

香港數學教育學會

聯合主辦



香港公開大學  
THE OPEN UNIVERSITY  
OF HONG KONG

30  
OUHK

# 香港數學教育會議 2019

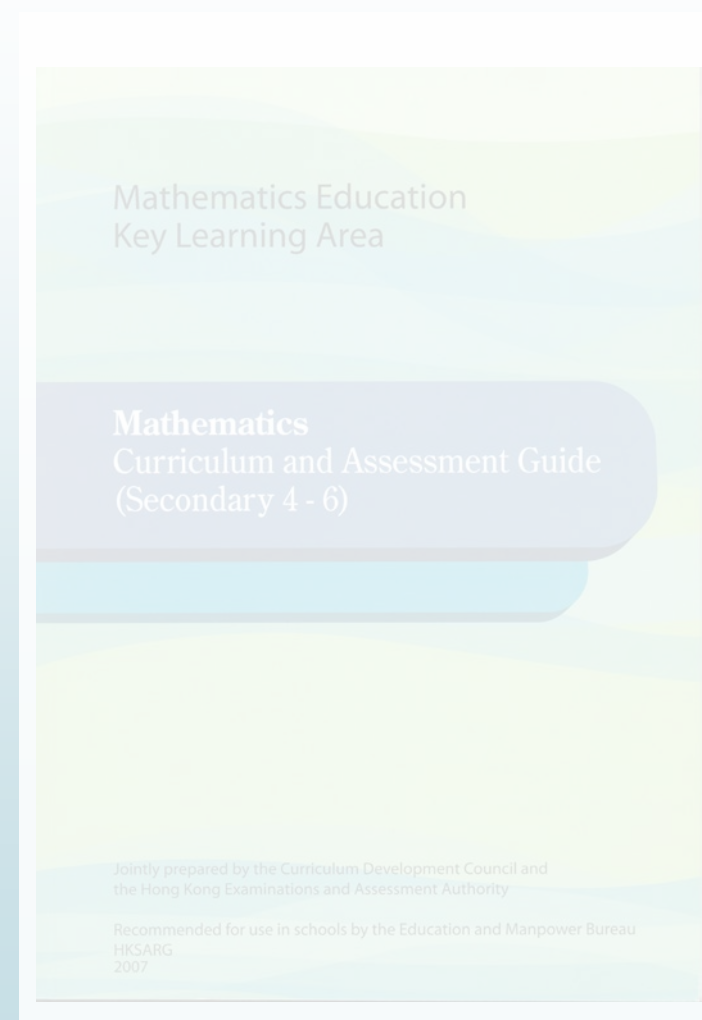
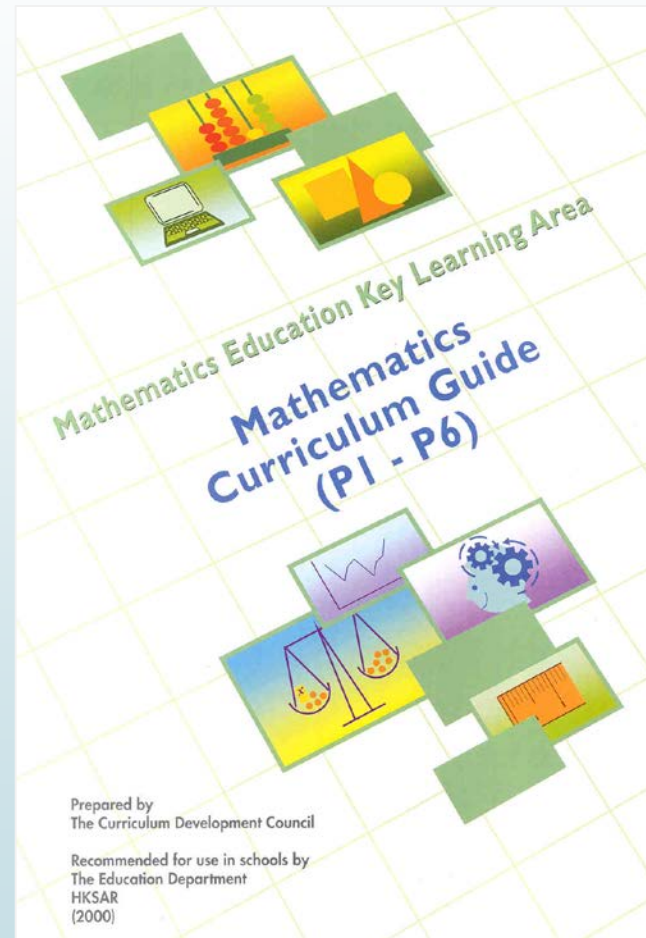
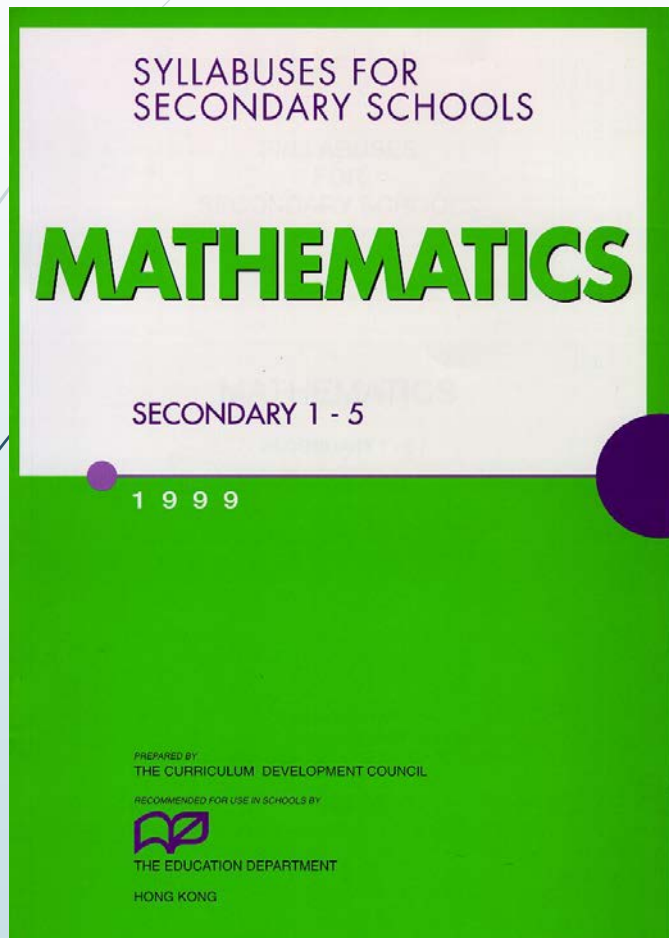
## Embracing Learner Diversity Learning from Culturally and Linguistically Diverse Learners in the Mathematics Classroom

