Think about the last few mathematics lessons you have taught. How much problem solving did the children do? Despite being one of the three aims of the National Curriculum (DfE, 2013) problem solving often gets forgotten about or added in, often at the end of the lesson or on a Friday. Ofsted continually remind us that '*problem solving is not emphasised enough in the curriculum*' (Better Mathematics Keynote, Spring 2015).

So, perhaps one of the problems with problem solving is that we don't do it enough! At NRICH we believe that every lesson can be a problem-solving lesson. Our curriculum mapping documents link NRICH activities to different curriculum areas and this article provides further support when considering types of problems and strategies to include in your planning, as well as reminding you about the NRICH four stage process in solving problems.

Planning for Problem Solving

In planning for problem solving the key is to be clear about the type of problem you want to use, the strategies you are going to focus on and teaching the stages of the problem-solving process. Combining these different elements allows children to build their confidence, skills and resilience in solving problems.

Remember, children don't become problem solvers just by doing problems!

1. Types of problems

This section includes five different *types of problems* (suggested originally by The Primary National Strategy, May 2004), to which we have matched some NRICH activities. It may be useful to consider which *type* of problem you want to focus on in a lesson, or over a series of lessons. This does not detract from the mathematical content of a lesson, but rather adds to it, in that children can practise the addition of numbers, but through the context of a problem, thus ensuring every lesson can be a problem-solving lesson.

Types of problem	Examples of NRICH activities
Word problems	We have a collection of short problems that would be ideal to fit into this category. While these problems sit within our secondary pages, the short problems on number would be suitable for upper primary students.
Visual problems	Tangrams and Baravelle
Finding all possibilities	Button Up and Zios and Zepts
Logic problems	Teddy Town and Multiplication Squares
Rules and patterns	Ip Dip and Tea Cups

2. Problem-solving skills

Alongside the type of problem you choose, it is helpful to consider the skill you wish the children to develop. Selecting a skill and then offering opportunities for it to be modelled can help children to realise there are many different ways to solve a problem. Children

learn to select a skill to use as they become more experienced at problems. (For more detail, see our article [Using NRICH Tasks to Develop Key Problem-solving Skills](.).)

Problem-solving skill	Examples of NRICH activities
Pattern spotting	[Domino Patterns](#) and [Consecutive Numbers](#)
Working systematically	[Same Length Trains](#) and [Beads and Bags](#)
Using diagrams and pictorial information	[Fraction Match](#) and [Build It Up](#)
Working backwards	[Doing and Undoing](#) and [Andy's Marbles](#)
Trial and improvement	[Find the Difference](#) and [Fifteen Cards](#)
Visualising	[Happy Halving](#) and [How Would We Count?](#)
Conjecturing and generalising	[Break it Up!](#) and [Take Three Numbers](#)
Reasoning logically	[I Like …](#) and [Sealed Solution](#)

3. Four Stages of the Problem-solving Process

Perhaps another problem with problem solving is that children don't know how to solve problems. This four stage process is a helpful guide to scaffold the skills being developed, from getting started to thinking more deeply about the task.

Stage 1: Getting started
Stage 2: Working on the problem
Stage 3: Digging deeper
Stage 4: Reflecting

Our article on [Developing Excellence in Problem Solving with Young Learners](#) offers a more detailed account of this process.

Pulling it all together

Perhaps another problem with problem solving is there is too much choice. It can be confusing thinking about which type of problem to select or which skill to focus on. In this feature we have offered different NRICH activities for each type and skill of problem solving. However, one approach is to decide upon the type of problem and skill you want to focus on, and then find one activity that exemplifies both. Here is an example:

Focus for the lesson: *addition and multiplication*
Type of problem: *Finding all possibilities*
Problem-solving skill: *Working systematically*
NRICH task: *Zios and Zepts*

Conclusion

Becoming a mathematical problem solver really is the point of doing mathematics. This will enable children to 'understand[ing] the world, [have] the ability to reason mathematically, [have] an appreciation of the beauty and power of mathematics and [develop] a sense of enjoyment and curiosity about the subject' (DfE, 2013).

References

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