Mathematical Thinking (Thinking)

Thinking in a mathematical way and being mathematical in your approach. Everyone is a mathematical being, capable of mathematical thinking and developing as a mathematical thinker (including mathematical learning behaviours or dispositions).

'Mathematical thinking is a whole way of looking at things, of stripping them down to their numerical, structural, or logical essentials, and of analysing the underlying patterns' (Devlin 2011, p.59)

Exploring, questioning, working systematically, visualising, conjecturing, explaining, generalising, justifying, proving... are all at the heart of mathematical thinking'. (NRich)

Reasoning
Knowing and explaining 'why' (not just knowing 'what' and 'how'). Reasoning can be describing, explaining, convincing, justifying and proving (NRich's novice to expert reasoning progression) and the quality relates to the coherence or completeness of the chain of reasoning.

Connection-making
Make and use connections between mathematical concepts, between representations, between different strategies or approaches and between mathematics and everyday experiences.

Fluency (Doing)

Flexible, efficient and accurate. Fluency tends to also suggest being confident and comfortable.

Includes rapid recall of knowledge as well as using this recalled knowledge alongside understanding of mathematical structures to find what is not currently known. Fluency can include using the most efficient method or strategy and working flexibly with the mathematics (manipulating and adapting).

Representation (Seeing/Feeling/Showing)

A way of showing the mathematical structure. Representations can be models, symbols or expressions of the mathematical situation. Some are more abstract that others. Children can see patterns in representations which support them in beginning to understand the underlying mathematical structures. Common representations (such as number lines and hundred squares) will be encountered many times.

Stem sentence
Describes a representation and supports children to generalise and develop more abstract thinking. It emphasises the essence of the mathematics and also supports the development of verbal reasoning.

Recording
Formal or informal representation of the mathematics by the adult or child. This can include mathematical graphics (children's own representations or purposeful mark-making), numerals, symbols, diagrams, writing and formal written methods.

Variation (Contexts)

Procedural Variation (intelligent practice)

The precise designing of examples, problems or questions to help the children see patterns, notice structures, make connections or understand relationships (to support conceptual understanding).

Conceptual Variation

Explore the same mathematical concept in different contexts or represented in different ways. The same mathematical concept is engaged with multiple times, in different contexts to emphasised it is the essence of each n more than one context or way of seeing it, the essence of the maths is emphasised, and depth of understanding is developed through applying this understanding to many different (and perhaps increasing complex) contexts.

Teaching for Mastery Terminology for Early Years Practitioners

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