Mathematics at Langford Village Academy

Intent

At Langford Village Academy our intention is to enable all children to achieve their full potential in Mathematics and to become fluent, confident and independent-thinking mathematicians who can apply their learning to new contexts and articulate their reasoning. In meeting this intention, we employ the Mastery approach to mathematics which embodies the belief that all children can achieve in mathematics, not just the few.

The key elements of the Mastery approach to the teaching of mathematics are:

- An expectation that all pupils can and will achieve.
- Pupils are taught through whole class teaching with the children working on the same the lesson content at the same time. Differentiation emphasises deep knowledge and individual support/intervention.
- Teaching is underpinned by methodical curriculum design, with units of work that focus in depth on key topics. Lessons and resources are crafted carefully to foster deep conceptual and procedural knowledge.
- Makes use of mathematical representations that expose the underlying structure of the mathematics
- Helps children to make sense of concepts and achieve fluency through carefully structured questions, exercises and problems that use conceptual and procedural variation to provide 'intelligent practice', which develops conceptual understanding and procedural fluency in parallel;
- Blends whole class discussion and precise questioning with intelligent practice and, where necessary, individual support.
- Lesson design and planning create a carefully sequence learning journey in which key learning points and areas of potential difficulty are identified
- Procedural fluency in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- Conceptual understanding is developed at the same time as fluency and is something al children can develop through intelligent questioning and careful use of concrete, pictorial and abstract representations with all children.
- Key number facts such as times tables and number bonds are taught so as to enable swift recall and learnt by the children to help avoid cognitive overload and to facilitate clear focus on new concepts.
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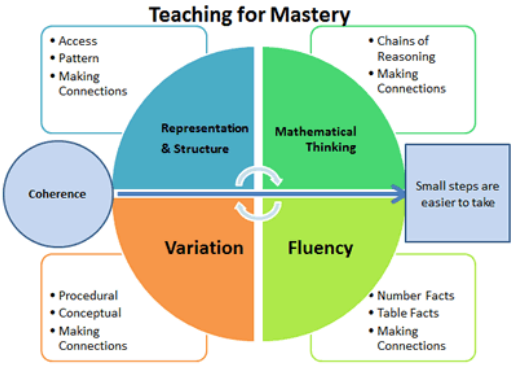
Our intention will be met, we believe, through our Maths curriculum which is structured to ensure that children are given the opportunity to experience and meet all the objectives of the National Curriculum. The sequence, timing and duration of topics are purposefully chosen to provide all children with the opportunity to develop procedural fluency and secure grasp/mastery of mathematical concepts. Our Maths curriculum is intended to enable the acquiring of knowledge and skills in a cumulative manner which builds on previous years learning and facilitates retention and the building of connections between areas of learning.

Implementation

In meeting our Intent, the Five Big Ideas of teaching for Maths Mastery are key.



Coherence
Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Representation and Structure
Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation

Mathematical Thinking
If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others

Fluency
Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics

Variation
Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

To help fulfil our intent we aim to teach the key skills of mathematics as well as developing knowledge of facts and concepts. Development of these skills alongside intelligent questioning by the teachers provide convincing evidence and proof that support mathematical thinking which are always promoted in maths lessons at LVA. In planning for each lesson we identify the maths skills children will need to employ in their learning:

These skills are:

Conjecturing & Convincing, Organising & Classifying, Imagining & Expressing. Specialising & Generalising

Conjecturing
Children should be encouraged to **make conjectures,** that is say what they think about what they notice or why something happens. E.g., “I think that when you multiply an odd number by an even number you are always going to end up with an even number.”

Convincing
Children should then be encouraged to **convince**, that is to persuade people (a partner, group, class, you, an adult at home etc) that their conjectures are true. In the process of convincing, children may use some, or all, of their other maths powers.

Organising
Children should be encouraged to **organise,** putting things (numbers, facts, patterns, shapes) into groups, in an order or a pattern, e.g., sorting numbers or shapes

Classifying
Children should then be encouraged to **classify** the objects they have organised e.g., identifying the groups odd and even numbers, irregular and regular shapes, etc.

Imagining
Children should be encouraged to **imagine,** objects, patterns, numbers and resources to help them solve problems and reason about mathematics.

Expressing
Children should be encouraged to **express their thinking,** that is show and explain their thinking and reasoning e.g., about a problem, relationship or generalisations.

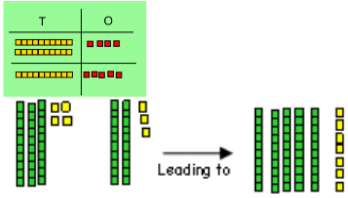
Specialising
Children should be encouraged to **specialise,** that is to look at specific examples or a small set examples of something. For example, looking at the odd number 7 and the even number 8 to test their conjecture that an odd X even number = odd number. Children can also specialise in order to start to see patterns

Generalising
Children should be encouraged to **generalise,** that is to make connections and use these to form rules and patterns. For example, from their specific example they could generalise that any odd number multiplied by an even number gives an even number.

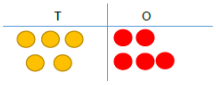
Lesson delivery involves using appropriate representations: Concrete, Pictorial & Abstract

24 + 15=

Add together the ones first then add the tens. Use the Diennes first before moving onto place value counters.



After practically using the Dienes and place value counters, children can draw the counters to help them to solve additions.



Expanded column method

$$\begin{array}{r} 24 \\ +\ 15 \\ \hline 9 \\ 30 \\ \hline 39 \end{array}$$

Leading to compact (Short) method

$$\begin{array}{r} 24 \\ +\ 15 \\ \hline 39 \end{array}$$

Further challenge, extension and deeper thinking tasks are made available to pupils who complete work and challenge will always be present in lessons through the teacher questioning; promoting mathematical thinking and connections; developing reasoning skills and moving from the specific to the general.

Impact

The impact of maths lessons at LVA will be immediately apparent within the lesson itself. The opportunities for children to demonstrate their level of understanding will be evident through the Mathematical discussions and the children's responses to carefully planned and constructed questions posed.

Marking within the lesson and oral comments gives the children immediate feedback and allows the children to respond and develop their understanding as close to the point of learning/action as is possible and helps address any misconceptions before they become embedded.

Where possible interventions are provided within the lesson and in small, focussed groups tp support those who may need some additional learning.

The progress that pupils make over time is clear evidence of the impact of the teaching and learning. To measure this progress, teachers integrate a combination of formative assessment (gathered during discussions, questioning, resourced activities, paired and independent tasks) and summative assessment carried out at the end of each unit of learning. By considering all the evidence, teachers can evaluate a pupil's true understanding of the knowledge and skills in the unit of learning in a way that allows for the ever-present disparity between the natural, relaxed situation of demonstrating understanding in a lesson and the rigid, formality of a test where interpretation of the question may be the biggest stumbling block.

This informed teacher assessment is compared against age-related expectations for each term of the academic year. Demonstrable solid understanding of all the blocks within a term will meet age-related expectations for that stage of the year. Through the internal assessment process, gaps in understanding can be identified and addressed and parents can be informed of their child's progress over the course of the year to date.