

Executive Summary

This report explores how the two East Midlands Mathematics Hubs are mediating teachers' work and understandings of mathematics and mathematics education. To do so it asked the following primary research question: *'How do the East Midlands Mathematics Hubs support teachers to develop the learning of mathematics through the two national priority projects - Singapore Textbook and Shanghai Teacher Exchange'*.

Singapore Textbooks

- Feedback from the practitioners who took part indicates that the first year of the Maths textbook trials was successfully introduced and implemented.
- Participants' overall assessments of the CPD opportunities which they received as part of the trial were very positive.
- Practitioners have stressed the importance of adequate Continuing Professional Development (CPD) and being properly prepared in order for the Singapore style textbooks to be used effectively within the classroom.
- The evidence indicates that it is particularly valuable for training or induction programmes to provide practical illustrations of the way the textbooks can to be used within the classroom setting.
- Contributors have commented that the textbook project has helped to add to the expertise in teaching mathematics, in participating schools. In particular, it has been highly effective in generating enthusiasm amongst professionals, motivating teachers to think about and enhance their understanding of mathematics education.
- The practitioners that participated in this research were not able to articulate a coherent set of principles and beliefs which they felt were important components of a Mastery approach.
- Perhaps most significantly, participants strongly advocated the idea that all children can master the curriculum but how this was to be achieved was less clear.
- An additional element of Mastery, which all participants emphasized, was the centrality of enabling every



pupil in their class to acquire a deep understanding of the mathematics they were learning.

- Having a well thought out approach to presenting all pupils with central mathematical concepts, and illustrating the connections between them, was seen as one of the principal merits of using the textbooks.
- Many of the practitioners who have taken part in the trial mentioned that there are some challenges relating to classroom management when using the textbooks, especially with younger children. In particular, juggling multiple resources and having mixed-aged year groups.
- Participants have stressed the need for ongoing assessment as an integral part of teaching, in order to constantly check pupils' understanding of what they were learning. By doing so contributors felt they were able to monitor that the children were making the desired progress.
- By continually assessing pupils' progress teachers suggested they

were able to intervene swiftly to address misconceptions. It also presented the opportunity to adapt teaching and learning activities to reinforce student attainment.

- It would appear that there is a feeling that the textbooks can help to develop a Mastery approach to mathematics. However, there is a danger they are being injected into a procedural culture already established and embedded in classroom rather than incorporating the culture that would be normal and unquestioned in Singapore.
- Evidence suggests using the Singapore style textbooks are not having a significant impact upon the lowest performing mathematicians.

Shanghai Teacher Exchange

- Feedback from participants has been very positive regarding the way the England – China teacher exchange was carried out, both during and after exchange phase of the visit.
- Participating schools have said that they encouraged all teaching staff



at their institutions to observe at least one session delivered by teachers from Shanghai. They also welcomed colleagues from other schools across their regions to see the Shanghai approach.

- Professionals have engaged with the project in a variety of ways, while the level of involvement has varied, it has helped to foster and promote some exploration and development work that is still resonating within a number of schools.
- Interviews and consultations with a range of professionals, from across the Maths Hub regions, indicate that many of them have taken advantage of the opportunity to observe the Shanghai approach to mathematics education. Many said they have been able to incorporate some elements of what they observed within their own classrooms.
- As well as transmitting information about the Shanghai approach, the trial has also helped to encourage teachers to increase collaboration

to enhance their delivery of mathematics teaching.

- The features of the Shanghai style of mathematics teaching, most commonly cited by professionals were:
 - Greater depth
 - Longer time devoted to topics
 - Whole class working together
- There is evidence to suggest the structure and approach used to organise the initial teacher exchange projects was an effective means of letting practitioners see a different approach to teaching mathematics. This has helped to spread some philosophical viewpoints behind teaching for Mastery, and encouraged professionals to investigate good practice in mathematics and the differences these can make.
- As more professionals develop an understanding of a Mastery approach and it begins to become embedded in classroom practice, so there may be the need to change the ambition behind future exchange visits. Rather than having a general aim of exposing



practitioners to a different mathematical culture, they should instead focus on specific areas of practice which is in need of development.

