Teaching for Mastery: **Representation and Structure**

Teaching for Mastery

- Access
- Pattern
- Making Connections

- Chains of Reasoning
- Making Connections

Representation & Structure

Mathematical Thinking

Coherence

Small steps are easier to take

Variation

Fluency

- Procedural
- Conceptual
- Making Connections

- Number Facts
- Table Facts
- Making Connections
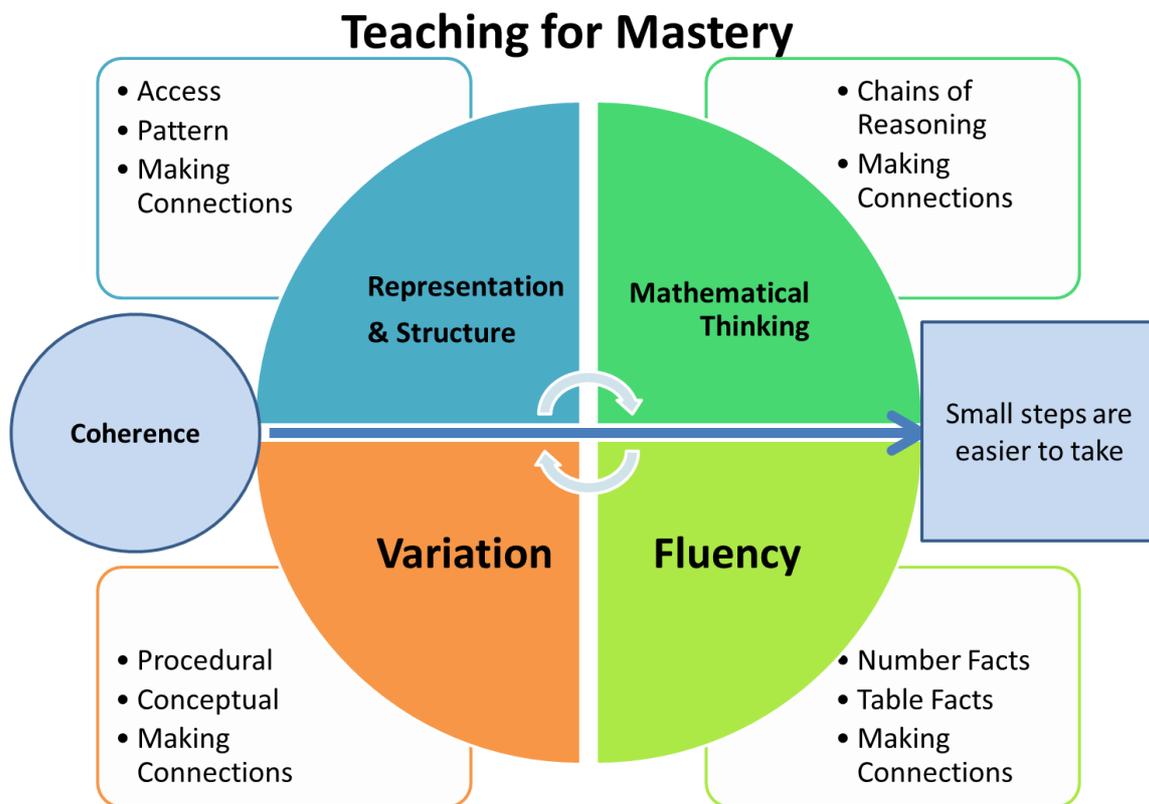
Key Messages

1. The representation needs to clearly show the concept being taught, and in particular the key difficulty point. It exposes the structure.
2. In the end, the students need to be able to do the maths without the representation.
3. A stem sentence describes the representation and helps the students move to working in the abstract ("ten tenths is equivalent to one whole"), and could be seen as a representation in itself.
4. There will be some key representations which the students will meet time and again.
5. Pattern and structure are related but different: students may have seen a pattern without understanding the structure which causes that pattern.

Represent these calculations with unit squares

1. $3 + 2 =$
2. $4 + (-3) =$
3. $-6 + 3 =$
4. $-1 + (-2) =$
5. $5 - 1 =$
6. $1 - (-2) =$
7. $-3 - 2 =$
8. $-2 - (-4) =$

Represent these expressions using algebra tiles

1. $x + 1$
2. $2x$
3. $2x + 1$
4. $x^2 + 1$
5. $x^2 + 2x + 1$
6. $x - 1$
7. $\frac{x}{2}$

Factorise these expressions using algebra tiles

1. $x^2 + 4x + 4$
2. $x^2 + 5x + 6$
3. $2x^2 + 5x + 2$
4. $x^2 + 4x + 3$
5. $x^2 - x - 6$