

#### **Aim of the project**

The aim of this project was to increase the links that children made with models and images across the different areas of maths. Taking into consideration the Connective Model (Haylock and Cockburn, 1997), it was established that in our school there was a particularly strong emphasis on the symbolic stage and that all areas of the Connective Model were not being given equal attention.

The best learners follow a model where they experience maths concretely, then move to a pictorial representation, and then finally moving to the abstract. These stages can be scaffolded and faded on top of each other to ensure that children are really confident with their understanding of concepts. Another aim was to ensure that children could see maths resources, like models and images, could be used across different concepts rather than just for one single purpose. Teachers would know if their children had improved in making links across the different areas by providing opportunities for children to solve non-routine problems that would require flexible thinking and demand them to call upon their knowledge of models and images being used as a tool.

#### **What did the project involve?**

The project involved working alongside other teachers in a coaching capacity and offering advice in an informal manner. The school worked on developing use of models and images during teaching sessions where children would see a range of models and images on the interactive whiteboard and then have access to their version of the representation. It had been noted before the project that a number of children did not see the link between the maths they were 'seeing' on the whiteboard, and the maths they were 'learning' away from the board. To help this, the school devised a working wall approach where a display board would be divided into four sections – one for each of the Connective Model's components.

1. Symbols
2. Language
3. Actions
4. Models and images

Teachers would add to the board in the different ways that they had used the components of the Connective Model and, crucially, make reference to all areas of the model over the course of a lesson. This gave teachers a visual representation of which areas they were

focusing on. I role modelled doing this well, and a number of other staff engaged with it over time and then went on to share best practice with each other.

### **Outcomes of the project**

It was found that staff's mindset and attitude towards maths changed over the course of the project. Many teachers felt and reflected that they had moved children off of the pictorial representation and on to the abstract too quickly, and in some cases, they had missed it out completely. Teachers also found that by making links between models and images and using it simultaneously as a tool both, mentally and practically, children were able to solve problems that they had previously found very challenging.

Making links between different models and images, and the skills required to use them, children were able to solve non-routine problems at a level of challenge higher than what they had previously been engaging with. In addition, children in Reception, Year 1 and Year 2 have made strong progress (higher than national expectation) in the term that the project was conducted.

Teachers have described a notable increase of 'penny drop' moments where children are making links between areas of maths and making learning gains in their understanding of a concept. The difference for the school has been that all adults now have a greater awareness and confidence of ways they can use models and images to support and make links in learning, and how they can be used to help children develop their mental maths skills. A huge difference has been that teachers no longer rush to move children to the abstract. Instead, they are focusing on securing an understanding in a mathematical concept and looking at it deeper rather than acceleration by content or removal of models and images. It was clear that using practical resources takes longer, but it was agreed that the payback would be well worth the time investment. A long term impact will be that children will have a secure base understanding of various models and images and be able to choose the maths they use alongside a specific model or image.

In leading this project I learned that it is important to challenge teacher perception that children are deemed to be more able if they are using fewer models and images. In our school the teachers were very open and willing to adapt their practice to give children mathematical experiences concretely, pictorially and abstractly. I feel that we have taken huge strides towards developing a mathematical learning culture filled with models and images where teachers draw attention to connections between different areas of maths.

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