WONG Ka Lok

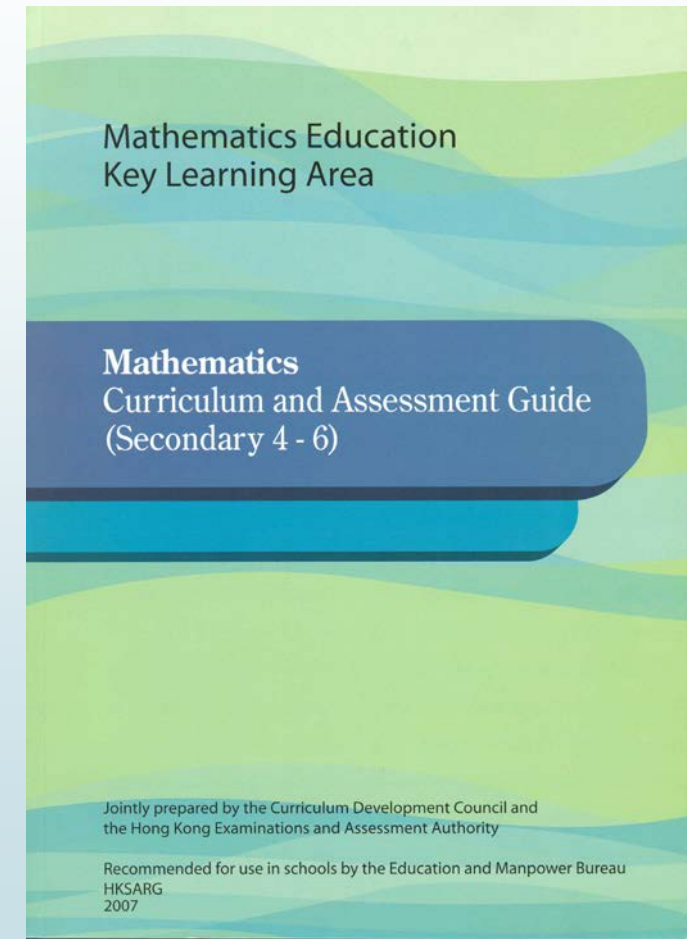
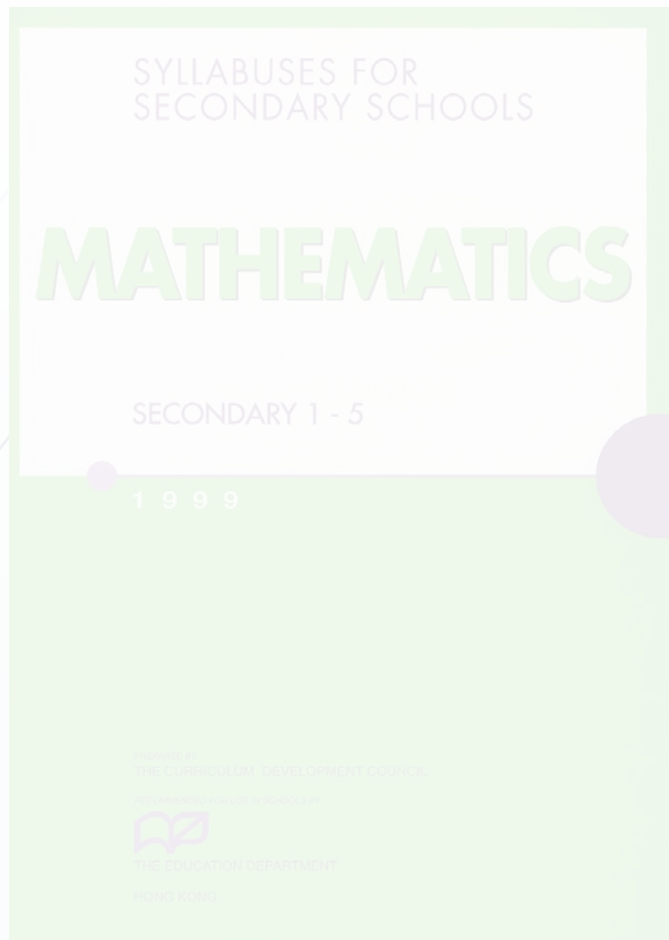
Faculty of Education, The University of Hong Kong

June 21, 2019

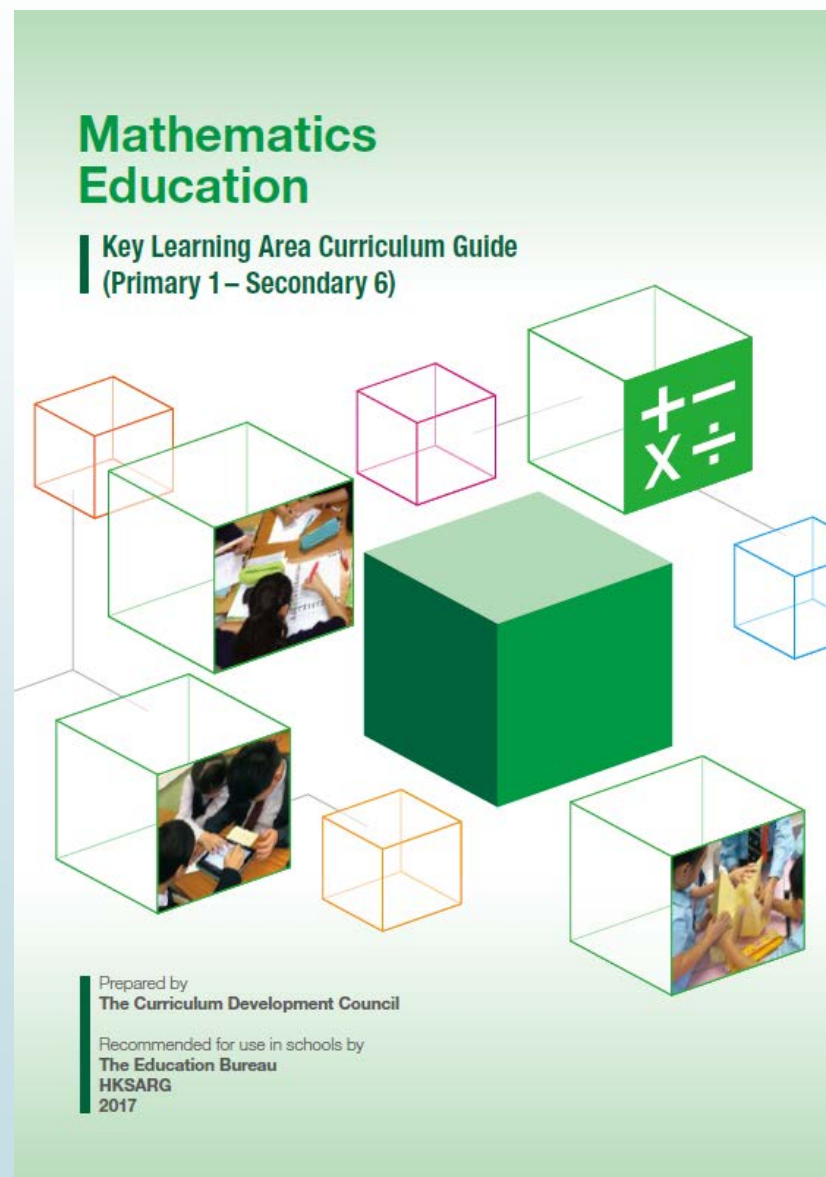
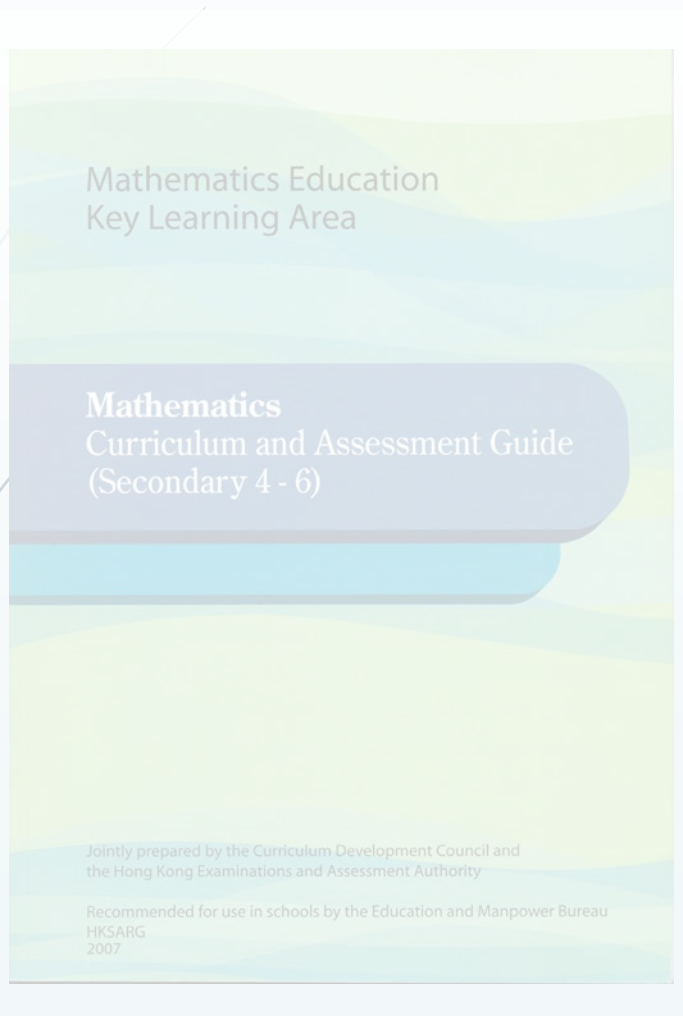
# Catering for Learner Differences



