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Key stages	KS2
School type	LA maintained, primary
Themes	Mathematics

Do talking frames reduce girls' anxiety in maths?

Abbots Langley Primary School

Context

Abbots Langley Primary School is a larger than average-sized primary school located in the Three Rivers district of Hertfordshire. The school was rated 'good' by Ofsted in May 2014.

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 Liz Gardner, Assistant Headteacher and Maths Subject Leader at Abbots Langley Primary School.***

I decided on this focus as I had a number of girls in my class who consistently selected challenges that were not pitched at the right level for them. The group regularly picked a challenge that was too easy. They displayed anxiety when they answered questions wrong and were very reliant on adult support to move forward.

Description of my approach

I began by completing a questionnaire with the children, in the school library, to gain an insight in to their views of maths. This meant they were away from their peers and had some privacy. I explained that I wanted to find out their thoughts on maths and then that we would work together to make some changes and adjustments to how we work. One of the girls asked me if they should put their name on the sheet, I then explained I didn't want them to so that they could be completely honest. I explained each question and gave the girls time to complete the questionnaire. The girls were very positive about the 'project' to begin with, they were excited to have been selected for what they saw as a special privilege. I introduced a talking frame to the group and explained how they could use it to support each other in maths lessons. They received it enthusiastically and proceeded to use it in maths lessons confidently (it was attached to the back of their books). They were keen to use the talking frame together in their books and made a point of getting it out at the beginning of each lesson and requested to sit together in order to use it. There was an immediate positive impact on their approach in maths lessons. They

presented more confidently, asking more questions during whole class input and discussing questions in greater depth with their talk partner.

After compiling the results of the questionnaire, it was clear that there was a mis-match between how the girls had answered and their working practices. I believed the children were giving me the responses they knew they should say or believed I wanted to hear rather than an honest response. I explored this further in a group discussion. It transpired that the girls liked to discuss their learning with a partner and when challenged on what this involved, they disclosed that they were telling each other the answers rather than supporting each other to get to an answer. We further developed the Talking Frame together; adding additional support questions. I also introduced a self-assessment slip that could be used throughout the lesson (we previously used a face scale at the end of a session). The impact of this was that the children were reflecting on how they felt about their learning and making changes mid-lesson (changing challenge or seeking assistance from a partner, adult or checking station) rather than waiting to the end of the lesson.

They were also using the Talking Frame more successfully to support and challenge each other rather than simply telling each other the answer. The children's confidence grew and they became more articulate when discussing mathematical concepts. It also became apparent that sometimes the Talking Frame wasn't enough. When both partners still weren't sure of how to procedure, the anxiety appeared again and the pupils were changing down a challenge. As a result we introduced a 'Checking Station' into some maths lessons, where pupils could go and use calculators to check their answers. It was agreed with the class that the station could be accessed after they had completed 3 or more calculations and that after their visit they needed to change challenge (either up or down) to ensure work was pitched at the right level. This resulted in a greater number of children, in the focus group and in the whole class, trying a more complex challenge and persevering with it.

Widening the approach

I shared my practices with the parallel Year 5 class. At this stage the Talking Frame was rolled out for whole class use and the focus group shared their experience of using the Talking Frame and how it had helped them. The children in the focus group enjoyed sharing their knowledge and felt empowered and proud to be sharing 'their resource' with the class. They were particularly keen to share their input into the adapted questions with the whole class. I observed the focus children's confidence grow when using an explaining the Talking Frame to children outside of the focus group.

After trialling the Talking Frame and the self-assessment slip across the whole year group, it was decided that the self-assessment slip could be stopped. This was because it took time for the slips to be stuck in and completed, which interrupted the flow of the lesson. However, the short-term use of it helped support the children in their reflection of their learning and they were able to continue having the discussions about their understanding and progress without the slip.

Across the year group, we also started to change the approach in maths lessons too, as by this point it was the late summer term and sessions were more focused on revising and revisiting areas of misconception. As a result, we allowed the children more freedom in who they worked with (children had previously been sat in places randomly selected by lollipop sticks and changed each week). This meant children were working with their peers who had selected the same challenge. This increased the level of dialogue between pairs and the children reported that they found it easier to use the Talking Frame when they were working on the same challenge. This style of working did need careful teacher management as some pupils would select a particular challenge in order to work within their friendship group. This wasn't always a bad thing but needed careful monitoring, depending of the dynamics of the group.

As a year group there was a noticeable change, from observation, in the pupil's behaviour in maths after the Talking Frames were used at a whole class level. The changes that were observed were:

- An improvement in the children's independence. They attempted tasks independently before asking for help and were also observed using the Talking Frame on themselves, reading the questions as prompts of what to do.
- An improvement in the pupil's ability to articulate their mathematical thinking, explaining what they had done or what needed to be done do (both when sharing with the whole class and working it a partner or group).