Math Hubs Impact

- Contributors have suggested the Singapore Textbook and Shanghai Teacher Exchange projects have been an effective means of transmitting information about a Mastery approach. Both internally within the institutions taking part and externally to other schools within the region.
- Via the national projects the Hubs are supporting teaching for Mastery, by helping teachers to investigate good practice in mathematics and the differences these make.
- Our research evidence indicates the practitioners involved are not necessarily following either of the projects, rather they are trying to understand which aspects are most helpful, and evaluating how this can best develop practice. The emphasis has very much been on professionals trying to understand

what works best within their own classrooms.

- The practitioners who took part in this evaluation revealed that they are not restricting themselves to a single source of information about Mastery. Rather the Maths Hubs are assisting them in receiving information from multiple sources.
- The national projects are just one of the ways in which the Maths Hubs are influencing the development of practice in mathematics teaching and learning. Participants have also made reference to accessing multiple services they provide for a variety of information and practical support.
- Those practitioners who were consulted agreed that the sharing of experience in the way promoted by the national projects is valuable. They suggested that they would appreciate the opportunity to have more official meetings supported by the Maths Hubs to share ideas and findings relative to effective practice.



- Participants have said that Mastery is not a ‘quick fix’, rather it requires time. Not only for pupils to develop a deep rather than superficial conceptual understanding, but also for the schools and teachers delivering a Mastery curriculum to ensure consistency of provision in all classes. Therefore, ongoing support for teachers and school leaders is essential if the approach is to become established.
- Schools within the East Midlands report they have made changes to practice, which they suggest are having a positive impact upon pupils. In particular, teachers who took part in the national projects have said that their pupils are now enjoying and engaging with mathematics more.

Conclusion

A Mastery pedagogy is a new way of working for the majority of English primary schools (Townsend, 2015), meaning it is advantageous to support teachers to make this transition. There is a body of evidence to indicate that via the national projects the East Midlands Maths Hubs have aided a number of practitioners to gain an

understanding of the essential ideas behind mastery – that all children need a deep understanding of the mathematics they are learning (Askew et al, 2015).

However, there was also some degree of intangibility over the nature of “mastery” and what that might mean in practice. This is also an issue nationally

Although the national projects have helped to disseminate information about effective practice, some professionals have commented that it is not always straightforward implementing the changes which they would like to in school. This seems to be especially true when teaching older cohorts who have not previously had experience of a Mastery approach.

The implication is clear; it is important to start teaching for Mastery at an early stage of pupils’ school careers before gaps in attainment emerge. The ongoing work of the Maths Hubs will be an important aspect of embedding this across the region.

3. Textbooks and Professional Development Project

Singapore Textbooks - Key Findings:

Participants said that the CPD they received as part of the trail helped them to use the textbooks with pupils.

Appropriate training opportunities are vital; practitioners require an understanding of the philosophy that underpins a Mastery approach if the textbooks are to be utilised successfully.

It is very useful to see the classroom practice – teachers can gain valuable insights from fellow professionals who have experience of using the textbooks

Teachers like the structure and planning that the textbooks offer – having well thought out questions and examples is particularly useful.

The textbooks provided teachers with helpful examples and resources to address specific learning objectives. For example, comparison (difference) between two digit numbers involving subtraction.

As the Mastery approach requires time and a shift in ethos towards studying concepts for longer and in greater depth, teachers need support from senior leadership and mathematics coordinators to instigate this.

Contributors have said that their pupils enjoyed using the textbooks and the style of teaching.

Participants said that they felt the textbooks had a positive impact on pupils, especially on the higher and middle ability range pupils.

Contributors have suggested the real value of the textbook project was that pupils engaged with this approach, though there is little hard evidence of greater achievement.

There are some classroom management issues that have to be overcome. For instance, it can be difficult to get all children in a class to focus on the same page of a textbook.