# Catering for Learner Diversity

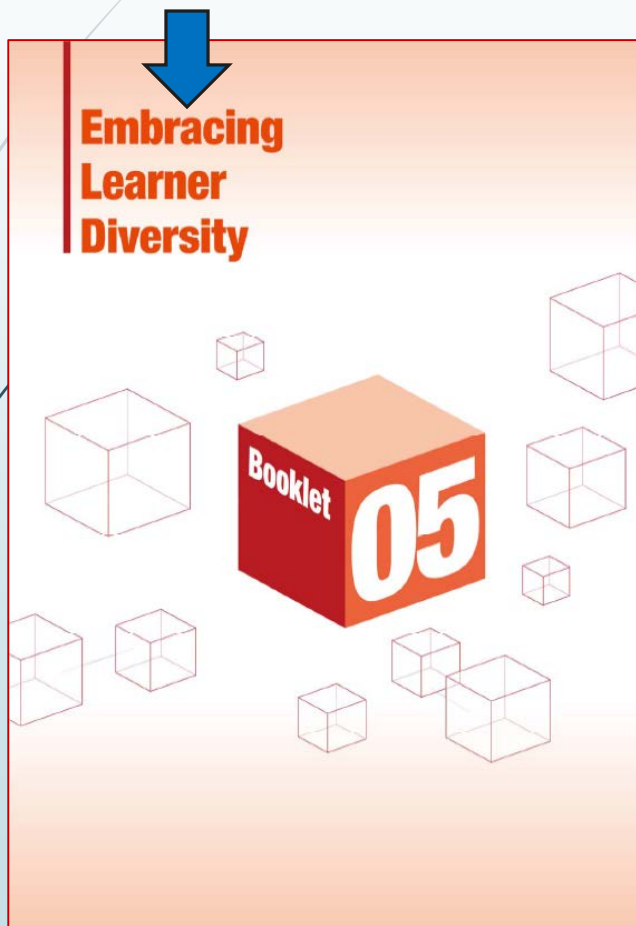


# Catering for Learner Diversity



# Embracing Learner Diversity

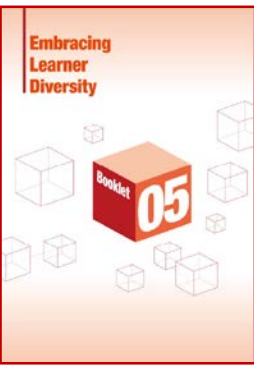
Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)





# Embracing Learner Diversity

Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)



Catering for learner diversity is about treating each learner the same and minimising the difference in student achievement.



Myth!!

(CDC, 2017, p. 4)

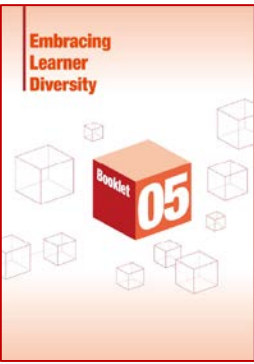
#### Debunking the Myth:

“Catering for learner diversity is about treating each learner the same and minimising the difference in student achievement.”

- In education, fairness or equity does not mean treating every student in the same way or providing each student with the same kind of instruction or learning support. As students differ in many ways, including their needs, interests, backgrounds, experiences, learning styles, aspirations and levels of readiness to learn, we need to understand, respect and respond to their individuality and uniqueness. With learner differences in mind, we have to differentiate our instruction and provide students with different avenues to acquire the learning content, to process or make sense of new information and ideas, and to apply and demonstrate their learning. In so doing, we aim to realise each student’s potential and narrow the learning gap, i.e. the gap between a student’s actual achievement and his or her potential for achievement.
- To equate catering for learner diversity with the narrowing of an achievement gap could be problematic, as the latter, which generally refers to effort made to minimise the difference in achievement between groups of students, implies that all students are expected to achieve the same learning targets or reach the same performance standards.

# Embracing Learner Diversity

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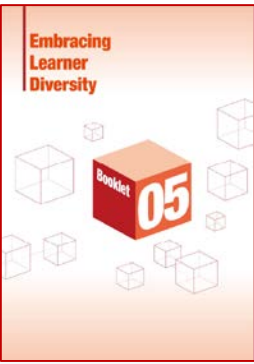
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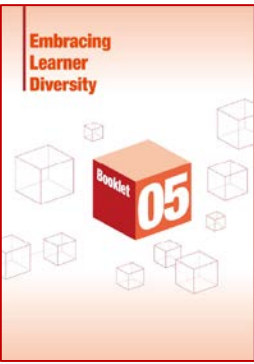


# Embracing Learner Diversity

## Learning from Culturally and Linguistically Diverse Learners in the Mathematics Classroom

# Embracing Learner Diversity

Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)



Over the past few decades, the Government and schools have taken concerted efforts to support students with diverse learning needs. There are resources from the EDB to support schools with intake of students with SEN and students who are gifted.

**Greater diversity in the demographic make-up of Hong Kong** is now observed in schools with an increasing number of newly arrived children (NAC) from the Mainland and NCS students, so there are **additional resources for schools to help these students adapt to our education system.** (CDC, 2017, p. 2)

# More and more ethnic minority students

In Hong Kong, the 'ethnic minorities' [EM] would refer specifically to approximately 3.6% of the Hong Kong population who are South Asians (such as Indians, Pakistanis, and Nepali).

Although EM students make up only about 4% of the total student population, the total number of EM students across all levels of schooling (i.e. pre-school to primary and secondary) has increased by 25% in the five-year period of 2009 to 2014 (Kapai, 2015).

Despite the small proportion (about 4%) of the total student population, the difficulties they, together with their teachers, experienced in school education have been well recognised (Erni & Leung, 2014).

Erni, J. N., & Leung, L. Y. (2014). *Understanding South Asian minorities in Hong Kong*. Hong Kong: Hong Kong University Press.

Kapai, P. (2015). The education of ethnic minorities. In P. Kapai (Ed.), *The status of ethnic minorities in Hong Kong 1997-2014: Final Report* (Chapter 3). Hong Kong: Centre for Comparative and Public Law, Faculty of Law, The University of Hong Kong.

# Difficulties confronting EM (NCS) students

“Some NCS students encounter learning difficulties and adjustment problems when they study in local schools. Greater care and help from schools, teachers and parents are required so that these students can adapt to the local education system and integrate into the community quickly. The EDB provides various support services to school administrators, teachers and parents to cater for NCS students’ general learning and adaptation needs ... especially in connection with the learning and teaching of the Chinese Language.” (CDC, 2017, p. 39-40)

# Difficulties confronting EM (NCS) students

“Some NCS students encounter learning difficulties and adjustment problems.”

The EDB **abolished** in the 2013/14 school year the so-called “**designated schools**” system aforementioned with a view to removing the misconception arising from the “designated school” label which is in fact a misnomer and to raising schools’ awareness to support NCS students’ learning of the **Chinese language**.



# Difficulties confronting EM (NCS) students

Puja Kapai (2015, p. 27, italics added) reported, “ethnic minority students were very much weaker in Chinese *and slightly weaker in Mathematics* than their Chinese counterparts at the point of Primary 1 admission”.

Difficulties are NOT ONLY  
due to Chinese Language!

# University-School Support Programme (USP)

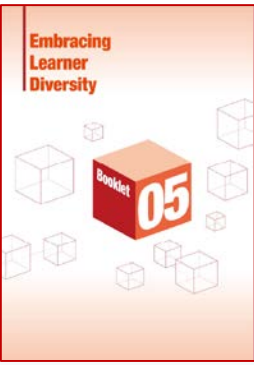
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in **Primary** Schools (2017-19)*
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in **Secondary** Schools (2015-17)*

## ACKNOWLEDGEMENT

The two USP projects were funded by **Education Development Fund**, Education Bureau, HKSAR.

