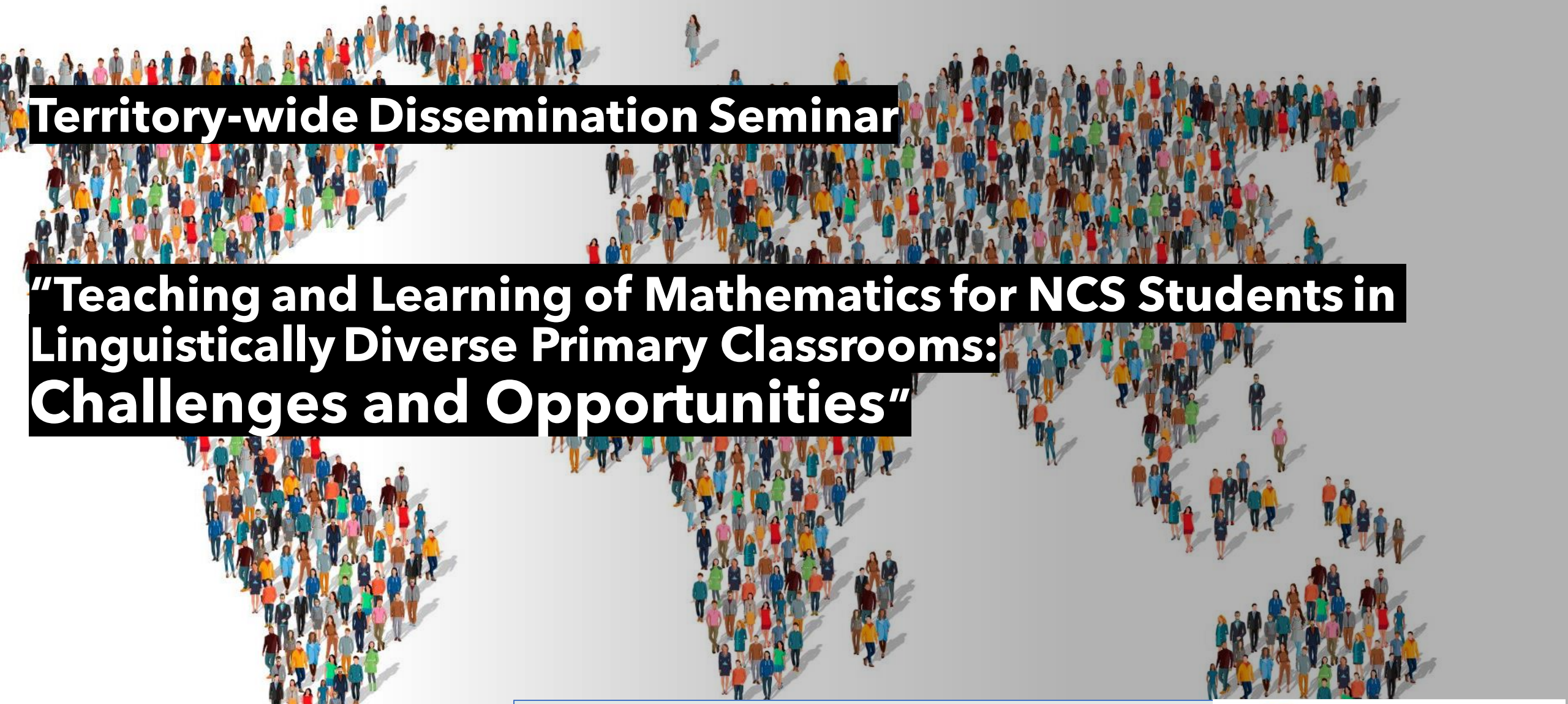


Territory-wide Dissemination Seminar

"Teaching and Learning of Mathematics for NCS Students in Linguistically Diverse Primary Classrooms: Challenges and Opportunities"

Quality Education Fund (QEF) Project:

