

The mathematical needs of teachers: roundtable discussion, 6 November 2014

This note summarises the main points raised during a recent discussion on professional development and the mathematical needs of teachers. In the note below, this is simply referred to as the ‘mathematical needs.’

Key points discussed and set out in the note below include:

- the benefits of a framework for teacher professional development
- the importance of communicating the mathematical needs of teachers to senior leaders and decision makers
- the need for expectation of career long teacher professional development for teachers and appropriate support for it.

1. Background

In November 2013 ACME published a report on the professional development of teachers of mathematics ‘[Empowering teachers: success for learners](#)’.¹

In the report ACME:

- set out its [vision for professional development](#), which included that all students are taught by well-qualified teachers of mathematics who are themselves professional learners
- made recommendations for policy to achieve ACME’s vision
- made a recommendation for an analysis of the mathematical needs of teachers (recommendation 2).

ACME argued that there is a need for good guidance on the ‘mathematical needs’ as teachers progress from novice to expert. In addition ACME made a start at identifying what the mathematical needs of teachers might include (see box below).

Mathematical needs of teachers

The mathematical needs of teachers will vary from individual to individual and will typically include:

- developing subject knowledge
- increasing pedagogical content knowledge
- becoming fluent with, and understanding the application of, key tools that can support the learning of mathematics such as digital technologies
- understanding the implications of relevant policy changes for classroom practice
- developing reflective practice
- becoming fluent in engaging with research and understanding its implications for classroom practice.

Extract from ACME (2013). [Empowering teachers: success for learners](#), page 8.

To discuss taking forward recommendation 2 and to consider more thoroughly what mathematical needs of teachers are, ACME convened a round table, bringing together stakeholders from the mathematics education community with expertise on professional development for teachers of mathematics.

¹ ACME (2013). *Empowering teachers: success for learners*, <http://www.acme-uk.org/media/19381/etsffullreport2014.pdf>.

2. The round table

The round table was co-chaired by ACME Chair, Professor Stephen Sparks, and ACME member, Jennie Pennant. It brought together a range of stakeholders from the mathematics education community, including senior leaders, representatives from Teaching School Alliances and Maths Hubs, teacher education providers, professional development providers and facilitators and organisations involved in education policy.

As discussed in the ACME report:

- there are no widely known examples of mathematics-specific professional development pathways for teachers across their career
- there is a need for good guidance on the mathematical needs of teachers as they progress from novice to expert.

The purpose of the meeting was to discuss the next steps to realise the recommendation made by ACME for an analysis of the mathematical needs of teachers. Participants were invited to discuss the 'mathematical needs' and the implications of articulating such needs on the professional development landscape. The implications for a range of stakeholders were considered, including how it would impact teachers, senior leaders and professional development providers.

3. What do the mathematical needs of teachers look like?

What are the mathematical needs of teachers?

A summary of discussions is set out below.

1. **The 'mathematical needs' might vary across phases of education (primary, secondary and post-16) and throughout a teacher's career;** however common needs were identified across all phases.
2. **Developing reflective practice** was identified as a key vehicle to support teachers at all stages of their professional learning journey.
3. The **key 'mathematical needs'** identified by some of the participants were:
 - developing **conceptual understanding**
 - developing **mathematical flexibility**
 - the ability to make **connections through the mathematics** they are teaching.

This provides a starting point and overlaps with some of the first thoughts identified in the ACME report (see box on page 1). Further thinking is required to develop a comprehensive and detailed understanding of the mathematical needs of teachers.

4. Teachers need to be able to **identify the limit of their personal subject knowledge as they move through their career** in order to know what they need to develop.

Much debate centered on the needs of teachers in general and the importance of clearly communicating these needs to head teachers and senior leaders, as opposed to significantly different needs being identified across the novice to expert landscape.

What would a document of the 'mathematical needs' look like?

Contributors identified potential formats for a 'mathematical needs' document. One suggestion was a matrix showing the different forms of knowledge a teacher should have at different career stages on one axis with the required support for each form of knowledge on the other.