# Embracing Learner Diversity

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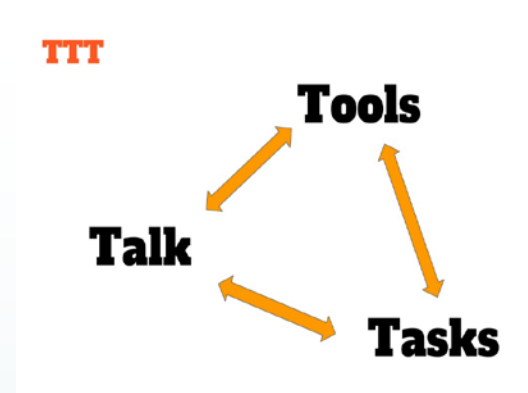
# A Few Principles & Standards

- Excellence in mathematics education requires equity – high expectations and strong support for all students (Equity Principle, p. 12)
- Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well (Teaching Principle, p. 16)
- Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge. (Learning Principle, p. 20)

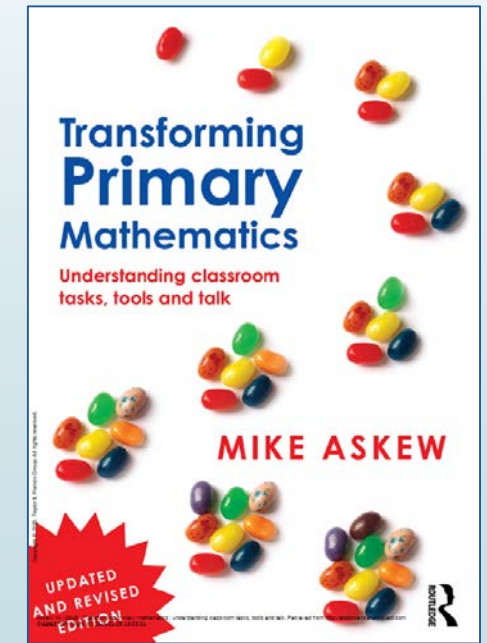
*Principles and standards for school mathematics,*  
NCTM (2000), cited in Bay-Williams & Herrera (2007, p. 44)

# Teaching Tripod

- Tasks
- Tools
- Talk



Mike Askew (2016, p. 115) suggests that “the teaching tripod can maximize the likelihood of mathematics emerging from lessons without closing things down too much. By attending to each of the elements in the teaching tripod lessons can be structured to be sufficiently open to allow children to bring their mathematical knowledge to bear, but also sufficiently structured to allow some degree of control over the direction of the content.”



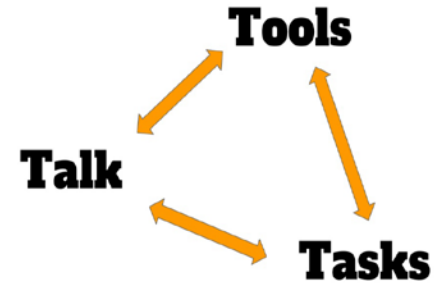
Askew, M. (2012). *Transforming primary mathematics*. Abingdon, Oxon / New York: Routledge.

Askew, M. (2016). *Transforming primary mathematics: Understanding classroom tasks, tools, and talk (Updated and Revised Edn.)*. London / New York: Routledge.



# Teaching Tripod

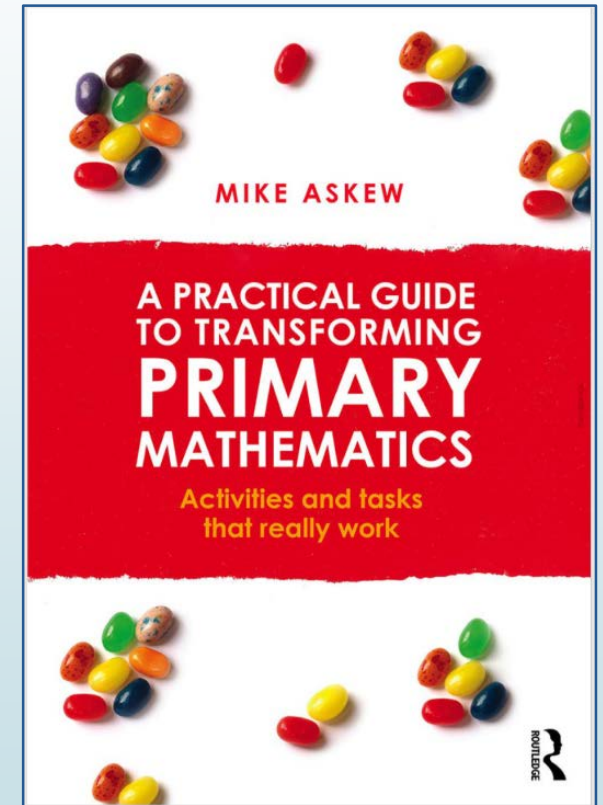
TTT



- **Tasks**
- **Tools**
- **Talk**

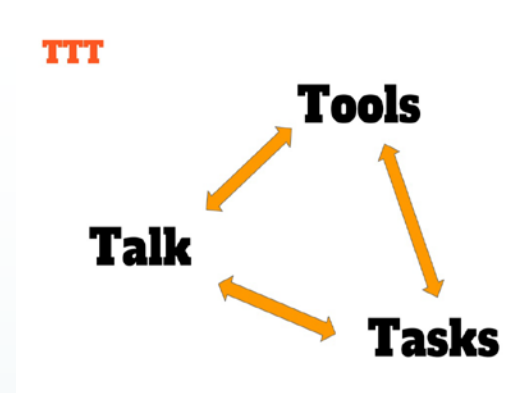
3 intertwined elements

Mike Askew (2016, p. 1) suggested that "preparing for and enacting teaching was **more secure** when based upon careful choice of **tasks**, supported by a range of **tools** that extend our 'natural' abilities and held together by **careful attention to classroom talk.**"

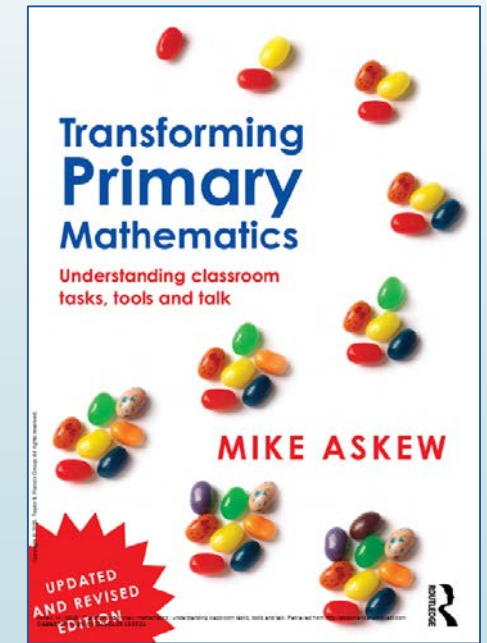


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# Mathematical Background & Language Proficiency

Limited Mathematical Background & Language Proficiency

use concrete examples & manipulatives for new concepts; work with peers with more relevant mathematical knowledge

modify the contents (e.g. less technical words), informal pre-assessment of the current knowledge & skills; develop towards increasing word complexity

Limited Mathematical Background & Limited Language Proficiency

Proficient Mathematical Background & Language Proficiency

opportunities to learn more by application & articulation (e.g. to serve as translators & mentors for their peers)

opportunities to learn more by application & articulation (e.g. to serve as translators & mentors for their peers)

Proficient Mathematical Background & Limited Language Proficiency

# Five Aspects of learning and teaching

## **Activity first**

Learning mathematics through games and activities

## **Beyond algorithm**

Developing conceptual understanding as well as procedural knowledge of arithmetic operations