This has been a sustained change over a term and a half. Although the children refer to the Talking Frames less, they are maintaining the talking structure when discussing maths in the classroom; they have begun to use the questions and prompts naturally. The research by Jo Boaler into talk in maths, from her book *The Elephant in the Classroom*, also backs up these findings, that ensuring high quality talk, discussion and questioning is crucial and that pupil discussions are particularly valuable between pupils of different levels of ability. It also references evidence that states that children who can articulate, question and give reasons in maths lessons have better levels of attainment and enjoyment. The enjoyment was certainly clear from observation; it is too early in the research to see if there has been a wider impact on attainment for these pupils yet, however they did show a better understanding of objectives in the short term.

Impact and recommendations

Overtime my teaching practice changed. I ensured that there were opportunities for evaluation and reflection throughout the lesson. I also found that as the novelty wore off from the Talking Frame, the focus group continued to use it regularly but I had to remind the rest of the class to use it in lesson. I did, however, notice an improvement in the pupil to pupil dialogue; the children in my class were using the questions and style of questions from the prompt in their mathematical discussions.

I repeated the pupil questionnaire in the Summer Term. There was a positive impact on 7/19 of the statements, a negative impact on 3/19 statements and an equal response on 9/19 statements. The statements that had a positive impact and I am most pleased with were:

Question	Focus Group Pupil response (6 girls)
I enjoy maths lessons	4/6 agree, 2/6 strongly agree
I understand what I am learning in most of my	4/6 agree, 2/6 strongly agree
I feel that I don't understand what I am taught in maths lessons.	4/6 strongly disagree, 2/6 disagree
It matters which challenge I pick.	1/6 agree, 5/6 strongly agree
I know what I need to improve on in maths.	4/6 agree, 2/6 strongly agree

From observation, I could see the children from the focus group behaving in the way the above statements suggested. I am pleased with this change in learning behaviour. These new behaviours were also explained in Chapter 7 of Jo Boaler's *Mathematical Mindsets* book, which explores how getting students to work in groups promotes discussion, thinking skills and collaborative learning.

The statements that had an increased negative response were:

- I pick the right challenge for me (previously two girls had strongly agreed but that dropped to 1 girl).
- I like to do the same challenge as my friend or partner (two girls strongly agreeing, where previously there had been no strongly agree responses.

I believe this was as a result of the change in working practices within the class. A culture of talk and questioning had been strongly developed; the pupils were now regularly discussing and sharing their learning. As a result, some children were selecting challenges based on their partner's ability rather than their own so that they could work together. Despite my attempts to convince the children that they could still support each other when working on different challenges, they found it easier to work collaboratively. Some of the reasons the pupils gave for this was that they knew what the question meant (having completed it) or they knew how to get to the answer (having completed it or one very similar). This didn't have a negative impact on the children's progress, however it did need close teacher monitoring to ensure one pupil wasn't too reliant on another.

When I asked the focus group to evaluate the Talking Frame, asking them to suggest which question in each section had been the most useful and why, all the girls gave clear answers about the Talking Frame being supportive to them and they answered confidently. The girls all made clear, quick choices and justified their selection.

I also questioned the class as a whole, asking for their feedback on the Talking Frame. The pupils were on the whole very positive; I asked them to vote for their favourite question and then took some feedback comments. From the children's responses, it was clear that they were using the Talking Frames, or questions from it successfully with their partner to support one another.

Overall, the Talking Frame did help to reduce the girls' anxiety in maths lessons. Mainly due to the change in culture in the classroom, that dialogue was expected and praised but also because the Talking Frame provided structure. This helped the girls feel more confident as they had a set procedure to follow when they were unsure how to proceed mathematically. Being part of the focus group and trying something before the rest of the class (and then being in a position of power when it was rolled out to whole class use) also boosted their confidence. The use of the 'Checking Station' further aided the girls' confidence levels. This helped them to regain some feeling of control and therefore reduce their mathematical anxiety and further develop their growth mindset. The girls were more likely to persevere with mathematical tasks after these strategies had been introduced than they had been before the research.

Contact	**Liz Gardner, Assistant Headteacher and Maths Subject Leader at Abbots Langley Primary School**
Reading and website references	**School website: www.abbotslangley.herts.sch.uk** **Boaler, J. (2009) *The Elephant in the Classroom: Helping Children Learn and Love Maths* , London: Souvenir Press Limited** **Boaler, J. (2015) *Mathematical Mindsets: Unleashing Students' Potential Through Creative Math, Inspiring Messages and Innovative Teaching*, John Wiley & Sons.** **Carol Dweck – Mindset, How you can Fulfil Your Potential** **Pupil Voice adapted from 'Maths pupil voice questionnaire' by *turtonkei* from TES: *https://www.tes.com/teaching-resource/maths-pupil-voice-questionnaire-6332182***

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