Participants then discussed a **broad framework or principles document** of the 'mathematical needs'. Teachers and schools could build upon such a framework to tailor professional development to their individual needs.

The underlying documentation that would be required to **support a framework document** was discussed. Participants noted the benefit of case studies, digital technologies and Massive Open Online Courses (MOOCs).

The participants discussed whether a framework could be developed through teachers and schools as a 'grass roots' initiative or whether it was best developed through an initiative from government. The benefit of an initiative from government is that it would help ensure geographical and school-type equity. The development of a 'grass roots' initiative would have the benefit of 'buy-in' from teachers from the onset.

4. The importance of documenting the 'mathematical needs'

Why is an analysis of the 'mathematical needs' required?	Benefits: The round table discussed the benefits of identifying and articulating the 'mathematical needs', noting that it would be difficult for the needs of teachers to be addressed if there is no consistent understanding of what these are. Benefits included aiding teachers in understanding their own professional learning experience and ensuring professional development is embedded throughout a teacher's career.
When is it needed?	Urgency: The proliferation of actors involved in both professional development and initial teacher education in the current landscape, alongside the pace of education, reform illustrated the urgency of a common understanding between teachers and senior leaders of the 'mathematical needs'.

Key audiences of the ‘mathematical needs’

Participants discussed the audiences for the mathematical needs of teachers and the implications of articulating the ‘mathematical needs’ for each key audience.

Audience	Implication
Teachers	<p>The group agreed that articulating the ‘mathematical needs’ could help empower teachers, develop their practice and ultimately improve outcomes for learners.</p> <p>The ‘mathematical needs’ would also help teachers better understand their professional learning journey, allowing them to analyse their own needs and drive their professional development pathway.</p> <p>It would form the basis of a shared language for teachers to discuss their professional development needs with senior leaders and, in turn, professional development providers. This would be especially helpful for new teachers to see their place within their department and scheme of work. Such guidance could help retain teachers within the profession.</p>
Senior Leaders	<p>A framework for the ‘mathematical needs’ would help form a dialogue between teachers and senior leaders about professional development requirements.</p> <p>It could help senior leaders tailor professional development provision to their specific institution and the individual needs of each teacher.</p> <p>It could inform the commissioning of professional development provision and support the sustainability of professional development across their school.</p>
Professional development providers	<p>There is a broad range of professional development providers, which offer different types of provision. A framework could form a shared language to help providers to focus their provision and tailor it to specific needs of teachers.</p>

5. Next steps for the recommendation

Three key themes emerged from the discussions:

Developing a new expectation: A framework for teacher professional development should be considered an expectation by all involved education and an integral part of every teacher’s career progression.

Communication: Participants discussed the importance of communicating the benefits of a framework for the ‘mathematical needs’ to policy makers and senior leaders.

- One organisation or body could take ownership of creating and updating a framework for the ‘mathematical needs’ or it could be a partnership.
- These discussions should be undertaken with the support of the mathematics education community.

Partnerships: A range of possible partnerships were discussed:

- Partnership with industry and businesses could be explored. The science education community has had successful engagement with industry regarding professional development for teachers.²
- The [Maths Hubs](#) were also discussed as a potential actor to undertake a project on the mathematical needs of teachers.³

Further considerations

In order to take forward the 'mathematical needs' further consideration and discussion are required around the following points:

- What are the mathematics-specific aspects of a framework for the professional journeys of teachers?
- How would the 'mathematical needs' interact with other potential professional development or career pathway frameworks for teachers?
- Could the 'mathematical needs' be a pilot for further work around the professional development needs of teachers in other subjects?

6. Contributors to the round table

ACME would like to thank all who contributed to the round table discussions.

<i>Participants</i>
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² An example of this engagement is through project ENTHUSE. See: <https://www.sciencelearningcentres.org.uk/about/partners/project-enthuse/>.

³ For further information about the Maths Hubs see: <http://www.mathshubs.org.uk/>.