## **Culture matters**

Exploring culture and values of ethnic minority students

## **Depth with fluency**

Developing proficiency with number facts

## **Exercise counts**

Illustrative examples and intelligent practice

# Five Aspects of learning and teaching

## **Activity** first

Learning mathematics through games and activities





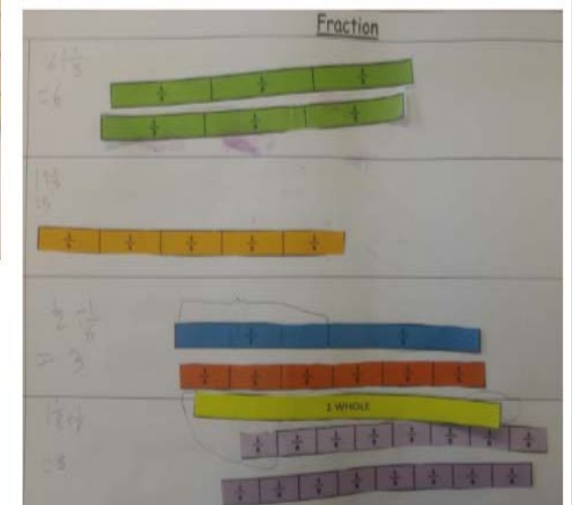
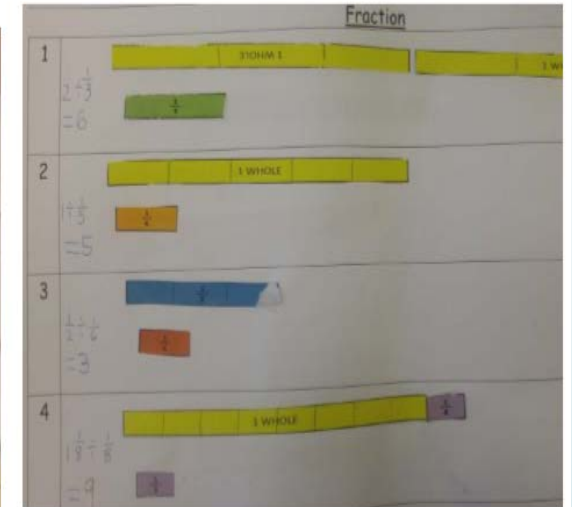
# Using Fraction Bar in Learning **Fraction Division**

**P5** – Division of fraction  
about 4 students work in a group.

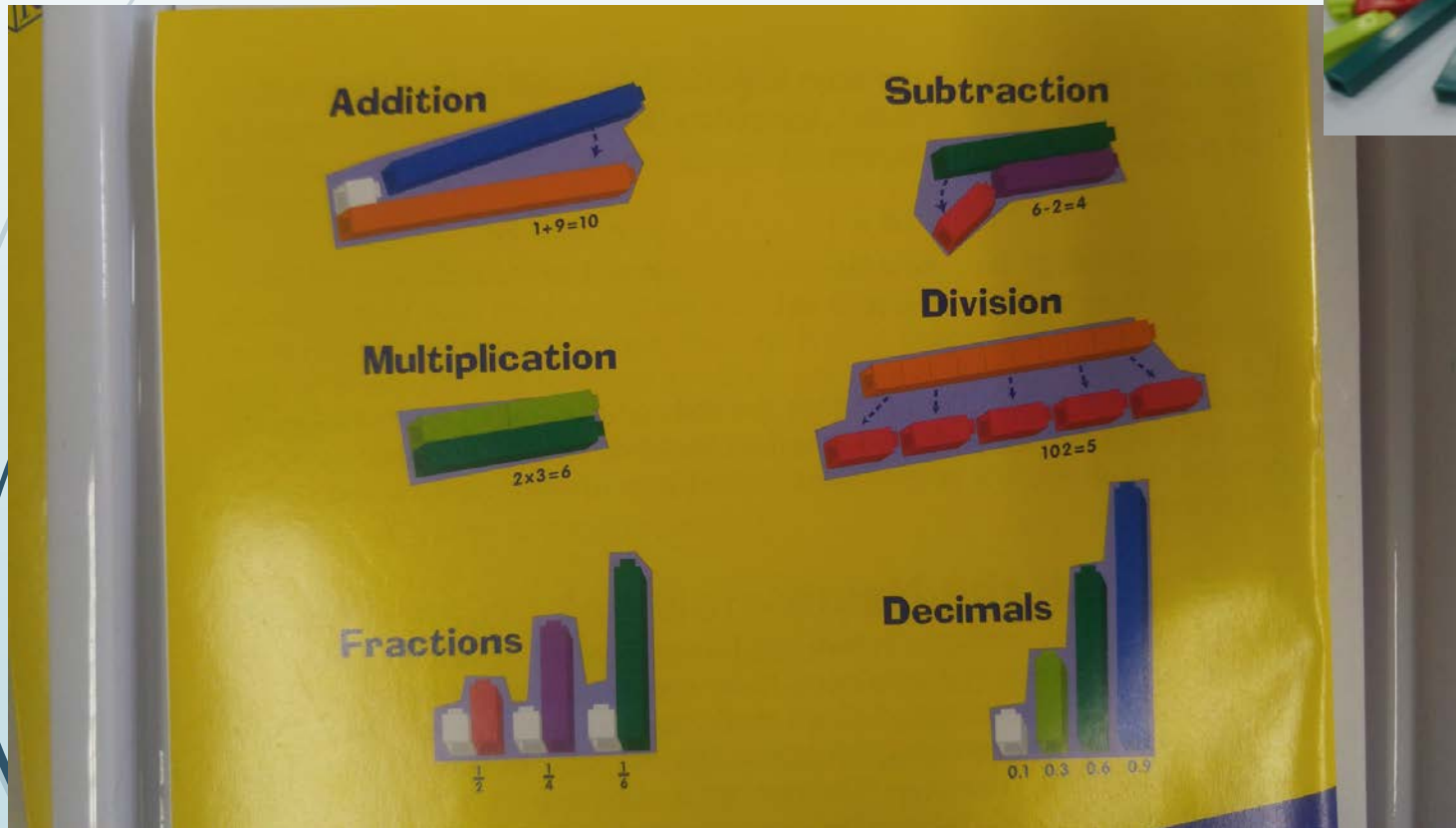
Students used fraction bars to explore the relationship of part and whole.

Students wrote down the mathematics sentences to represent their thoughts on division of fraction with fraction bars.

Making connection to division of integers rather than just memorizing procedures on division of fraction.



# Cuisenaire Rods (C-rods / Coloured rods)







2B 活動班

Dynamic Dharwood Pau Memorial Primary School  
Primary 2 1<sup>st</sup> term Mathematics Worksheet

Name: \_\_\_\_\_ ( ) Date: \_\_\_\_\_  
Class: \_\_\_\_\_ Marks: \_\_\_\_\_

8 Times table (10%)

|     | Multiplicand |   | Multiplier |   | Product |
|-----|--------------|---|------------|---|---------|
| 1.  | 8            | x | 0          | = | 0       |
| 2.  | 8            | x | 0          | = | 0       |
| 3.  | 8            | x | 9          | = | 72      |
| 4.  | 8            | x | 7          | = | 56      |
| 5.  | 8            | x | 1          | = | 8       |
| 6.  | 8            | x |            | = |         |
| 7.  | 8            | x |            | = |         |
| 8.  | 8            | x |            | = |         |
| 9.  | 8            | x |            | = |         |
| 10. | 8            | x |            | = |         |

Marks: \_\_\_\_\_

# Five Aspects of learning and teaching

## **Beyond algorithm**

Developing conceptual understanding as well as procedural knowledge of arithmetic operations

# 5-digit numbers with arrow cards

(P.3)



五位數  
5-digit number.

| 萬<br>Ten<br>Thousands<br>place | 千<br>Thousands<br>place | 百<br>Hundreds<br>place | 十<br>Tens<br>place | 個<br>Units<br>place |
|--------------------------------|-------------------------|------------------------|--------------------|---------------------|
| 2                              | 4                       | 3                      | 1                  | 6                   |

⑤  $20000 + 4000 + 300 + 10 + 6$

④  $24316 = 20000 + 4000 + 300 + 10 + 6$

③  $20000 + 4000 + 300 + 10 + 6$

②  $20000 + 4000 + 300 + 10 + 6$



# 5-digit numbers with arrow cards (P.3)

<https://ggbm.at/9757927> (Eng) <https://ggbm.at/9744708> (Chi)

Input a 5-digit numbers.

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|



# 5-digit numbers with arrow cards (P.3)

<https://ggbm.at/9757927> (Eng)

<https://ggbm.at/9744708> (Chi)

## Place Values of a 5-Digit Number

Author: Anthony OR 柯志明

Input a 5-digit numbers.

|   |   |   |   |   |
|---|---|---|---|---|
| 3 | 1 | 6 | 0 | 7 |
|---|---|---|---|---|

Expand

- "3" is in the ten thousands place.   
It stands for 30000.
- "1" is in the thousands place.   
It stands for 1000.
- "6" is in the \_\_\_\_\_ place.   
It stands for \_\_\_\_\_.
- "0" is in the \_\_\_\_ place.   
It stands for \_\_\_\_\_.
- "7" is in the \_\_\_\_ place.   
It stands for \_\_\_\_\_.

