



NCS Math (Primary)

Faculty of Education, HKU

## Quality Education Fund Thematic Networks – Tertiary Institutes (QTN=T)

Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking (NCS) Students in Primary Schools

# Depth with Fluency

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### How to Achieve Mathematical Fluency in Pace With Mathematical Sense?

The development of mathematical knowledge, particularly for primary school students, is a process from concrete realia to abstract ideas, a re-understanding or re-interpretation of their daily lives with mathematics.

Even though NCS students may have greater diversity in their mathematical knowledge and skills, they could be motivated and acquire mathematical skills as well as conceptual understanding.

#### Some Suggestions on Developing Concepts and Skills:

1. Use visual models to enhance skill building.

For example, the "multiples of 9" have interesting patterns which lead to many quick memorisation techniques. Asking NCS students to discover the patterns themselves with the use of ten-frames may help them learn the rules with a better sense of ownership and pick up mathematical problem-solving skills.

#### 2. Embed learning in more interesting activities.

For example, help lower primary school students add with better concepts and skills via dice games and later by ten-frames.

- Counting the dots on dice is more effective than finger counting. Dots also help students gradually learn to count with their eyes and then in their heart.
- Ten-frames help group numbers more effectively.

#### Make 10

#### https://www.geogebra.org/m/kwrhyrgs

This is a GeoGebra app that helps students work on pairs of numbers adding up to ten. They could be better prepared for subtraction and addition with carrying.

Visual elements of ten-frames enhance students' conceptual understanding and at the same time improve arithmetic skills.





NCS students do not only memorise. They can conceptualise the rules behind the facts.





#### 3. Misconception could be avoided with visual models.

Adding 2 and 3 is straightforward while adding  $\frac{2}{7}$  and  $\frac{3}{7}$  is not. It is not uncommon that NCS students add both the numerators as well as the denominators, resulting in a wrong answer.

With visual models, the meaning of fraction addition becomes apprehensible and meaningful. For example, the visual model as shown on the right suggests that it is 2 parts (out of 7 as a whole) adding to 3 parts (in the same sense), that will result in 5 parts (out of 7 as a whole).

#### 4. Bring mathematics to a real situation.

Do activities that require students to pick up the right mathematical tools to solve problems so that students could better understand mathematical concepts and their linkage.





Students solved the problem of finding the volume of a tiny object by measuring multiple identical objects to make displacement method possible (the change in water level was significant enough to be measured) and then using division to find the answer.



Students are motivated to raise questions that they are interested in and thus create more opportunities for real practice. The photo shows a student trying to find out the volume of her hand.