

## **Elaine Davies- Research Question**

How does the adult's role and the environment develop children's independent mathematical thinking?

### **Intro**

Maths within my classroom, previous to this research project, would be taught as a whole class session and then I would work with a small focus group who would be working on an adult led activity.

With this structure, my initial thoughts about Maths in my classroom were that the children's Mathematical thinking was too directed by me, which suited those children who already understood the Maths that I wanted them to do or the Maths that I needed to be evidenced against Development Matters. However I wanted to encourage all the children in my class to enjoy Maths and to be independent mathematical thinkers.

For as McGrath C, stated in Supporting Early Mathematical Development 2010

*"If we look at how children attempt tasks which they have set themselves in an environment which is meaningful and supportive we gain a truer insight into the child's mathematical motivation and understanding."*

With this in mind I began to think about the questions that I pose and my role in how I develop independent thinking as well as focusing on the environment that I create within the classroom.

I was also very aware that my expectations were that children would record their Maths through formal traditional mathematical symbols so as part of my research, I wanted to encourage an environment whereby more children would use mathematical graphics rather than expecting children to always record their maths using numbers and symbols.

*By valuing the children's own methods and really listening, teachers can uncover what they know (rather than what they do not know). The mathematical graphics also help the teachers to 'see' their thinking. (Carruthers and Worthington, 2010)*

### **Ethics**

I informed the head teacher and staff that I was involved with this research project and discussed my question in a staff meeting. This did encourage some KS2 members of staff to come and have a look at the wall and floor books as well as the rest of the reception team who were keen to see how the children would respond to our Maths sessions being less structured.

### **Methodology**

I used a blank sheet of paper on the wall next to the Maths resources entitled 'Show me your Maths'. I also used a Maths floor book placed in a space that was accessible not only to me but to the children. I then observed the Maths that happened in the classroom during independent activities time. I observed what

happened if no adult was present compared to when an adult was sat next to the sheet.

## **Findings**

Initially the use of the 'Show me your Maths' wall was very slow. After introducing it to the children, no-one went to write on it. I observed the space for two days and gave the whole class a reminder each day that 'it would be great to see their Maths' but still it wasn't used. I then decided to stand at the wall, after I had encouraged the whole class to come and have a go. A small group of boys began to use the wall, wanting to impress me with the Maths that they could do. This was a group of 3 boys (who do like Maths) who are very competitive. The wall got filled up with various addition and subtraction calculations, which I was thrilled with, as they had started to use the wall. I then was able to use their scribings to direct my Maths teaching as I knew what these children were interested in doing.

After this initial occasion of the wall being used, it then became a snowball effect as I was able to praise the boys for taking a risk and 'showing me their Maths'. This then encouraged more children to want to show me their Maths. Within the first two weeks of the wall being introduced 17 different children came to the wall and scribed numbers and symbols on the wall, which I found very effective, as I was able to work spontaneously 1:1 as well as with small groups to help with any misconceptions and also to challenge the children's learning. This I felt, helped them to make more progress as it was their own fascinations and interests that was steering the learning.

However I was still concerned that the environment was not encouraging all children to be independent thinkers.

With this in mind I then introduced the floor book which was accessible not only to me but to the children, which meant that children could instantly display their work in the book and also they could easily review Maths work that the whole class had been involved in. It also helped me to inform the future Maths sessions and planning and I could refer to it myself or review it with the class on a daily basis. This really encouraged all the children to want to show me their Maths with children doing Maths all around the classroom inside; sticking post it notes and paper into the book as they had ownership of it. I noted that all the class stuck something into the book, independently and that children also wanted to look through the book.

## **Impact**

- Maths planning and activities are now directed by the children's interests and fascinations.
- As there are more spontaneous assessment opportunities I am much more confident about what all my children know and also I am more confident about their next steps and how to ensure they all make progress.

- The 'Show me your Maths' wall has grown from strength to strength and I am now including vocabulary lists of what children have said or words that will support their learning. Most children are visiting it, independently and showing me their Maths which has encouraged a 'rich Mathematical environment' within the classroom.
- I am modelling more mathematical graphics which has encouraged more children to draw their mathematical thinking
- More children are now willing to take risks with their Maths and are doing Maths everywhere.
- My level of questioning has changed and I am conscious that I am always asking the children questions for them to solve and they are responding to this by asking and challenging themselves and as well as each other, with more questions. This is important for as Carruthers and Worthington, 2010 state.

*Problem solving needs to be seen within the wider spectrum of the class environment within which teachers build a culture of mathematical enquiry.*

In conclusion to answering my question as to how does the role of the adult encourage independent thinkers, I think that it is important to ensure that the adult does not expect the child to understand adult Maths' but that the adult must strive to understand the child's knowledge through observing their actions and verbalisations. This research has shown me that children will become more independent thinkers when they are allowed to have ownership of their Maths and that they are happier to take a risk and enjoy Maths more when the adult and environment guide their thinking and not direct it.

## **Bibliography**

Carruthers, E. and Worthington M. *Understanding Children's Mathematical Graphics: Beginnings in Play*. Maidenhead: Open UP, 2011.

McGrath, C *Supporting Early Mathematical Development: Practical Approaches to Play-based Learning*. London: Routledge, 2010.