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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)
Faculty of Education, HKU

Activities First

WK Cheng

According to the participating teachers of our Project, Chinese speaking students outperform NCS students in mathematics. Ethnic minority advisors suggested that NCS students do not like doing tonnes of homework. Rather, they prefer skills and knowledge related to their daily life. In order to help NCS students engage actively in learning, interesting materials would help. While playing mathematical games, they are working on mathematical exercises. While looking for the others' mistakes, they are picking up skills in assessment. While discussing mathematical problems in class, they are developing collaboration and communication skills. All these little details arouse students' interest in mathematics, promote student agency and motivate them to learn. Consequently, students acquire different generic skills and enjoy a happy learning environment when they learn mathematics through games and activities.

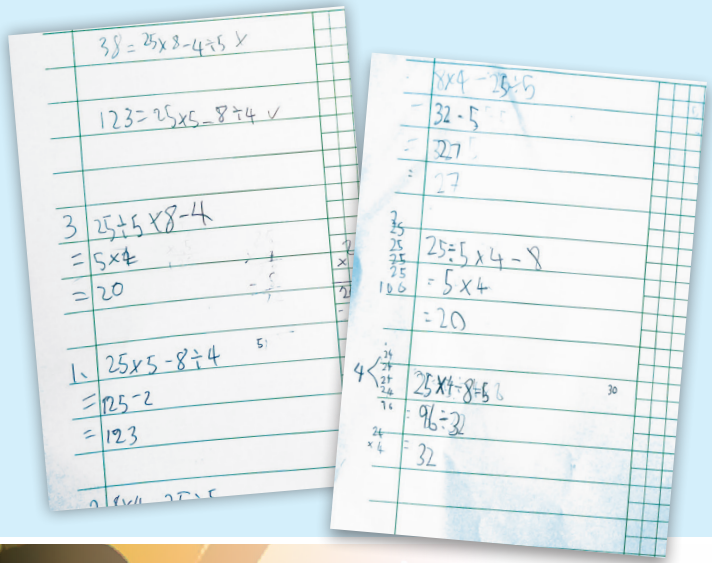
Reasons for Mathematical Games and Activities

Davies (1995) suggests that the advantages of using games in learning mathematics include:

- applying mathematical skills in meaningful situations,
- enhancing motivation,
- promoting positive attitude towards learning mathematics,
- increasing opportunities to test intuitive ideas and problem solving strategies,
- allowing children to operate at different levels of thinking and to learn from each other,
- assessing children learning in a non-threatening situation,
- providing 'hands-on' interactive tasks for both school and home,
- working independently of the teacher as the rules of the game and the children's motivation usually keep them on task.

Rutherford (2015) states that

"People of all ages love to play games that are fun and motivating. Games give students opportunities to explore fundamental number concepts, such as the counting sequence, one-to-one correspondence, and computation strategies. Engaging mathematical games can also encourage students to explore number combinations, place value, patterns, and other important mathematical concepts."

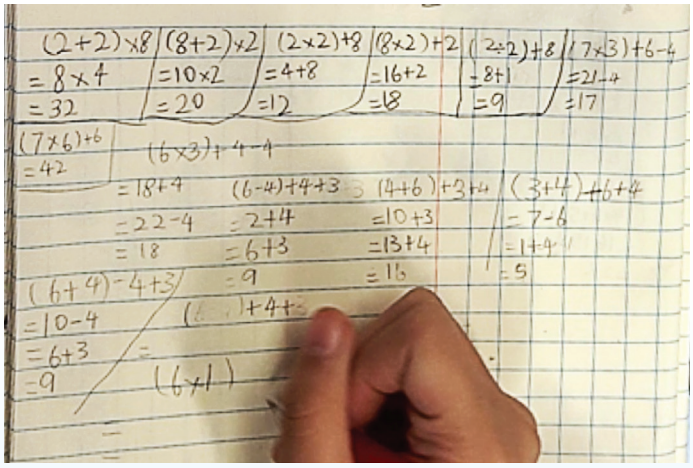


Two activities with student examples are included in this part. They are open-ended tasks that give flexibility for students to create their own mathematical expressions. In *Activities 1* and *2*, student agency is evident. They learn from self-checking and peer-checking which promote Assessment as Learning. There is no prescriptive answers in the activity. The experience of self-creating mathematical expressions gives students a sense of ownership in learning. These activities are particularly useful for some less motivated learners and help cater for learner diversity because each student can work at their own pace.

Activity 1 Card Game for P4 Arithmetic Operations

Students work in groups of 4. They are given some cards showing the numbers 4, 5, 8 and 25 and different operators. Students are asked to write down as many arithmetic operation expressions as possible and work out the solutions.

Activity 2 Dice Game for P2 Addition, Subtraction and Multiplication

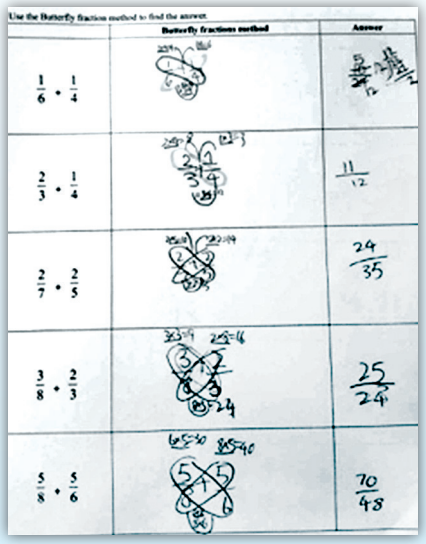


Students work in pairs. They roll 3 or 4 dice which can be 10-sided dice. They are asked to write down different mathematical expressions and work out the solutions. Each student checks their peer's work.

Mathematics Through Hands-on Activities

Two activities are included in this part. Both are hands-on activities which help students develop mathematical concepts with visualisation. *Activity 3* allows NCS students to use drawing and visualisation to work out the addition of fractions. *Activity 4* encourages students to use fraction bars to simulate division of fractions.

Activity 3 Butterfly Fraction for P5 Addition of Fractions (Remedial Classes)



Some students need help in consolidating the concept of comparing fractions. Some students often mix up different procedural knowledge in handling fractions. They may mix up addition and multiplication of fractions, as well as reducing and expanding fractions. Images with lovely drawings may help students memorise the procedures.

After drawing the "butterfly", students can easily obtain a fraction, though it might not be in its simplest form.

Activity 4 Fraction Bars for P5 Division of Fractions

Students work in groups of 4. They are given sets of fraction bars of different colours. Students stick the fraction bars together based on the given mathematical expressions. For example, $2 \div \frac{1}{3}$. Students are required to stick 2 fraction bars. Each of the bars is divided into 3 equal parts. They use these fraction bars as a visual representation for division of fractions. This activity helps students extend their knowledge from division of integers to division of fractions.

What can Teachers Do to Facilitate the Activities in Mathematics Classrooms?

Teachers reflects that NCS students often actively participate in discussions. It is desirable that students work in small groups with some open-ended tasks. Giving ample time for students to explore and communicate about the learning activities, teachers could know more about what their students think and if there are any gaps in their understanding of the mathematical concepts. Teachers could encourage students to express their ideas in front of the class and urge students to check their peers' work.

References:

Davies, B. (1995). The role of games in mathematics. Square One, 5(2), 7-17.

Rutherford, K. (2015). Why play Math Games. Retrieved from https://www.nctm.org/publications/teaching-children-mathematics/blog/why-play-math-games_/