Supporting the Learning and Teaching of Mathematics for Non-Chinese Speaking (NCS) Students in Primary Schools (2019-20) (QTl

優質教育基金
Quality Education Fund

Coordinating Organisation
Faculty of Education,
The University of Hong Kong

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

小學非華語學生數學的學與教支援計劃

EXPERIENCE AND ACHIEVEMENTS

2015-2017

Supporting the Learning and Teaching of Mathematics for ***NCS Students*** in Secondary Schools

2017-2019

Supporting the Learning and Teaching of Mathematics for ***NCS Students*** in Primary Schools

2019-2020

Supporting the Learning and Teaching of Mathematics for ***NCS Students*** in Primary Schools

2020-2021

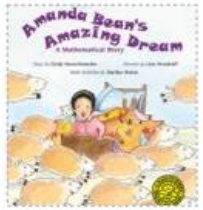
Catering for ***Culturally and Linguistically Diverse Learners*** in Primary Mathematics Classrooms

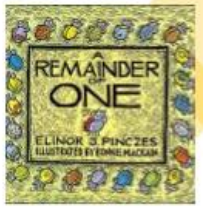
Rundown

Time	Thematic Titles
2:30pm-2:40pm	Opening Speech
2:40pm-3:00pm	'Learning by Doing' in P5 Shape and Space
3:00pm-3:20pm	'Pouring' our Understanding into the Learning of P3 Capacity
3:20pm-3:40pm	Project Deliverables
3:40pm-4:00pm	Bridging the Learning Gaps with Tools and Tasks
4:00pm-4:20pm	Equity for Language Learners in Mathematics Classrooms
4:20pm-4:40pm	Team Teaching of P4 Area to Cater for Learners' Diverse Needs
4:40pm-5:00pm	Closing Remarks & Q&A

P4 Perimeter
Concept Building
Engagement
Exploration
Creativity

📖 以故事引入教「數的基本組合」





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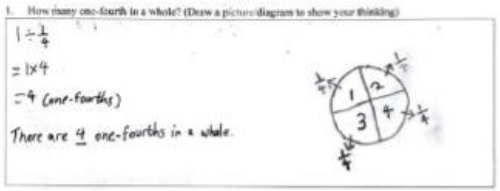

從計劃所獲得的延續
- 推動校本數學課程的發展
- 發展有效的學與教及評估策略

Medium of instruction affect the learning and teaching of mathematics for NCS students

The change in student composition

Storytelling to unleash learning opportunities and develop students' empathy


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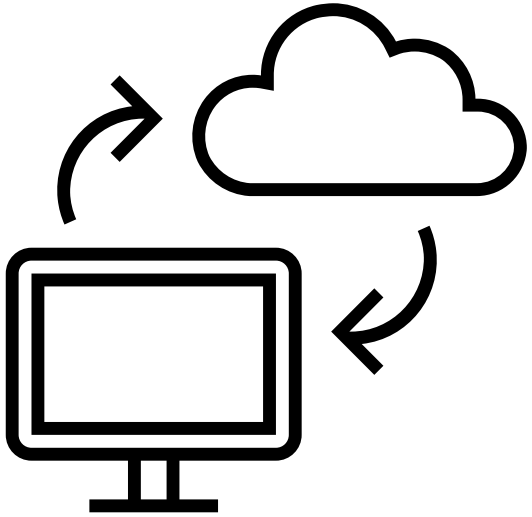

