

Numicon - Key Mathematical Ideas

The mathematical processes that support effective learning in mathematics are:

- FLUENCY (not necessary speed, but smoothness of thinking, understanding, flexibility, familiarity, and automaticity),
- REASONING (action, imagery, conversation, relationships)
- THINKING MATHEMATICALLY (generalising and connecting, reasoning, being systematic in approaching problems, exploring and using representations, selecting tools and applying strategies based on 'pattern' and 'relationship').

To note:

- Most mathematical ideas are generalisations and because of this appear to be abstract. Generalising encourages children to ask at every point, 'Will this always work or happen?' Every lesson needs to include this (Mason et al 2005). Looking for patterns in every situation enables students to generalise. This brings success in problem solving.
- Problem-solving in context brings an opportunity to communicate the challenge, use resilience, and resourcefulness. They apply knowledge and reason to a solution based on 'pattern'. Being systematic is an aspect of effective reasoning and a secure foundation for generalising and predicting.
- Students reflect on their own thinking (metacognition) plus their use of language (metalinguistic awareness) (Sfard), and to consciously adjust, to make their solutions mathematically efficient and accurate.
- They are curious to see the problem from others' perspectives and to use the most efficient strategy based on 'pattern' and 'relationship'. They love joining in with others. (Vygotsky)
- *Making situations predictable is exactly what maths is about.* (Wing)

PATTERN AND ORDER

An essential idea underlying all Numicon activities that makes it stand out from other programmes is that of 'pattern'. The sensing of patterns helps us make predictions, vital to our everyday lives. A huge number of these patterns involve an order, a sequence.

The idea of sequential order is the first and most important of all mathematical ideas.

Once students see the pattern that each next whole number is one more than the last, they know that counting with numbers go on forever. The ability to think ahead, to see how things would be if they carried on like this is crucial to an understanding of our number system and to the mastery of calculating. Place value, understanding our number system and all operations are based on a predictable pattern.

Numicon guides the sequence of teaching/learning and provides the resources for teachers to select the best activities to meet the differing needs of ALL their students.

Our current curriculum opens with:

Mathematics is the exploration and use of patterns and relationships in quantities, space, and time.

Statistics is the exploration and use of patterns and relationships in data. These two disciplines are related but are different ways of thinking and of solving problems. Both equip students with effective means for investigating, interpreting, explaining, and making sense of the world in which they live.