

Strengthening links in Mathematics:

Where Is the Maths In That?

Irchester Primary School

In which way were you planning to strengthen links in Mathematics?

I planned to strengthen links within mathematics through looking at everyday objects and making connections and links within maths, and the real world.

Why did you choose this area?

I identified fractions, decimals and percentages (FDP) as an area for development in our school so I decided to raise the profile for staff and pupils. Through discussion with the head teacher, it was agreed that I could support staff by helping them make the link between FDP and other maths areas. This would ensure that lessons incorporated different elements of maths and revisited concepts more regularly during each term.

Using everyday objects was a more tangible way to develop stronger links between FDP in maths and could be easily adapted for different age ranges and abilities. Furthermore, it was a logical next step to our whole school focus on times table recall and related division facts from the Autumn term.

What did your project involve?

1. I led a staff meeting to introduce the project which included a practical session 'Where is the maths in that?' I chose an everyday object (a 1litre bottle) and modelled questions focusing on FDP using the bottle and information on the bottle as a starting point. Pairs of teachers across key stages chose an everyday object from which they created a bank of questions linking to FDP. They were guided to make links to as many areas of maths as they could (e.g. measures, shape, ratio, money) and were encouraged to incorporate a wide range of appropriate maths vocabulary (e.g. sum, difference). **See example below**
2. Following on from the first staff meeting, I held a second meeting with at least one representative from each year group to work on improving the original closed ended questions. I modelled examples of open ended and reasoning questioning using a range of resources (including National Numeracy Strategy's Maths Vocabulary Book P4, 5, 6 and a bank of reasoning questions in line with the New Curriculum). The teachers set about improving the original bank of questions created.
3. FDP questions were created for all year groups to use and teachers were encouraged to amend and add to these questions for their corresponding year groups. These were then used immediately in Y3 and Y4, and particularly successful when trialled in Year 5.
4. All year groups planned a variety of sessions linked to the FDP questions staff created.
5. A problem solving display was created in KS2, initially with an FDP focus and a link to everyday objects. All staff agreed to update this display regularly to celebrate and increase the profile of problem solving in KS2.

What did you find out throughout carrying out your project

I was pleased that staff were enthusiastic and open to improving their practise throughout my project; I received positive feedback from a number of teachers regarding the practical nature and usefulness of my maths staff meetings. Initially, teachers created a bank of questions with a capped ceiling on the learning but, when I highlighted the closed nature of these questions, the teachers were keen to improve their questioning skills and appreciated being involved in, and taking ownership of, the process. In fact, many asked to attend, despite only requesting one representative from each year group.

This enthusiasm spread to the children. After their teacher's input of modelling questions and answers, children were successful in answering a range of questions and were even keen to create their own to add to the FDP resources. Furthermore, Y5 pupils easily and confidently adapted their questioning skills in other areas of maths and the curriculum.

What differences did it make to your learners?

Pupils were successful in using the same format of questioning in other curriculum areas. For example, Year 5 pupils analysed statistics from Antarctica's weather stations in our topic on Extreme Environments. Pupils were far more confident and competent at creating higher order thinking and reasoning questions. This was evident in all abilities within the year group. Pupils even challenged themselves to create higher thinking questions for their peers to solve.

What difference did it make to your school?

The staff meeting and follow up sessions helped revise and readdress the importance of using a variety of question types and the impact that open ended questions have on promoting reasoning, explanation and discussion in maths lessons. Maths planning, working walls and books show clearer evidence of good quality and varied questions. Lessons are less rigid because teachers are more confident to allow the learning to take another path.

Teachers are now talking more about maths. They are keen to share some great examples of questioning and problem solving going on in class, both with myself and other colleagues.

Most importantly, pupils are showing more enthusiasm in lessons where everyday objects have been used; they said it made the lessons "more fun". Pupils are more confident when tackling a question which is worded or set out differently and are challenging themselves to create multi-step problems for peers to solve. They are using a wider range of mathematic vocabulary in their questions because of the range of vocabulary used in modelled questions. The WAGOLs - 'What a good one looks like', clearly had an impact on the quality of questions the children's created.

What did you learn yourself?

Through this project, I learned that having enthusiasm and a positive approach is essential when seeking to engage staff. I recognised how important it was to allow the teachers to become involved in the project and not be seen, nor see themselves as merely passive followers. I have recognised my personality and drive for maths is infectious.

In my role as maths leader, I have always recognised the importance of modelling a wide variety of quality questions. I realise that I must maintain my proactivity in engaging staff, making regular and informal contact, to have sustainable impact.

Any other comments

The next steps are to strengthen links by developing conceptual understanding – from Concrete to Abstract.

A staff meeting is planned for Term 6 to share and revisit the connective model of Haylock and Cockburn and look at some good examples of this in practice on working walls from a primary school in Milton Keynes. This will lead to the involvement of all staff in preparing to adopt this model for our maths working walls in September 2015.

A 1 litre squash bottle

<p>Where would half be? Draw a line on the bottle. Now check if you were correct.</p> <p>Now find some other containers that are equivalent to $\frac{1}{2}$ litre?</p>	<p>If you use 1 capful of squash to different quantities of water, what ratio are you using? Taste them, which one is the best?</p> <p>Record your results to share with others.</p>
<p>How much is 1 serving?</p>	<p>What % of salt is in the whole bottle?</p>
<p>Fill the bottle with water. Share it between you and your friend. How much would each person get?</p> <p>Share it between 4 people How much would each person get?</p> <p>Share it between 8 people? How much would each person get?</p>	<p>This bottle of diluted squash is to last you all day. Your cup measuresml.</p> <p>True or false? You can have drinks.</p>
<p>True or false? Half the bottle would be 500ml.</p> <p>True or False Half of 1 litre is 200ml?</p>	<p>Compare the diameter of the fattest and narrowest part of the bottle. What is the difference between them?</p>
<p>A cup contains 200ml. How litres would I need to serve a group of 10 children?</p> <p>How many bottles would I need to serve the whole year group?</p>	<p>Can you tell me 2 quantities that make a litre? And another And another</p>
<p>Put the quantities in order starting with the smallest? $0.5L$, $\frac{1}{4}L$, $\frac{3}{4}L$</p>	<p>Our class have a drink from one bottle? One bottle will be enough for the whole class to have a drink? True or false? Explain why</p>
<p>1 litre of squash costs £1.50. How many bottles can I buy for £10?</p> <p>If I paid with a £20 note what change would I get?</p>	<p>Fill the bottle with water. Share it between you and your friend. How much would each person get?</p> <p>True or false? Sharing the water between 4 children means each child will have 500ml?</p>