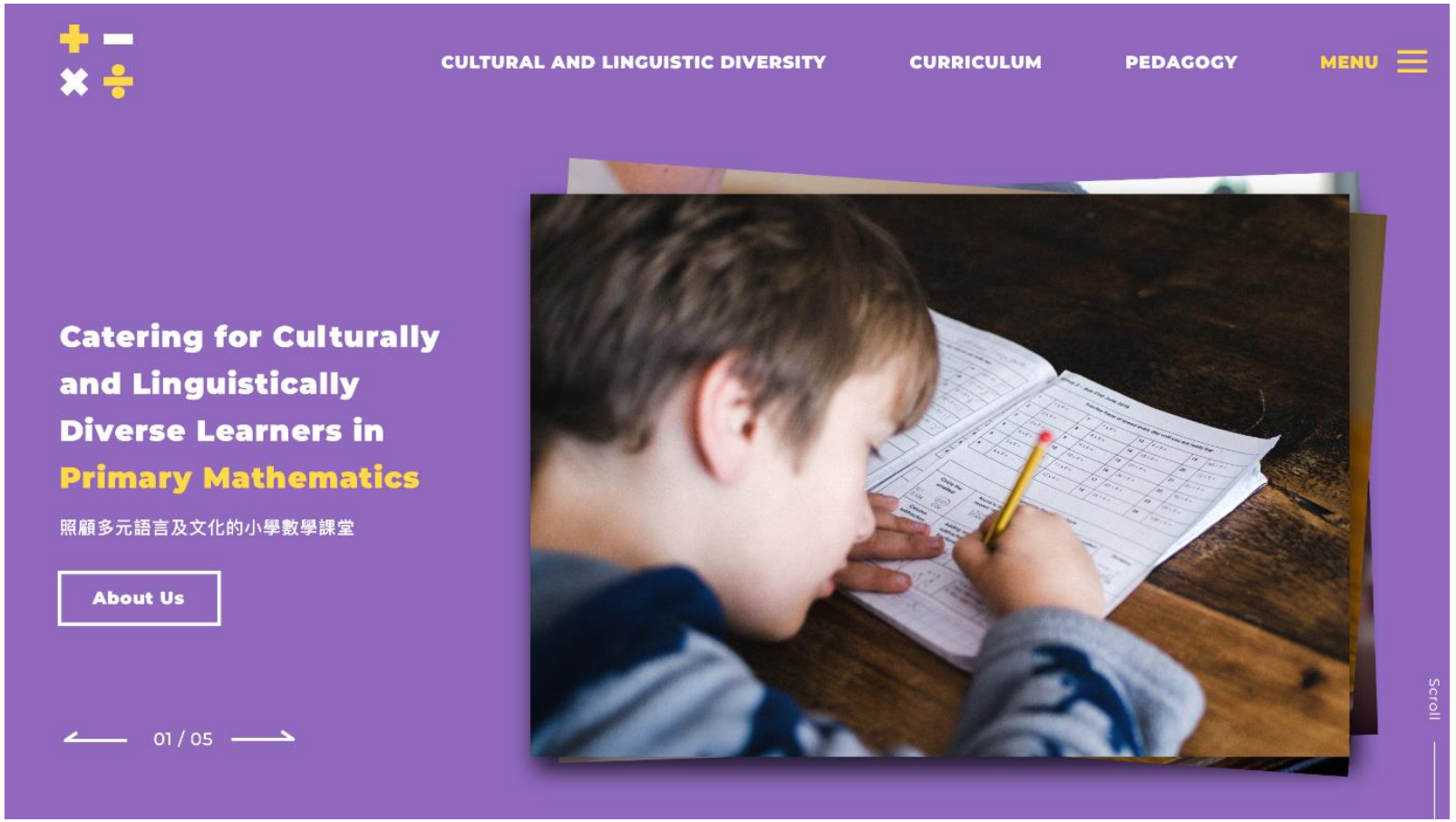

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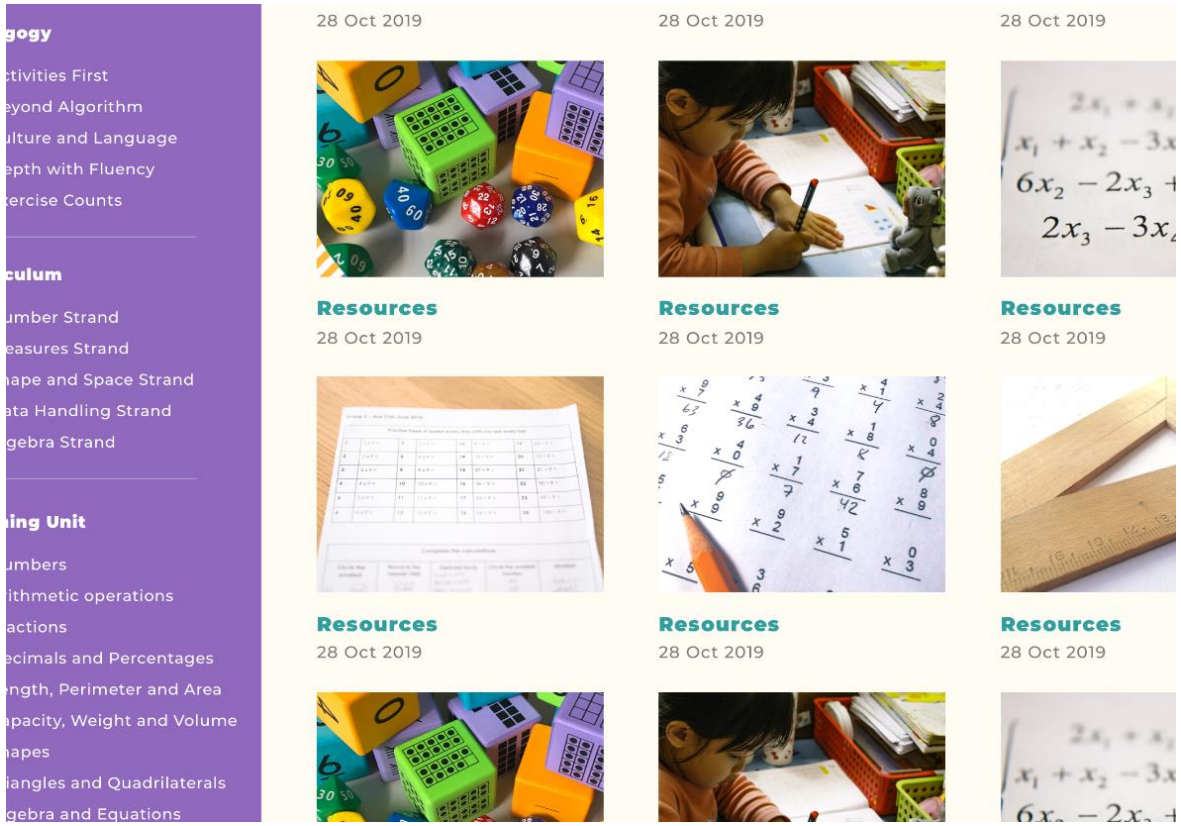
Supported by: Faculty of Education The University of Hong Kong 香港大學教育學院 優質教育基金 Quality Education Fund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[2019-2020]
ONLINE THEMATIC SHARING SESSION (II) ON WORD PROBLEMS
[Re-scheduled]
14 FEB 2020
THEMATIC SHARING SESSION (I)
Thematic Sharing Session (II)
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6 Mar 2020 2:30 pm
Joint-School Workshop
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14 Feb 2020 2:30 pm
Thematic Sharing Session
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10 Jan 2020 2:00 pm

Stay Tuned

Culture and Language

Cultural neutrality of mathematics is debatable. One reason for the underachievement of ethnic minority students is that mainstream schooling based on the dominant culture advocates different values from those in the minority culture. The discord is rooted in the differences between the cultural values that are embraced by the students themselves, their parents, their peers, the teachers, the principals in school, as well as the communities they live in. Cultural differences – with the different underlying values – may influence how the same mathematics content might be taught through different approaches and assessments (Seah, 2003). And through identifying and understanding these cultural differences allow us to improve our pedagogy and to develop a more culturally responsive curriculum in multicultural and multilingual context.