Many practitioners felt that the pupils do not need an individual textbook. Rather, it is more appropriate to present topics to the whole class using an interactive whiteboard.

The textbooks are year specific, some class have mixed year groups, e.g. reception and year one. Teachers have to resolve this issue in a way that suits their particular circumstances.

Some participants suggest there is the need for appropriate additional assistance and support for pupils who are not keeping up.

There are significant financial questions about affordability relating to use of the textbooks.

4. England – China Teacher Exchange

Shanghai Exchange - Key Findings:

Feedback from participants has been very positive regarding the way the England – China teacher exchange was carried out, both during and after exchange phase of the visit.

The practitioners who were involved in the project have said that it has been an effective means of transmitting information about the Shanghai approach to mathematics teaching.

Participating schools have engaged with the exchange – all the teaching staff have been encouraged to observe at least one taught session with the visiting professionals.

Teachers from across the region said that participating schools have been welcoming, accommodating them to observe the Shanghai teachers delivering sessions.

Schools have reported they are adapting their practice based upon what they have discovered. For example, switching to a shorter maths session in a morning and a follow up session in the afternoon.

Teaching professionals suggest they have adopted parts of the Chinese approach – ‘cherry picking’ the best bits for their classrooms.

The main features of the Shanghai style of mathematics teaching, which many practitioners said they had picked up on were:

- Greater depth
- Longer time devoted to topics
- The whole class working together

Contributors suggest ongoing continuing professional development opportunities are vital - developing teacher’s mathematical confidence has to be a priority to enable teaching for Mastery.

Collaboration between professionals is indispensable - teaching staff need to have time to work together and to share ideas.

The project is having an ongoing impact with practitioners being able to observe teachers within the region teaching in a style influenced by the exchange project.

Professionals have been able to engage with the project in a variety of ways. While the level of involvement has varied, it has helped to foster and promote exploration and development work that is still resonating within a number of schools.

6. Conclusion: The National Projects and Maths Hub Impact

The impact of the National Projects and Maths Hubs, Key Conclusions:

The East Midlands Maths Hubs are helping to foster a desire amongst professionals to discover more out about the development of practice in mathematics teaching and learning in general, and a mastery approach in particular.

The two national priority projects - Singapore Textbook and Shanghai Teacher Exchange have been an effective means of transmitting information about a Mastery approach. Both internally within the institutions taking part and externally to other schools within the region.

By enabling practitioners see some of the different approaches to teaching mathematics, the national projects create the possibility of doing things differently.

Via the national projects the Hubs are supporting change, by helping teachers to investigate good practice in mathematics and the differences these make.

The practitioners who took part in this evaluation revealed that they are not restricting themselves to a single source of information about Mastery. Rather the Maths Hubs are assisting them to receiving information from multiple sources.

The national projects are just one of the ways in which the Maths Hubs are influencing the development of practice in mathematics teaching and learning. Participants have also made reference to accessing other services and assistance they provide.

Through the National Projects and other activities, the Hubs are starting to help transform and change professionals practice, in particular they helping to reinvigorate enthusiasm for mathematics education within schools.

Teachers who took part in the research have said that both they and their pupils are enjoying and engaging with mathematics more than previously.

Many practitioners have said that they found the professional development opportunities provided by the Maths Hubs very useful.

The Maths Hubs are helping to create a community of teachers sharing experiences, expertise and effective practice between schools.

Practitioners said they valued the networking opportunities that Maths Hubs and priority projects provide, asserting they would like additional opportunities to discuss ideas with colleagues.

For a variety of reasons there are still some schools who have not taken the opportunity to fully engage with the Maths Hubs. It is recommended that additional means are found to try to involve them in the work of the Hubs.

There is a need for additional robust evaluation evidence in relation to the impact of the national projects, particularly examine the impact of Singapore style textbooks.

There is a need to address the ambiguity behind the meaning of “mastery” and to work with practitioners to understand it through carefully designed pedagogical approaches that fit the realities in UK Classrooms.

