



Mathematics Teaching and Learning Policy

Aims

- Start and end with assessment. Accurate assessment of what children can and can't do to inform planning and ensure common errors and misconceptions are addressed is vital
- Ensure progress and mastery. Planning, marking and target setting to ensure all pupils make rapid progress from their individual starting points and achieve mastery of their maths' skills
- Focus on the basics. Fluency in the fundamentals forms the basis for our daily targeted skills teaching to give children the toolkit of skills and vocabulary they need to be successful mathematicians
- An increasing focus on solving problems. Conceptual understanding, discussion and real-life problems to form the heart of our mathematics teaching
- Nurture mathematicians. Opportunity in lessons to nurture mathematical independence, allow time for reflection, reasoning and development of logical thinkers
- Aim high. Teachers communicate high expectations, enthusiasm and passion about mathematics to learners

PR1ME Mathematics

Our mathematics programme is delivered through schemes of learning and resources in the PR1ME Maths scheme. PR1ME is based on a composite of approaches, used by the top-performing nations in mathematics, and based on Singapore Maths used by over 58 nations globally.

To understand how the top performing nations in primary maths education get great results, being aware of some of the stated Principles of Teaching used in mathematics education in Singapore might help.

Principle 1

Teaching is for learning; learning is for understanding; understanding is for reasoning and applying and, ultimately problem solving.

Principle 2

Teaching should build on students' knowledge; take cognisance of students' interests and experiences; and engage them in active and reflective learning.

Primary Mathematics Teaching and Learning Syllabus, Ministry of Education, Singapore, 2012, pp21-22

No doubt, many New Zealand schools and teachers also have these principles central to their maths teaching.

How are these teaching principles delivered so successfully in Singapore?

The Ministry of Education believes that many teachers need support to deliver the curriculum, and acknowledges the role that textbooks play in providing some of the support required. As a result, it assesses all published materials made available to teachers and students in Singapore. It is the way they ensure the integrity of their curriculum is delivered the way they want it to be.

PR1ME Mathematics is a collaboration between the Singaporean Ministry of Education and Scholastic. It is designed to give schools outside of Singapore the benefit of the world-class curriculum and teaching/learning experiences used in Singaporean schools.

Teaching Principle 1: Problem solving

"The learning of mathematics should focus on understanding, not just recall of facts or reproduction of procedures. Understanding is necessary for deep learning and mastery. Only with understanding can students be able to reason mathematically and apply mathematics to solve a range of problems. After all, problem solving is the focus of the mathematics curriculum."

Primary Mathematics Teaching and Learning Syllabus, Ministry of Education, Singapore, 2012, p21

There is no doubt that for many years, New Zealand teachers have been emphasising the critical importance of problem solving. This is not new. Problem solving is at the heart of the New Zealand Curriculum: Mathematics.

The Planning Process

Long Term Plan

Teachers at Kiwitahi School use the long-term schemes of learning created by PR1ME Mathematics to organise groups of children who will learn new concepts and skills together. These schemes of learning are detailed to give teachers a solid driver towards teaching pupils what they need to know and do.

Daily Planning and Effective Maths Teaching

1. Learning Journey

Unit overview proformas may be glued into the children's books at the start of the unit or may be held by the teacher to reference pupils' progress over the unit. These are used to allow the children and teacher to track their progress through the unit of work and to tick off 'I cans' as they are achieved.

2. Modelling

The modelling should be focused on the objective, and should model what the children will be doing including careful modelling of the resources the children will be using. Modelling should take a 3-step approach. Step 1 will be the teacher modelling their thinking on how to solve the

problem with key questions to elicit understanding where appropriate. Step 2 will involve engaging the children at certain points of the process. Step 3 will be more child-centred, with the children talking through the steps to solve a problem.

3. Guided Group and Independent Learning

The teacher (and where appropriate the teacher aide) will support specific individuals or groups of children during independent work. This should be an opportunity to extend the learning or offer additional scaffolding where appropriate. It should involve the teacher modelling and the group working together to solve a problem(s). The teacher may start with one group and move to support another group.

