional development and career progression for mathematics teachers, and we focus on two key facets of the system.

### 4.1 Multi-Academy Trusts (MATs)

*The current picture*

There is a significant shift taking place in England’s school system towards it being the norm for schools to be part of a MAT<sup>90</sup>. The full implications of this shift are still to be worked through, however, there are important new possibilities for supporting capacity for the areas discussed within this paper. MATs are increasingly developing their own teachers and mathematics leaders with responsibility for mathematics leadership across the schools in the trust. MATs are gradually increasing in size<sup>91</sup>. When MATs reach an effective size, it allows for greater potential for supporting development in new and sustainable ways.

As suggested in section 2.1, some schools could be designated as ‘training schools’ for the professional development of mathematics teachers, both for ITT and also during early career development. Suitably sized MATs could work towards having a ‘training school’ within their group of schools. Also, within the overall workforce at a MAT level, it becomes possible to offer the various different mathematics leadership roles described in section 3.1.

*What’s your view?*

- *How might MATs offer structured career development routes for mathematics teachers?*
- *Would it be useful for early-career mathematics teachers to start their careers in a ‘training school’ which nurtures their development as expert mathematics teachers?*

*Is there practice we can learn from?*

- *What evidence already exists regarding MATs offering more structured career routes for mathematics teachers and leaders?*

### 4.2 National mathematics education leadership

*The current picture*

National mathematics leadership is provided by a combination of centrally funded bodies and independent expert bodies.

#### 4.2.1 Centrally funded bodies

A well-established national support structure for mathematics education already exists in England, with the potential to provide ongoing, high-quality support for all mathematics teachers. This national structure includes government-funded programmes:

- The National Centre for Excellence in the Teaching of Mathematics (NCETM) (est. 2006)<sup>92</sup>
- The Advanced Mathematics Support Programme (AMSP)<sup>93</sup> (est. 2018, building upon the work of predecessor programmes between 2005 and 2018, the Further Mathematics Network, Further Mathematics Support Programme and the Core Maths Support Programme)
- The national Maths Hubs Network (est. 2014)<sup>94</sup>

These are each funded separately through relatively short-term (typically 3-year), Department for Education contracts and grants. The NCETM coordinates the work of the Maths Hubs and all three programmes cooperate closely to ensure they operate coherently.

*What's your view?*

- *Should the NCETM and AMSP be replaced by a single programme or centre – a 'National Mathematics Centre' – with responsibility for leading coherent support for mathematics education (4-19) and co-ordinating the Maths Hubs Network and local support?*
- *Should a long-term, stable funding approach for such a centre and the Maths Hubs be established, to ensure long-term capacity to develop and maintain high-quality mathematics teaching?*

*Is there practice we can learn from?*

- *Are there international examples of effective central organisation of mathematics education leadership?*

#### 4.2.2 Independent expert bodies

Alongside the government-funded support structure, further support is provided by other national expert bodies, including:

- The Royal Society's Advisory Committee for Mathematics Education (ACME)<sup>95</sup>; the London Mathematical Society (LMS)<sup>96</sup>; the Institute for Mathematics and its Applications (IMA)<sup>97</sup>; the Joint Mathematical Council (JMC)<sup>98</sup>; the Academy for the Mathematical Sciences<sup>99</sup>
- The five mathematics teaching associations (the Association of Mathematics Education Teachers (AMET)<sup>100</sup>, the Association of Teachers of Mathematics (ATM)<sup>101</sup>, the Mathematical Association (MA)<sup>102</sup>, the National Association of Mathematics Advisers (NAMA)<sup>103</sup> and the National Association of Numeracy and Mathematics in Colleges (NANAMIC)<sup>104</sup>
- Mathematics in Education and Industry (MEI)<sup>105</sup>, National Numeracy<sup>106</sup> and NRich<sup>107</sup>

These independent bodies contribute their expertise to inform improvements in mathematics curriculum and pedagogy. Membership of subject associations supports mathematics teachers to feel part of a community of committed mathematics education professionals, helping to develop and reinforce their identity as expert mathematics educators.<sup>108</sup>

*What's your view?*

- *How can subject bodies help strengthen the professional recognition of teachers of mathematics?*
- *How can subject bodies and the mathematics teacher associations offer support for individual teachers' development that complements the government-funded support structure?*

*Is there practice we can learn from?*

- *What international evidence is there of effective models of national support structures for mathematics education and mathematics teacher development?*
- *Does membership of a mathematics subject association improve mathematics teacher retention?*

## Conclusion

The severe shortage of secondary and post-16 mathematics teachers is a confounding barrier to improving secondary school mathematics education and expanding participation in mathematics education post-16.

Good mathematics teachers are the key to improving mathematics education in England and we need many more of them.

MEI believes that improving professional development and career progression opportunities for mathematics teachers are crucial to making mathematics teaching a more attractive career, and vital to supporting mathematics teacher retention<sup>109</sup>.

There is good news: the work of the AMSP and the NCETM demonstrates that it is possible to provide high-quality professional development for mathematics teachers throughout England, and ongoing developments in the Maths Hubs and Multi-Academy Trusts (MATs) demonstrate how we could develop a rewarding and motivating career progression structure for expert mathematics teachers.

We hope the ideas and questions in this paper will generate discussion and stimulate thinking on how we can develop the national mathematics teacher workforce our young people need to support national and individual success.



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