



Primary mathematics specialism

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Introduction

Primary mathematics specialism is intended to provide a route for trainee primary teachers who have a specific interest in mathematics, and are interested in developing this in their training. Following a mathematics specialism path should lead to primary generalist teachers who have begun to develop a specialism in primary mathematics and have a desire to continue the development as their career progresses. With continued professional development this might lead to subject leadership and/or specialist teaching of mathematics within a primary setting. Evidence from high performing countries suggests that specialist mathematics teachers at primary level are a key element to increased attainment in mathematics. The introduction of a specialism route provides a stepping stone towards increased specialist teaching of mathematics at primary level in the future.

Entry requirements

What additional entrance requirement would be expected of those on the primary mathematics specialism route? What level of subject knowledge in mathematics?

For PGCE, many providers suggest a minimum grade B at GCSE and evidence of further study, for example, an A level in mathematics or some mathematics at degree level for such a specialism.

For undergraduate routes, many providers look for a minimum grade B at GCSE and evidence of some mathematics study beyond this level. Interest in following a specialism can be identified at the end of year 1 with years 2 and 3 providing opportunities to develop this.

Trainees will have a particular interest in how children develop their understanding of mathematics and in becoming a mathematics lead, and/or specialist mathematics teacher in a primary school later in their careers.

Applicants should provide evidence of the following:

- have a good understanding of mathematics at GCSE level with an appreciation of mathematics as being about pattern, structure and relationships;
- a propensity to look for and make connections in mathematics;
- a genuine interest and enthusiasm for the subject; and
- positive beliefs and attitudes towards mathematics teaching and learning and a willingness to question and reflect throughout their training.

Course content

What content (subject knowledge and pedagogy) should trainees on the primary mathematics specialism follow?

In order to teach primary mathematics, all trainees need good content knowledge and subject specific pedagogy. This knowledge needs to include an understanding of the 'big ideas' in mathematics such as:

- equivalence and non equivalence;
- place value;
- unitising and correspondence;
- variance and invariance;
- additive and multiplicative relationships;
- proportional reasoning;
- generality;
- congruence and similarity;
- data handling and interpretation; and
- an understanding of connections both within mathematics and between mathematics and other subjects.

Trainees should understand the importance of:

- both procedural and conceptual knowledge;
- the relationships between them; and
- the need for both procedural fluency and deep understanding which is underpinned by both intelligent¹ practice and problem solving.

Such approaches of both confidence and competence underpin the notion of a 'mastery' curriculum. For those developing a mathematics specialism, this knowledge and understanding will be more developed than for those without a mathematics specialism. These trainees will evidence this increased expertise through deep insight on the learning and teaching of mathematics at primary level and informed critiquing of research and innovation. The emphasis should be on establishing a depth of understanding, rather than additional content knowledge, and on expanding on the understanding of non-specialism teachers in order to lay the foundations for developing specialism in their teaching careers.

Primary mathematics specialism also involves developing:

- an understanding of the affective domain;
- understanding how to develop positive attitudes to mathematics;
- high expectations of all pupils; and
- resilience and confidence.

¹ Intelligent practice is that which is based on variation theory where practice integrates the opportunity for both the development of procedural fluency and the deepening of conceptual understanding. Ference, GU Lingyuan HUANG Rongjin MARTON (2004). "Teaching with variation: A Chinese way of promoting effective mathematics learning." *How Chinese learn mathematics: Perspectives from insiders* p. 309.

All primary teachers need an understanding of the sequencing of topics, misconceptions and learning difficulties but those with a specialism will have developed this further. They will also understand how to scaffold learning for pupils requiring support and intervention and how to provide enrichment and rich learning opportunities for all pupils.

Teaching mathematics requires an understanding of the different models of mathematical concepts, such as those embedded within division and fractions, and the skills to select from a range of representations of mathematics that express and provide pupils with access to the underlying structure of mathematics. Good primary mathematics teaching involves understanding the role of specific teaching resources and tools, including the use of high quality textbooks, to support the development of mathematical concepts. Trainees will also be developing an understanding that inclusion is often achieved through high quality teaching, and resources that enable pupils to access and understand mathematical concepts. Those with a mathematics specialism will be interested in extending their understanding to a greater range of topics than non-specialism teachers.

