

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

NCS Math (Primary)

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Exercise Counts

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In the tradition of mathematics education in Hong Kong schools, exercise largely consists of drills and procedural practices. However, students usually do not like repeating procedures if they do not have any good idea about the reasons behind. Ethnic minority students may be even more so; they have difficulties in engaging themselves with routine drills and practices. For such ethnic minority students, in order that they can have opportunities to experience mathematics in a new, first-hand, richer and authentic ways, we propose to incorporate four engagements⁽¹⁾ in the exercise as follows:

1. **Developing mathematical sense** on top of mechanical repetition
2. **Taking part in dialogue** on top of listening to teacher's monologue
3. **Directing oneself freely towards the objective** instead of learning the teacher's method passively
4. **Exploring boldly** other than merely guessing the teacher's standard answers

To illustrate how these four engagements may work, some examples like the following should help. As will be seen, they start from simple exercises, and then gradually develop into more open-ended ones.

Exercise 1

Ask students to think of an everyday situation that may lead to a mathematical expression.

1. 試畫圖或用文字說出一個用數式 $9 - 3$ 去計算的故事。
2. 試畫圖或用文字說出計算 $8 + 5$ 的方法。

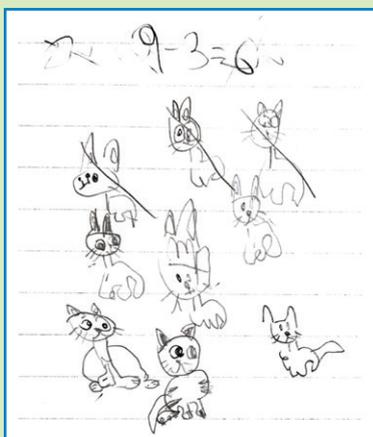
Student A's writing:

屋內有9隻牙籤，後來剩3隻。

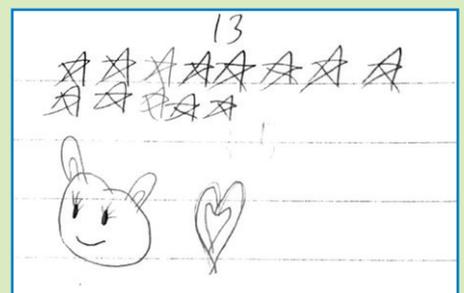
Student A's writing:

我有8個餅乾，大妹妹有5個，
共有13。

Student B's drawing:



Student C's drawing:



(1) These four suggested engagements are inspired by the cultural preferences of ethnic minority students in Hong Kong where they were found to value, as more important than their ethnic Chinese counterparts do, the learning attributes: (a) working out the maths by themselves, (b) knowing the steps of solution, which formula to use, and concepts of processes, and (c) looking for different possible answers and ways to find the answer and to memorise facts.

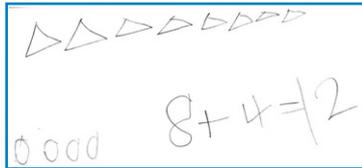
Exercise 2

Ask students to show their understanding of a word problem.

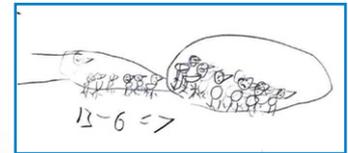
試畫出下列問題的意思。(Draw what you think the word problem is asking.)

1. 思思寫了 8 個詞語後，再寫多 4 個，她共寫了詞語多少個？ 2. 農場裡原有 13 隻鴨子，其中 6 隻游走了，還餘鴨子多少隻？

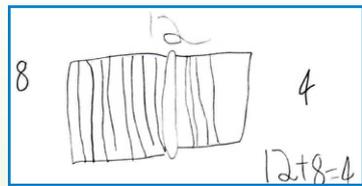
Student D's drawing:



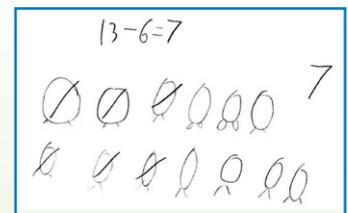
Student F's drawing:



Student E's drawing:



Student G's drawing:



Exercise 3

Let students develop their own algorithm in solving a problem.

Students can be encouraged to give answers by drawing, telling, writing arithmetic expressions or exploring with apps, e.g. TouchCounts⁽ⁱⁱ⁾.

This exercise could be even more fruitful if it is assigned as group work, and lesson time is allocated for students to discuss, explain and present their solutions.

A. Miss Chan has 4 bags of candies, each containing 4, 6, 8 and 10 pieces as shown below.



She wants to re-arrange the candies in the 4 bags so that each has the same number. How would you help her do it?

B. Mr. Wong has 30 candies and 7 boxes. He uses them to make boxes of candies as prizes in a game. To make a prize, each box contains an equal number of candies.

- To use all 30 candies, how many prizes would you suggest Mr. Wong to make? If Mr. Wong wants to make as many prizes as possible, how many can he make?
- Mr. Wong wants to use all 7 boxes to make 7 prizes. If Mr. Wong wants to use as many candies as possible, how many candies does each prize have?

C. Let students design their own problems similar to A and B above for classmates to solve. Other than varying the numbers of candies, bags and boxes, they may be encouraged to come up with quite different contexts, requirements and questions.

Some proposed problems may be ambiguous, unsolvable and blended with incomplete or irrelevant data, whereas some others may involve procedures that would only be introduced at least one year later in the formal curriculum. These “wrong turns” deserve to be welcomed because

- ambiguous problems can be clarified collectively, bringing nuanced mathematical sense for all,
- they facilitate rich dialogue,
- problems “too soon for their level” can provide precious motivation for self-directed learning ahead, and
- students are often capable of devising ingenious algorithms to solve problems “beyond their reach”.

References:

TouchCounts 1.0. (2016, January 31). TouchCounts 1.0 [Video]. YouTube. <https://www.youtube.com/playlist?list=PLBZloLoBe0L3wMzFb5ferglzNIZxeAHM>

(ii) The following two videos from TouchCounts 1.0 are highly recommended. They are inspiring for both teachers and students. (i) Number compositions, <https://www.youtube.com/watch?v=oJxdNJHBNk&app=desktop> and (ii) Fair share, <https://www.youtube.com/watch?v=eQSPFGbhvg>.