## Place Values of a 5-Digit Number

Author: Anthony OR 柯志明

Input a 5-digit numbers.

|   |   |   |   |   |
|---|---|---|---|---|
| 3 | 1 | 6 | 0 | 7 |
|---|---|---|---|---|

Expand

Back

Reset

|   |   |   |   |   |
|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 |   |
| 6 | 0 | 0 |   |   |
| 0 | 0 |   |   |   |
| 7 |   |   |   |   |

- "3" is in the ten thousands place.   
It stands for 30000.
- "1" is in the thousands place.   
It stands for 1000.
- "6" is in the \_\_\_\_\_ place.   
It stands for \_\_\_\_\_.
- "0" is in the \_\_\_\_ place.   
It stands for \_\_\_\_\_.
- "7" is in the \_\_\_\_ place.   
It stands for \_\_\_\_\_.

# 4-digit numbers with arrow cards (P.2)

<https://ggbm.at/9758506> (Eng)

<https://ggbm.at/9753572> (Chi)

Input a 4-digit number.

7 6 8 9

Expand

Back

Reset

7 0 0 0

"7" is in the \_\_\_\_\_ place.

It stands for \_\_\_\_\_.

6 0 0

"6" is in the \_\_\_\_\_ place.

It stands for \_\_\_\_\_.

8 0

"8" is in the \_\_\_\_ place.

It stands for \_\_\_\_\_.

9

"9" is in the \_\_\_\_ place.

It stands for \_\_\_\_\_.

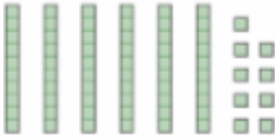



# Dividing a 2-digit number by a 1-digit number (P.3) – Lesson 1





<https://ggbm.at/10003881> (Eng) <https://ggbm.at/9977401> (Chi)

$69 \div 3 = ?$









|   | T | U |      |
|---|---|---|------|
|   |   |   |      |
|   |   | 3 | } 23 |
|   | 2 | 0 |      |
| 3 | 6 | 9 |      |
|   | 6 | 0 |      |
|   |   | 9 |      |
|   |   | 9 |      |
|   |   |   |      |
|   |   |   |      |
|   |   |   |      |
|   |   |   |      |

Each pupil gets 2 ten-blocks and  
3 unit-blocks.

# Dividing a 2-digit number by a 1-digit number (P.3) – Lesson 1



<https://ggbm.at/10003881> (Eng)    <https://ggbm.at/9977401> (Chi)

$69 \div 3 = ?$

|   | T | U |
|---|---|---|
|   |   | 1 |
|   |   | 2 |
|   | 2 | 0 |
| 3 | 6 | 9 |
|   | 6 | 0 |
|   |   | 9 |
|   |   | 6 |
|   |   | 3 |
|   |   | 3 |
|   |   |   |

23

Flexibility  
of  
Algorithm

Each pupil gets 2 ten-blocks and  
3 unit-blocks.

# Five Aspects of learning and teaching

## **Culture** matters

Exploring culture and values of ethnic minority students

→ responsive teaching that addresses students of different cultures and values



# What do ethnic minority students in Hong Kong value in mathematics learning?

## Most valued components:

**C1: Knowledge**

- knowing the steps of the solution (Q56), which formula to use (Q58, Q38), and concepts processes (Q54)

**C4: Product**

- looking for different possible answers (Q16) and ways to find the answer (Q15) and memorising facts (Q14)

**C6: Process**

- completing work (Q61), knowing the theoretical aspects (Q59), and understanding correct/incorrect solutions (Q63).

**C9: Exposition**

- explaining by the teacher (Q5) and working step by step (Q6)

**C11: Effort**

- Working out the maths by myself (Q42)

**C15: Right answer**

- Getting the right answer (Q50)

| Ethnic Minorities | Ethnic Chinese |
|-------------------|----------------|
| C9                | C9             |
| C4                | <b>C15</b>     |
| C1                | C4             |
| C6                | C6             |
| <b>C11</b>        | C1             |

# What do ethnic minority students in Hong Kong value in mathematics learning?

## *Difference in Valuing between EM & EC:*

### C2 Activities

Mathematics  
Games

Stories about  
Mathematics /  
Mathematicians

Outdoor  
Mathematics  
Activates

### C3 Practices

Practicing with  
lots of Questions

Doing a lot of  
Maths Work

Maths  
Homework

### C10 Tools

Using Diagrams

Using Concrete  
Materials



# INTERVIEWS

*Pictures and diagrams help student's learning in mathematics.*

I think I do like **visual learning**

(P6 Nepalese girl 2)

一個盒（係紙上面畫圖案），呢個係長，呢個係寬，跟住呢啲呢，呢個例如呢個7cm，呢個都係，呢個2cm，跟住7乘以2.....14

A box (*drawing a picture on paper*), this is length, this is width, and these are what, this this is 7cm for example, and so is this.

This is 2cm, then 7 times 2 ... is 14.

(P4 Pakistani boy 2)



# Five Aspects of learning and teaching

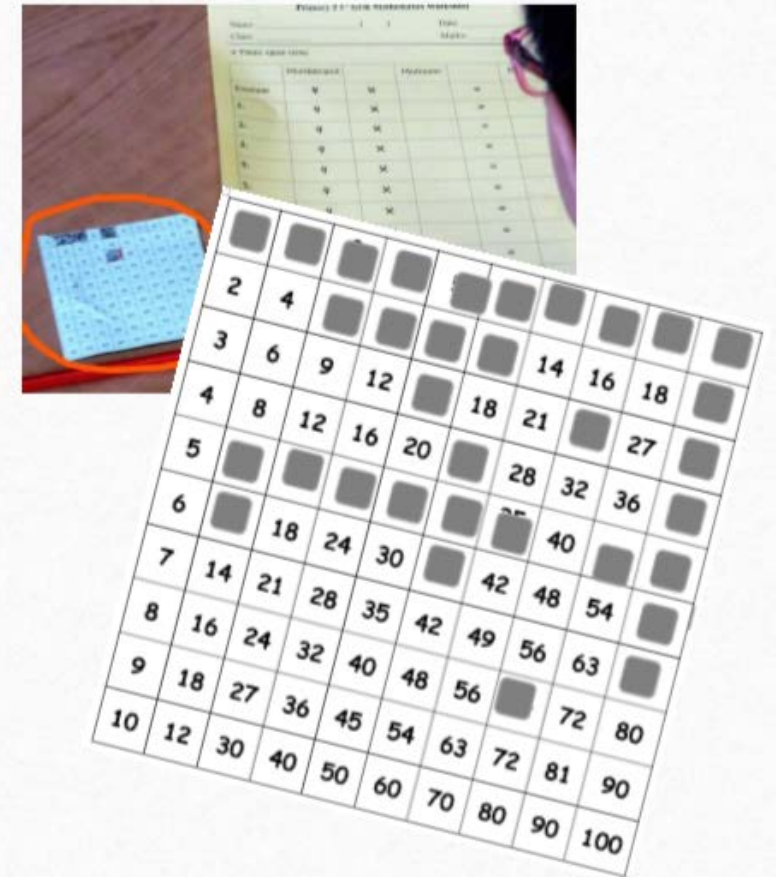
## Depth with fluency

Developing proficiency with  
number facts

# Insights from Lessons at Project Schools

- Automaticity activities can be Fun and Effective
- There are great individual differences.
- Students should learn to manage their own learning.

