National Centre for Excellence in the Teaching of Mathematics

MathsHUBS



Big Ideas in Teaching for Mastery: Key Messages

Coherence

1. Small steps are easier to take.
2. Focussing on one key point each lesson allows for deep and sustainable learning.
3. Certain images, techniques and concepts are important pre-cursors to later ideas. Getting the sequencing of these right is an important skill in planning and teaching for mastery.
4. When something has been deeply understood and mastered, it can and should be used in the next steps of learning.

Representation & Structure

1. The representation needs to pull out the concept being taught, and in particular the key difficulty point. It exposes the structure.
2. In the end, the children need to be able to do the maths without the representation
3. A stem sentence describes the representation and helps the children 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 children will meet time and again
5. Pattern and structure are related but different: Children may have seen a pattern without understanding the structure which causes that pattern

Variation

5. The central idea of teaching with variation is to highlight the essential features of a concept or idea through varying the non-essential features.
6. When giving examples of a mathematical concept, it is useful to add variation to emphasise:
    a. What it is (as varied as possible);
    b. What it is not.
7. When constructing a set of activities / questions it is important to consider what connects the examples; what mathematical structures are being highlighted?
8. Variation is not the same as variety – careful attention needs to be paid to what aspects are being varied (and what is not being varied) and for what purpose.

Fluency

1. Fluency demands more of learners than memorisation of a single procedure or collection of facts. It encompasses a mixture of efficiency, accuracy and flexibility.
2. Quick and efficient recall of facts and procedures is important in order for learners' to keep track of sub problems, think strategically and solve problems.
3. Fluency also demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections and to make appropriate choices from a whole toolkit of methods, strategies and approaches.

Mathematical Thinking

1. Mathematical thinking is central to deep and sustainable learning of mathematics.
2. Taught ideas that are understood deeply are not just 'received' passively but worked on by the learner. They need to be thought about, reasoned with and discussed.
3. Mathematical thinking involves:
    - looking for pattern in order to discern structure;
    - looking for relationships and connecting ideas;
    - reasoning logically, explaining, conjecturing and proving.