Ethnic Minorities and their Values

Our research study shows that activities, practice and tools are more valued by ethnic minority students than ethnic Chinese students in Hong Kong.

Table 3. Value components and the items associated with each component

Value component	Items associated with each component
C2 Activities	17 Stories about mathematics
	18 Stories about recent developments in mathematics
	61 Stories about mathematicians
	25 Mathematics games
	34 Outdoor mathematics activities
	32 Using mathematical words
C3 Practice	36 Practising with lots of questions
	37 Doing a lot of mathematics work
	57 Mathematics homework[
C10 Tools	47 Using diagrams to understand maths
	48 Using concrete materials to understand mathematics

Language and Mathematics Integrated Intervention

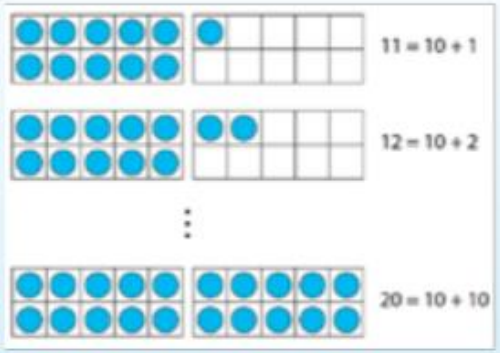
Language is more than a tool for representation and communication; it is a tool for thinking and constructing knowledge via constructing meanings (Prediger & Wessel, 2013). Ethnic minority students learn mathematics in a second, and many times as third or fourth language. They faced with the challenge of learning mathematical content as well as the language of instruction that influence their attainment. Different languages can provide different conceptualizations for mathematical concepts (Barton, 2008), and by knowing the differences in language-related nuances allow us to design instruction aim at fostering students' conceptual development through language acquisition.

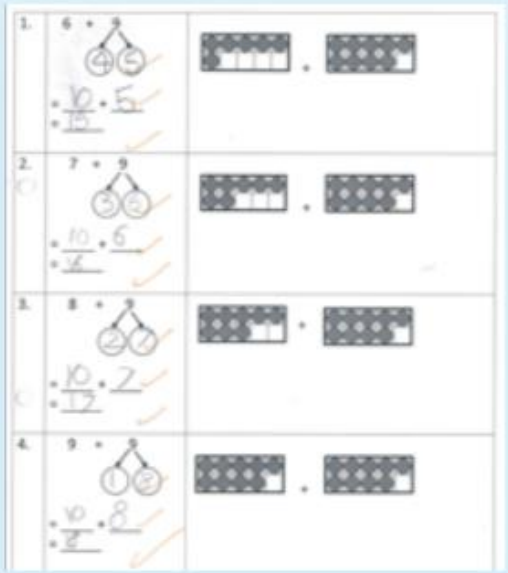
Number words

Chinese number words have clear tens and ones that represent composition of numbers, e.g. 'ten one', 'two ten', thus, Cantonese-speaking teachers make less emphasis on the number that makes ten with a given number. Many South-East Asian languages including Nepali, Urdu, Punjabi and Hindi have irregular number-word systems, and students from less regular counting systems have poorer understanding of base-ten system (Mark & Dowker, 2015). They would have difficulties in acquiring a new set of number words and are more likely to make mistakes in place-value tasks and in multi-digit addition and subtraction. In order to develop students' understanding that teen numbers are made up of 'ten and ones', particular attentions must be placed in linking number words and symbols using 10-frame and other multi-representations.

Language of fractions, part-whole relationship

Part-whole relationships are taught differently in different cultures, and fraction words reflect the fraction concepts they represent. In Chinese, the denominator of a fraction is read first, the word 分 signifies partitioning, and 4 分之 1 literally means "one of the four partitions". In English, the counting number (numerator) signifies "how many" while the ordinal number (denominator) signifies what is being counted. Gunderson and Gunderson (1957) suggested that at the beginning of fraction instruction, we should write out the fraction words rather than use standard notations. For example, we should write 3-fourths, instead of ¾.