Trainee experiences

**What experiences should these trainees have in school during their training?
How will this be distinct from what is experienced by generalist primary trainees?**

Trainees developing a specialism in primary mathematics need to be placed in schools with excellent reputations for their work in mathematics and with a school mentor who has developed expertise in the teaching of primary mathematics. Trainees need to have a specialist mathematics tutor from their training provider, who is involved in all aspects of assessment of a trainee's progress. Much of the learning in developing a specialism can be undertaken through the adaptation of the generic course tasks, such as assignments and engagement with current research and literature, to give these a mathematics focus. Trainees must be observed teaching mathematics with mathematics-specific feedback, and should undertake additional tasks such as:

- supporting the subject leader in school with parent workshops;
- observing mathematics teaching across EYFS to year 6;
- visiting a secondary school to observe lessons and work with learners in Key Stage 3;
- producing a reflective log; and
- developing a portfolio in order to start developing the breadth and depth of understanding necessary for mathematics specialism.

Expectations after the course

What would you expect of such trainees by the end of their training?

Trainees following such a specialism are highly employable. Providers should develop an assessment model for the award of specialism, which could include the

completion of a portfolio (containing the work suggested in the previous section) and a requirement for completing the overall PGCE course at a high standard. They should be able to demonstrate a confidence/interest/enhanced level of awareness in their knowledge and understanding of the teaching and learning of mathematics. After their school-based training, trainees should have a picture of mathematics beyond their own classroom, an understanding of the role of the subject leader and of the whole primary school curriculum map for mathematics. Such trainees should complete their ITT with a clear pathway outlined as part of their NQT plan which will enable them to continue to build their specialism with the aim of becoming a subject leader and or specialist primary mathematics teacher in time and contributing to the development of mathematics in their setting.

Organisational issues

What organisational issues are there? How can these be overcome?

For PGCE courses, in particular, time is very limited so care needs to be taken in order not to over-burden trainees and not to 'double up' on tasks. This could be achieved by adapting some of those tasks set to the whole cohort to have a mathematics focus so, for example, where trainees are expected to write case studies of pupils, one of those case studies is of a child with identified mathematical difficulties.

There are at least three possibilities for developing specialism:

- developing a mathematics focus through tailoring the overall programme;
- providing additional teaching in an 'options block' where trainees choose to enhance their mathematics pedagogy in preference to following another interest; and
- utilising opportunities to offer specific input in place of the usual mathematics programme.

On some PGCE courses, all trainees specialise and the mathematics specialism option can be provided within this.

Cohorts on undergraduate courses are often large enough to offer options in years 2 and 3 where prospective mathematics specialism trainees will have opportunities to develop both their subject knowledge and pedagogy. Such modules may also be offered more widely across universities to undergraduates on other degree courses and are best delivered either by specialist mathematics tutors in education departments or by mathematics lecturers who have a good understanding of teaching and learning in primary schools.

Funding

The National College for Teaching and Leadership (NCTL) allocates and funds teacher training places.

They provide financial incentives, such as training bursaries and scholarships, to help schools and initial teacher training providers attract high-quality graduates to the teaching profession. They do this in line with the needs of the sector and national targets set by the Department for Education.

The bursaries in the table below are available to trainee teachers undertaking the primary maths specialism course.

Eligibility ¹ 2015 to 2016	Trainee with 1st/PhD	2:1/Master's	2:2	Other²
Primary maths ³	£12,000	£12,000	£12,000	£9,000

Notes:

¹ Applicants with a degree from outside the UK should refer to the [equivalency table](#) to see if their degree is likely to attract a bursary, or should consult their chosen training provider.

² Trainee teachers in maths and physics, and on primary maths courses, with a relevant degree and at least a B at A level in maths or physics (or equivalent) will be eligible for a bursary of £9,000. Trainees will not be entitled to this bursary if they are also entitled to a higher bursary based on degree class.

³ Bursaries are available to trainees on primary maths specialism and primary maths specialist courses. Trainees on other primary courses will be eligible for the standard primary bursary.

School Direct salaried route

NCTL also provide training and salary grants to School Direct lead schools to cover training costs for salaried trainees to achieve qualified teacher status (QTS) and subsidise salary costs. Amounts vary on a regional basis. [Find out which areas are covered by the definitions for inner London, outer London and London fringe.](#)

The funding in the table below only applies to trainees with at least a B at maths A Level and who are on primary maths specialism courses.

Funding per place (by region)	Amount
National	£19,000
Inner London	£23,900
Outer London	£22,600
London fringe	£20,200

For further information regarding School Direct funding, please read the [School Direct: funding manual - academic year 2015 to 2016](#).

For further information on ITT funding for 2015-16, please read the [2015-16 funding manual](#) available on [the governments' website](#).