Exchanging Curriculum & assessment Excellence®

Date	March 2017
Key stages	KS1
School type	LA maintained, primary
Themes	Mathematics

Does mixed ability grouping and choice of tasks help to give children confidence when approaching new mathematical problems?

Dundale Primary School and Nursery

Context

Dundale Primary School and Nursery is an average sized primary school located in the Dacorum 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 *Beckey Capstick, Year 2 teacher and mathematics subject leader at* Dundale Primary School

My initial interest in this research came in the build up to Year 2 SATs. As a school we had been developing a 'growth mind-set' and I had worked hard with my class to develop a culture where mistakes were 'ok'. However, I quickly became aware that when presented with a new maths problem my class were unsure where to start. Although keen to impress, they struggled to work together to solve a problem. Observing my class when problem-solving, I soon discovered that talking about their maths was very limited in the class and tended to be evident more in the higher attaining children telling the others what to do. As such, no one was really gaining from the experiences provided. My lower attaining children, in particular, would generally sit and wait for adult intervention. I knew I needed to adapt my practise in the classroom and encourage more collaboration for supportive learning and build confidence in the children's own perceptions of their mathematical ability.

Description of my approach

I started by asking my middle ability children what they thought of maths. Their initial reactions were positive – as one child said "Maths is fun! If you make a mistake that is ok. You can just make you brain grow". When I dug a little deeper, I found that the children had a deep rooted perception of who was the cleverest in the class at maths.

The perception was that the children who answered the questions quickly were the best at maths. From my point of view I found that, while these children might get the answers quickly, they really struggled to explain the answer and therefore could not demonstrate a deeper understanding of the problem. From the questionnaire, 9 out of the 12 children said they would not volunteer their answers because the other would "always be quicker".

After reading Jo Boaler's chapter, "Making low ability children" from her book '*The Elephant in the Classroom'*, I decided to use mixed ability seating. I put the children in groups with at least one person of the same ability. I hoped that this way the children would not feel so anxious. Initially when faced with a new problem, the children reacted in a very similar way as before, waiting for someone else to answer.

Over the course of the next few weeks, I introduced and modelled "Talk for Maths" with the children and provided them with a lot of opportunities to discuss the problems and tasks they were doing. It took a while for the mind-set of the children (particularly my middle ability children) to change. Initially the higher achieving children would just take over when working collaboratively. I found I had to model the discussions and initially gave the children different roles within the group e.g. scribe, speaker, checker. The impact was that, over time, it became a natural occurrence in the classroom and the children began to reason. The most interesting part was that they would build upon each other's learning. We built a culture where they were working as a team and supporting each other. I found that when children worked as a group they were more willing to share as it was not themselves individually making mistakes.

Initially when I started, only about 8 children out of a class of 31 would volunteer to explain their answers. This also tended to be the higher attaining children. However, after just a few months, I have noticed a real change. Now when asking for volunteers - about 28 hands will go up and, although they might get stuck, the other children will often help. This was a really positive change in the classroom.

I took this further and thought about the tasks I was setting the children. Now the children were confident to start a problem and discuss the methods they were using but I wondered whether I was capping their learning by telling them the tasks I wanted them to complete and therefore not allowing them to take control. As a result, I changed the way I presented activities and problems to the children. I still kept my differentiation but, instead of designating these to the children, I allowed them to choose the problem they wanted to solve. I presented them with three challenges: Super, Mega and Whopper. The impact was almost immediate with the middle attaining children. I found they had the confidence in their own ability to choose their own problem. Most chose the Mega challenge which I had expected. What I did not expect was that the children were able to self-assess themselves. If they found it too challenging, they asked for support. Not from an adult but from peers on their tables.
When I first started this, my higher attaining children would have just given the answer. Now I was seeing teaching from the pupils. One conversation I observed was between a lower attaining girl and a high attaining boy who were sitting on the same table. They were working on a problem to do with money.

Girl: "It is this purse the one with the 8p?"
Boy: "Can you give me an 8p coin?"
Girl thinking for a minute and then looking at the coins.
Girl: "There is not an 8p coin!"
Boy: "How could you make 8p?"
The girl then proceeded to use a combination of coins to make 8p. They then completed the problem together. The boy was supporting the girl with questioning but he never actually gave her the answer, but could also demonstrate his own learning and reasoning.

Impact

As a result of this project, I have seen a real change with the majority of my class in the way they approach different tasks. While they still don't always work collaboratively together, what they do is discuss problems and use each other to ask for help. Each child has the confidence to have a go at the problems. This was reflected in our Year 2 SATs where every child in the class had a go at the questions, which was a big improvement from a few months ago.

Contact	**Beckey Capstick, Year 2 teacher and mathematics subject leader, Dundale Primary School and Nursery**
Reading and website references	**Boaler, J. (2009) *The Elephant in the Classroom: Helping Children Learn and Love Maths* , London: Souvenir Press Limited** **Clarke, S. (2014) *Outstanding Formative Assessment: Culture and Practice*, London: Hodder Education** **School website: www.dundale.herts.sch.uk**

If you have an aspect of interesting practice that could be shared or are interested in finding out more about a case study please get in touch by emailing exchangingexcellence@hertsforlearning.co.uk

Herts for Learning is a not for profit company dedicated to improving standards of education in Hertfordshire and beyond. HfL publishes these case studies to share examples of interesting practice which schools believe have worked well for them.