How many eighths are in four?

Iterating, or counting parts can be used to develop the understanding of division of fractions, which is one of the least understood algorithms in primary mathematics. Partition four whole into eighths and then iterate (emphasizing the eighths as you read), 1-eighth, 2-eighths, …, 32-eighths. Consider that there are 8-eighths in a whole, then 32-eighths in 4 wholes, and by counting fractional parts (the denominator), students begin to notice why we multiply by the denominator in the standard algorithm for division of fractions (Bay-Williams, 2013). They will see why "invert and multiply" works. Emphasising on "ths" for fractions and iterating can help students to understand division of fractions, as well as other operations with rational numbers (Van de Walle, Karp, & Bay-Williams, 2013).

References:

Bay-Williams, J. (2013). 5 language substitutions when teaching fractions. Mathematics Teaching in the Middle School, 19(2), 68–69.

Barton, B. (2008). The language of mathematics: Telling mathematical tales. New York: Springer.

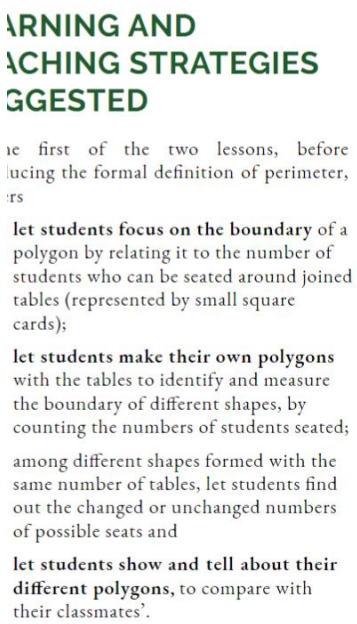
Gunderson, A. G., & Gunderson, E. (1957). Fraction concepts held by young children. The Arithmetic Teacher, 4, 168–73.

Mark, W., & Dowker, A. (2015). Linguistic influence on mathematical development is specific rather than pervasive: revisiting the Chinese advantage in Chinese and English children. Frontiers in Psychology, 6, 203.

Prediger, S. & Wessel, L. (2013). Fostering German-language learners' constructions of meanings for fractions—design and effects of a language-and mathematics-integrated intervention. Mathematics Education Research Journal, 25, 435–456.

Seah, W. T. (2003). The professional socialisation of teachers in transition: A values perspective. Paper presented at the International Education Research Conference AARE-NZARE, Auckland, New Zealand.

Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). Elementary and middle school mathematics: Teaching developmentally (8th ed.). Upper Saddle River, NJ: Pearson.



ARNING AND
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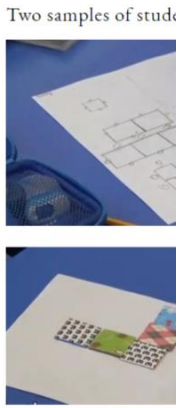
ıe first of the two lessons, before lucing the formal definition of perimeter, ırs

let students focus on the boundary of a polygon by relating it to the number of students who can be seated around joined tables (represented by small square cards);

let students make their own polygons with the tables to identify and measure the boundary of different shapes, by counting the numbers of students seated;

among different shapes formed with the same number of tables, let students find out the changed or unchanged numbers of possible seats and

let students show and tell about their different polygons, to compare with their classmates'.

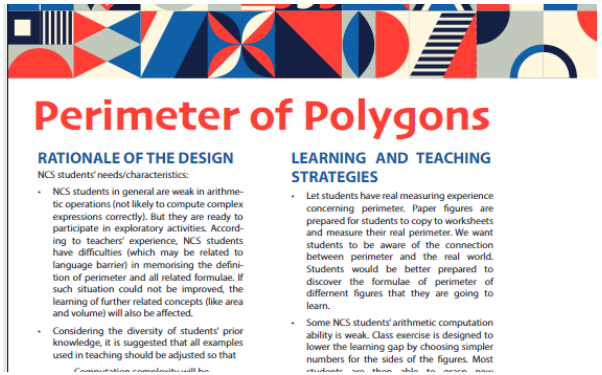


Two samples of stud

Using IT Tools and Physical Tools in Learning the Area of Triangles

RATIONALE

From teachers' experiences, NCS students could not remember the formulae of area of polygons for long and some students mixed up different formulae of area. Teachers agreed that students could retain the concepts they