**Get them Memorized.**








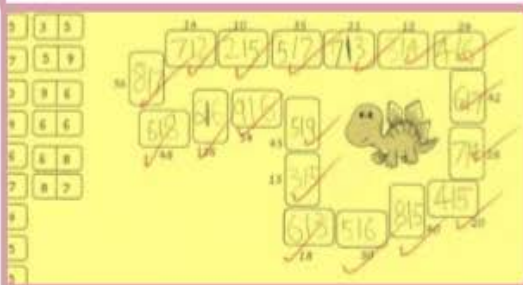


## Fun Worksheets

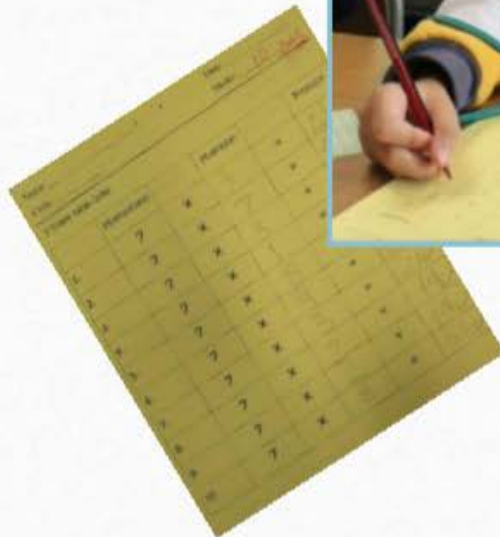


**Saad's Favourite Dinosaur**  
Find Saad's favourite dinosaur by following the following path:  
 $2 \times 1 \rightarrow 2 \times 4 \rightarrow 2 \times 7 \rightarrow 2 \times 9 \rightarrow 2 \times 0 \rightarrow 2 \times 2 \rightarrow 2 \times 3 \rightarrow 2 \times 5 \rightarrow 2 \times 6 \rightarrow 2 \times 1 \rightarrow 2 \times 8$

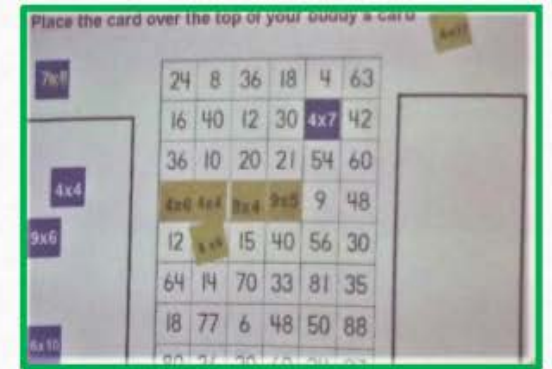
|   |    |    |    |    |    |    |   |
|---|----|----|----|----|----|----|---|
|  | 2  | 6  | 8  | 14 | 2  | 0  |    |
|   | 8  | 14 | 2  | 4  | 1  | 16 |    |
|   | 2  | 18 | 8  | 10 | 12 | 2  |    |
|   | 1  | 0  | 4  | 6  | 4  | 8  |   |
|   | 22 | 4  | 16 | 18 | 2  | 0  |  |



## Dice Activity



## Pair-game Bingo







# HKU NCS Math

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Moderate group

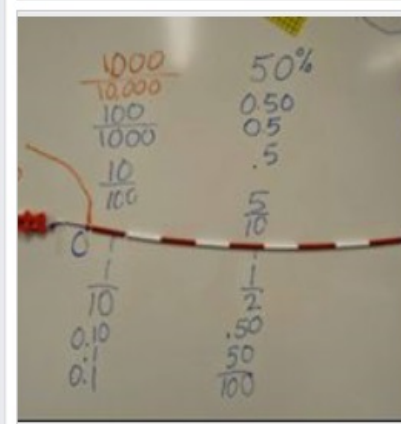
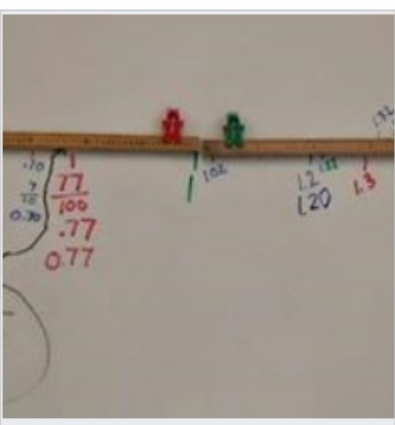
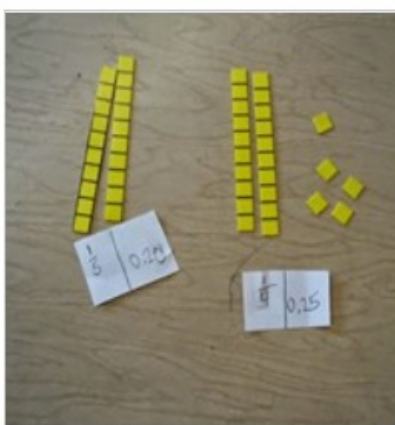
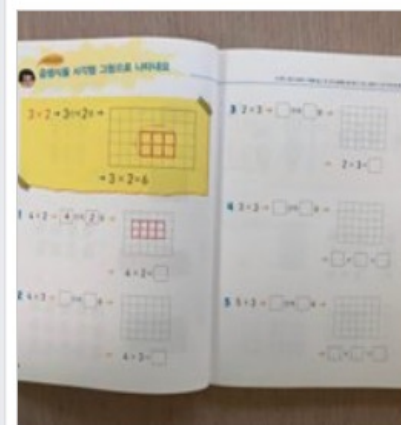
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### Shortcuts



HKU NCS Math



# Five Aspects of learning and teaching

## **Exercise counts**

Illustrative examples and  
purposeful exercise  
(intelligent practice)

# Practice makes perfect!?

typical exercise

練習十九

日期：\_\_\_\_\_

計算下列各題。

|                    |               |
|--------------------|---------------|
| 1. $3 \times 2 =$  | <b>1. 6</b>   |
| 2. $8 \times 4 =$  | <b>2. 32</b>  |
| 3. $3 \times 3 =$  | <b>3. 9</b>   |
| 4. $7 \times 6 =$  | <b>4. 42</b>  |
| 5. $1 \times 4 =$  | <b>5. 4</b>   |
| 6. $7 \times 4 =$  | <b>6. 28</b>  |
| 7. $6 \times 9 =$  | <b>7. 54</b>  |
| 8. $2 \times 5 =$  | <b>8. 10</b>  |
| 9. $8 \times 2 =$  | <b>9. 16</b>  |
| 10. $9 \times 7 =$ | <b>10. 63</b> |

學習日誌：

成績：

/10

|                     |               |
|---------------------|---------------|
| 2. $90 \times 2 =$  | <b>2. 180</b> |
| 3. $60 \times 9 =$  | <b>3. 540</b> |
| 4. $50 \times 4 =$  | <b>4. 200</b> |
| 5. $80 \times 7 =$  | <b>5. 560</b> |
| 6. $40 \times 6 =$  | <b>6. 240</b> |
| 7. $20 \times 8 =$  | <b>7. 160</b> |
| 8. $70 \times 5 =$  | <b>8. 350</b> |
| 9. $30 \times 2 =$  | <b>9. 60</b>  |
| 10. $60 \times 0 =$ | <b>10. 0</b>  |

學習日誌：

成績：

/10

# Practice makes perfect!?

練習十九

日期：\_\_\_\_\_

計算下列各題。

|                   |       |
|-------------------|-------|
| 1. $3 \times 2 =$ | 1. 6  |
| 2. $8 \times 4 =$ | 2. 32 |
| 3. $3 \times 3 =$ | 3. 9  |
| 4. $7 \times 6 =$ | 4. 42 |
| 5. $1 \times 4 =$ | 5. 4  |
| 6. $7 \times 4 =$ |       |

typical exercise

|                    |        |
|--------------------|--------|
| 2. $90 \times 2 =$ | 2. 180 |
| 3. $60 \times 9 =$ | 3. 540 |
| 4. $50 \times 4 =$ | 4. 200 |
| 5. $80 \times 7 =$ | 5. 560 |
|                    | 6. 240 |
|                    | 7. 160 |
|                    | 8. 350 |
|                    | 60     |
|                    | 10. 0  |

Key questions:

- WHAT kind(s) of practice?
- For WHAT PURPOSE(S)?

成績：

/ 10

$2 \times 3 =$

$6 \times 7 =$

$9 \times 8 =$

$2 \times 30 =$

$6 \times 70 =$

$9 \times 80 =$

$2 \times 300 =$

$6 \times 700 =$

$9 \times 800 =$

$20 \times 3 =$

$60 \times 7 =$

$90 \times 8 =$

$200 \times 3 =$

$600 \times 7 =$

$900 \times 8 =$

Shanghai Textbook Grade 2 (aged 7/8)

## Key questions:

- WHAT kind(s) of practice?
- For WHAT PURPOSE(S)?