4. Planning for Progression

The teacher needs to ensure daily opportunities are provided for children to deepen their understanding of the learning by planning for depth. This may include:

- Empty box/missing symbols questions
- Requiring children to create their own questions
- Explicit use of misconceptions - perhaps using a discussion mat
- Active argument/true or false
- Probing questions. "Show me" (show me one no one else will have), "Convince me", always/sometimes/never and prove it.
- Odd one out

5. Mini Plenaries

The teacher should use mini plenaries throughout the lesson to assess the understanding of those children working independently. Through posing questions such as, "What have you noticed.....?" "Is there a rule.....?" "What strategy have you been using.....?" "Can you explain how to solve.....?"

6. Plenary

A review of the learning should take place at the end of the lesson in relation to the lesson objectives: "Where are we now?" "What do we know now that we didn't know at the start of the lesson?" "Are we ready to move on?" "What key points do we need to remember?" "How can this learning help us in other lessons?"

One of the following activities could be completed:

Show me what you know (but just one related to the objective)

Always/sometimes/never question

Convince me question

Spot the mistake question

7. Daily Assessment

Assessment will feed into the planning for the next day/s. Consider if groups will need to be changed Does the objective need revisiting? If yes then it should be taught in a different way and not just repeated. Does the learning need to be extended further through understanding and application? Books should be marked daily following the marking code.

Marking

The marking code for the school must be followed when marking all work. For maths, in a two week unit in the senior class, it would be expected that there are at least four examples of deeper marking resulting in *pink pen* work for each child. Pink pen learning can often be taken from the unit progress proforma probing questions menu. Pink pen work generally fits into three categories:

- Re-teach is used for groups who don't understand the learning and need time with an adult to have skills re-taught. Pink pen should be evident on the learning
- Check is used where a child has made a few errors but is able to correct on their own. Check should be accompanied with a comment helping the child see their error. A question prompt could be used. The errors could be underlined. A correct example could be provided. Pink pen should be evident on the learning.
- Challenge is used where a child has got the learning. It can take the format of 'going for gold' questions (resulting in house points awarded if the child is able to answer the question) which challenge pupils to extend their learning further. It will be a pink pen activity on the same learning but with a new twist on it that provides additional challenge and ensures the child has mastered the skills. Probing questions can be selected from the proforma menu for this. Pink pen should be evident on the learning.

To ensure that pink pen work is completed effectively, teachers must ensure that they plan for dedicated improvement and reflection time every week.

Basic Skills

There should be a daily basic skills teaching of around 10 minutes at the start or end of maths lessons. This should be used to reinforce basics such as mental arithmetic and times tables. This can be completed either with pen and paper, white boards and pens, or the 10ticks Mental Maths programme available to all pupils on the iPads. In addition to this, a single lesson per week should be devoted to times tables work to ensure that our pupils have a solid understanding of times tables.

By the time pupils leave the junior class, they should have mastered:

- count on and back in 1s to 10 and 20
- count in 1s, 2s, 5s and 10s teach the 2x table
- teach 2x, 10x and 5x table

In the senior room, the pupils should be developing as follows:

Year 3 - review 2x, 5x and 10x table and teach 4x, 8x and 3x table

Year 4 - teach 4x, 8x, 3x, 6x, 12x, 9x, 11x, and 7x table

Year 5 - All up to 12 x 12

Year 6 - All up to 12 x 12

Assessment

Assessment happens at every stage of the learning journey. It informs what we teach. It informs what we plan. It informs how quickly children move on in a lesson. It changes our plans from one day to another. Without accurate assessment of what our children can and can't do they will be unable to make good progress in their learning. Assessment takes place as both formal tests and continuous assessment for learning, each of which are integral to ensuring that we have a good understanding of where are pupils are and what is needed to move them forwards.

Formal Assessment

Children are formally assessed through a range of assessments. A Placement Assessment is undertaken at the start of the year to ensure that each pupil is working at the correct level in their Pr1me Maths learning. As well as this, GL Assessment reports are created periodically throughout the year (in the form of CAT4 cognitive tests) and Baseline assessments for New Entrants. This gives us a starting point and informs teachers of which pupils may require additional support. The standardised assessments provided by GL Assessment International also ensure that our overall teacher judgements are accurate. As well as this, high-quality daily marking should form the basis for effective continuous assessment.