



Date	March 2017
Key stages	KS2
School type	LA maintained, primary
Themes	Mathematics

How can questioning be used to support and encourage children when they say they are ‘stuck’ in maths?

St Thomas More Catholic Primary School

Context

St Thomas More Catholic Primary School, Letchworth, is an average sized primary school located in the North Herts district of Hertfordshire.

The focus

On Friday 18th September 2015 ,the Herts for Learning maths team hosted a national conference with Jo Boaler, Professor of Mathematics at Stanford University, as the key note speaker. Many Hertfordshire teachers attended the conference to find out more about developing mathematical mindsets and were inspired to continue improving opportunities in mathematics for their pupils through an action research project. The purpose of the project was to explore some of the themes covered by Jo Boaler and research different ways of developing mathematical mindsets. *This case study has been written by Paul Rickard, Year 6 Teacher at St Thomas More Catholic Primary School .*

I have been investigating the question: ***How can questioning be used to support and encourage children when they say they are ‘stuck’ in maths?*** I came to a decision for this focus from the realisation that some members of my Year 6 class – despite having good capabilities with number- had a tendency to admit defeat when solving problems, lacking strategies for unpicking the problem or refining their working if they were not able to see a method straight away. From conducting a pupil voice survey on the subject of becoming ‘stuck’ in maths, I received a range of responses including a number of excellent strategies, as well as answers that showed some children would become frustrated, ask the teacher or move on. This confirmed to me that it would be beneficial to focus on strategies that would enable these children to become more resilient and resourceful in such situations.

Description of my approach

The first point of change came through my own practice, and how I responded to children asking for help. Instead of a modelling approach or guiding children towards the next step of a method, I began to ask questions from a prepared bank designed to train the children to find strategies that would help them. Through asking these questions (also shared with other adults working with the class) and modelling using some of them to solve problems in whole class teaching (e.g. *can you put this problem into your own words?*) children have been able to find ways to solve problems with greater independence and gain confidence.

As I became more consistent in the use of these questions and children became more familiar with them, some children began to ask these questions of themselves to support their problem solving.

Widening the approach

Following discussing with the school's maths coordinator, it was decided that the focus should be spread to cover a range of ages across the school, and so the focus has been shared with Year 1 and Year 3 teachers, combined with my work in Year 6.

I have shared my focus question and 'question bank' with these teachers, and in the limited time that they have had to put these ideas into practise, they have found them useful. My Year 3 colleague used questioning techniques to help improve her class' understanding of multiplication, an area they had struggled with. This enabled them to break down the task and understand clearly which strategies can be used and how their existing knowledge, in this case times tables, to answer a particular question. The questions also provided a useful prompt to help children to consider for themselves which resources they could use for the task. My colleague in Year 1 has been using a much simpler set of questions in her teaching and has found them useful so far but needs more time for these to make an impact.

Impact and recommendations

As I used this question bank in my teaching I very soon noticed that many children gained in confidence with problem solving as they responded to my questions; they were able to solve problems with greater ease and independence than before, without having to be guided through a method for solving the problem. A number of children also began to ask these questions of themselves and provided feedback in plenaries as to how this had supported them.

Having conducted a second pupil voice after implementing these changes, I have found that the majority of children in the class have found my questioning approach useful, and that many have changed their attitude to problem solving as a result. For example one child said, "I think it is good because it helps us think about our challenges. I had never really thought about a picture or diagram to visualise a problem before." Although some said that the questions were not useful and did not help, these responses were from more able children who were already very confident with problem-solving.

Children identified that drawing a picture or diagram often helps them visualise and solve problems, a technique not used widely in the class prior to this project. They also noted that my questioning helped them to look back at their question or over their answers and identify for themselves what they should do next. From the second pupil voice (at the end of the project), I noted overall a much more positive attitude towards problem-solving and a sense of resilience, that there are different ways to solve a problem and that it is still possible even if you feel stuck at first. I attribute this to the nature of the questions – by suggesting alternative ways of working it has empowered the children to become used to finding their own way past a problem and understanding how they learn best, gradually growing in confidence and independence.

The project could have been made more effective if implemented earlier in the year; introducing the questions in the summer term worked well but if introduced to a new Year 6 class in September I can foresee a greater impact over time. I would also include more specific modelling, including drawings for visualisation, to clarify my suggestions and to reinforce that drawings are still perfectly acceptable in Year 6.

Contact	Paul Rickard, Year 6 Teacher at St Thomas More Catholic Primary School
Reading and website references	<p>Boaler, J. (2009) <i>The Elephant in the Classroom: Helping Children Learn and Love Maths</i>, London: Souvenir Press Limited</p> <p>NRICH: https://nrich.maths.org/10341 https://nrich.maths.org/5727</p> <p>Making Mathematics, 'Getting stuck, getting unstuck—coaching and questioning', http://www2.edc.org/makingmath/handbook/teacher/StuckAndUnstuck/StuckAndUnstuck.asp</p> <p>School website: http://www.strcjmi.herts.sch.uk/</p>

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