# Intelligent Practice

$2 \times 3 =$

$6 \times 7 =$

$9 \times 8 =$

$2 \times 30 =$

$6 \times 70 =$

$9 \times 80 =$

$2 \times 300 =$

$6 \times 700 =$

$9 \times 800 =$

$20 \times 3 =$

$60 \times 7 =$

$90 \times 8 =$

$200 \times 3 =$

$600 \times 7 =$

$900 \times 8 =$

Shanghai Textbook Grade 2 (aged 7/8)

“The practice that Chinese children engage in provides the opportunity to develop both procedural and conceptual fluency. Children are required to reason and make connections between calculations. The connections made improve their fluency.”

(NCETM, 2015, p. 7)

NCETM (October 2015). *Calculation Guidance for Primary Schools*.

<https://www.ncetm.org.uk/public/files/25120980/NCETM+Calculation+Guidance+October+2015.pdf>



# Intelligent Practice

not only multiplication,  
not simply quick / mental  
calculation, but attention to  
place values

$2 \times 3 =$

$6 \times 7 =$

$9 \times 8 =$

$2 \times 30 =$

$6 \times 70 =$

$9 \times 80 =$

$2 \times 300 =$

$6 \times 700 =$

$9 \times 800 =$

$20 \times 3 =$

$60 \times 7 =$

$90 \times 8 =$

$200 \times 3 =$

$600 \times 7 =$

$900 \times 8 =$

Shanghai Textbook Grade 2 (aged 7/8)

"... rather than pupils repeating a mechanical activity, they are taken down a path where the thinking process is practised with increasing creativity."

"The arrangement of these tasks and exercises draw pupils' attention to patterns, structure and mathematical relationships, thus providing 'intelligent practice' and the opportunity to deepen conceptual understanding."

# Example: Practice with multiplication and ...

1.  $19 \times 2 =$

2.  $18 \times 3 =$

3.  $17 \times 4 =$

4.  $16 \times 5 =$

5.  $15 \times 6 =$

6.  $14 \times 7 =$

7.  $13 \times 8 =$

8.  $12 \times 9 =$

Can you write out another set of multiplication expressions like the ones you have just done?

## Example: Simple addition and ...

算一算，照样子分别再写出一组算式。

$3 \times 7 =$

$30 \times 7 =$

$300 \times 7 =$

$63 \div 9 =$

$630 \div 9 =$

$6300 \div 9 =$

# Example: Practice with multiplication and division

里应该填几?

$$\square \times 2 = 60$$

$$\square \div 2 = 60$$

$$\square \times 2 = 24$$

$$\square \div 2 = 24$$

$$\square \times 3 = 60$$

$$\square \div 3 = 60$$

$$\square \times 3 = 12$$

$$\square \div 3 = 12$$

Can you write out another set of expressions like the ones you have just done?

# Example: Simple addition and ...

哪两个数相加最接近 500 ?

220

160

256

290

哪三个数相加最接近 800 ?

196

210

385

104



# Example: Practice with multiplication and ...

Fill in a number (as large as possible) in the box.

1.  $4 \times \square$  is less than 17.

2.  $6 \times \square$  is less than 25.

3.  $\square \times 5$  is less than 43.

4.  $\square \times 7$  is less than 62.

5.  $\square \times 8$  is less than 38.

6.  $9 \times \square$  is less than 57.

# Intelligent Practice

“The practice that Chinese children engage in provides the opportunity to develop both procedural and conceptual fluency. Children are required to reason and make connections between calculations. The connections made improve their fluency.”

(NCETM, 2015, p. 7)

The above examples also show a common feature:

With the task at hand, students are working on many calculations which are not simply at the order of the teacher but naturally generated (partly by the students themselves) according to certain mathematical principles and/or out of their curiosity about certain unexpected results or patterns.

NCETM (October 2015). Calculation Guidance for Primary Schools.

<https://www.ncetm.org.uk/public/files/25120980/NCETM+Calculation+Guidance+October+2015.pdf>

# University-School Support Programme (USP)

- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in **Secondary** Schools (2015-17)*
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in **Primary** Schools (2017-19)*

## ACKNOWLEDGEMENT

The two USP projects were funded by  
**Education Development Fund**, Education Bureau, HKSAR.

# Quality Thematic Network (QTN)

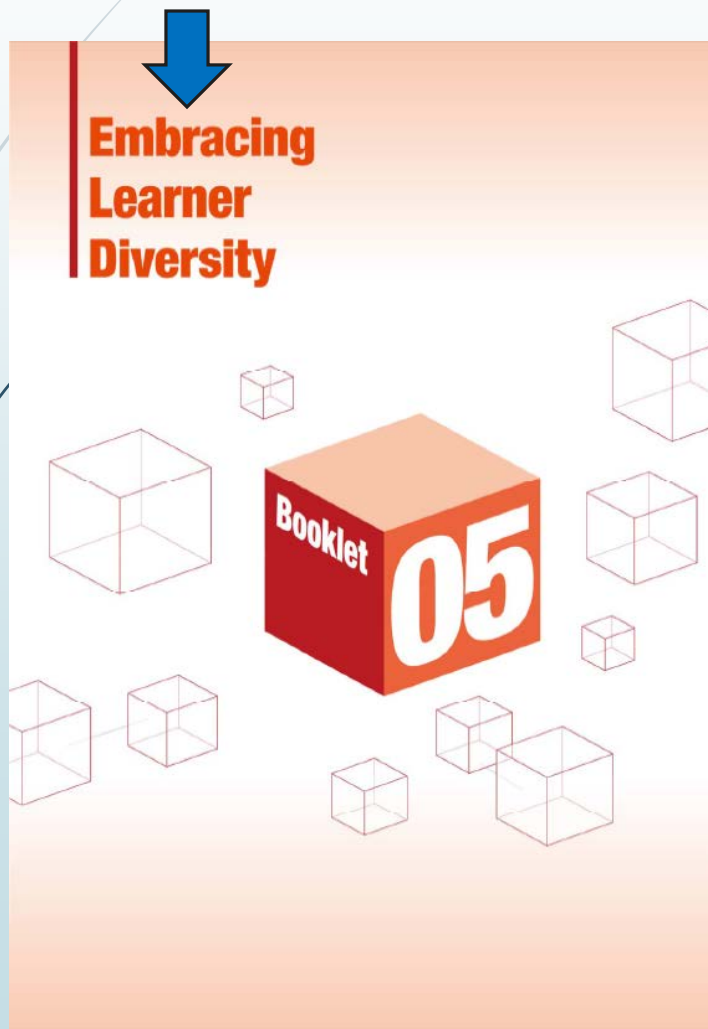
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in Secondary Schools (2015-17)*
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking Students in Primary Schools (2017-19)*
- *Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking (NCS) Students in Primary Schools (2019-20)*

## ACKNOWLEDGEMENT

The forthcoming project will be funded by  
**Quality Education Fund**, HKSAR.

# Embracing Learner Diversity

Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)





# Embracing Learner Diversity

Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)

Catering for learner diversity is not about minimising the difference in student ability and performance but about

- ➔ enabling all students, whether they are gifted or with learning difficulties, non-Chinese speaking or from the Mainland, to learn and perform to the best of their abilities, and about
- ➔ **using appropriate strategies** to help individual students to learn better and make improvements **through identifying and building on their strengths.** (CDC, 2017, p. 3)



# Embracing Learner Diversity

Secondary Education Curriculum Guide: Booklet 5  
(Curriculum Development Council, 2017)



Diversity is not something to be tackled but rather something to be celebrated.

- ➔ By embracing diversity among students, teachers would value diversity as an asset, making it an opportunity for enhancing their repertoire of teaching skills as well as professional capacity and development. (CDC, 2017, p. 4)
- ➔

# Teaching Tripod, and **one more T**

- Tasks
- Tools
- Talk
- **Trust**

One Final Remark!

“Changing teaching is risky, and risk taking means trusting that the outcomes will be worth the risk. If we want children to engage with mindful, meaningful mathematical tasks then **we, teachers, have to trust** that they will come up with improvised solutions that can be collectively crafted into the canonical mathematics. **They, the children, have to trust** that we are genuinely interested in their thinking. And **we have to trust ourselves** to be able to make sense of what the children produce.” (Askew, 2016, p. 157)