Perimeter of Polygons

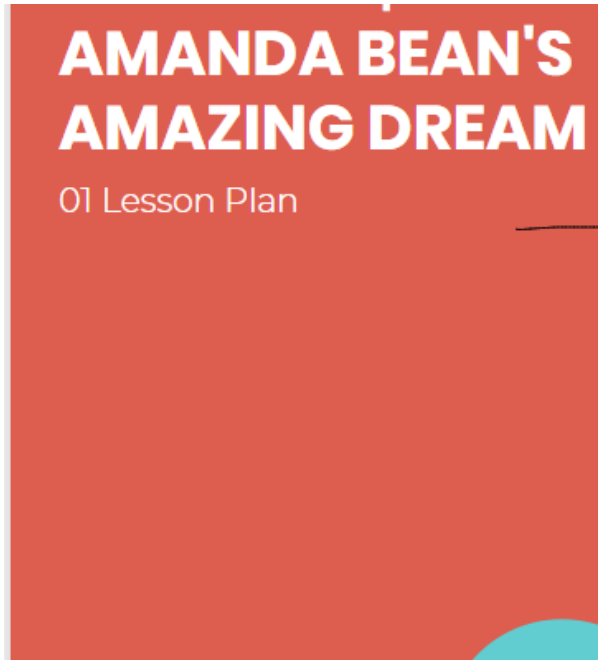
RATIONALE OF THE DESIGN

NCS students' needs/characteristics:

- NCS students in general are weak in arithmetic operations (not likely to compute complex expressions correctly). But they are ready to participate in exploratory activities. According to teachers' experience, NCS students have difficulties (which may be related to language barrier) in memorising the definition of perimeter and all related formulae. If such situation could not be improved, the learning of further related concepts (like area and volume) will also be affected.
- Considering the diversity of students' prior knowledge, it is suggested that all examples used in teaching should be adjusted so that

LEARNING AND TEACHING STRATEGIES

- Let students have real measuring experience concerning perimeter. Paper figures are prepared for students to copy to worksheets and measure their real perimeter. We want students to be aware of the connection between perimeter and the real world. Students would be better prepared to discover the formulae of perimeter of different figures that they are going to learn.
- Some NCS students' arithmetic computation ability is weak. Class exercise is designed to lower the learning gap by choosing simpler numbers for the sides of the figures. Most



AMANDA BEAN'S AMAZING DREAM

01 Lesson Plan

Quick Reference Cards

Evaluation form

NCS Math
Faculty of Education, HKU

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- Ms. YIP Yu Ting Antonia

Project Manager

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- Bui O Public School
- Catholic Mission School
- CNEC Ta Tung School
- Delia (Man Kiu) English Primary School
- HKFEW Wong Cho Bau School
- Hong Kong Christian Service Pui Oi School
- Hong Kong Taoist Association Wun Tsuen School
- Islamic Primary School
- Kam Tin Mung Yeung Public School
- Man Kiu Association Primary School
- Pat Heung Central Primary School
- Po Leung Kuk Gold & Silver Exchange Society Pershing Tsang School
- Sir Ellis Kadoorie Primary School
- SKH Wei Lun Primary School
- St. Margaret's Co- educational English Secondary and Primary School
- Tsuen Wan Trade Association Primary School

FIVE THEMES

Activity first

Beyond algorithm

Culture matters

Depth with fluency

Exercise counts

FIVE THEMES

- Activity first
- Beyond algorithm
- Culture matters
- Depth with fluency
- Exercise counts

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