Using games to cultivate an engaging learning environment to develop NCS students' multiplication fluency

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LEARNING TARGET

Develop students' multiplication fluency through dice games

RELATED THEME

Activity First – The rationale is to use dice games to enhance students' multiplication fluency. Many students could not recall many multiplication facts in a fast way, but they were not motivated to do lots of drilling exercise and practice to improve their multiplication fluency. A fun and engaging way has been found to be effective in motivating students to learn. Giving lovely dice to students and introducing different multiplication games to students could arouse students' interest in learning.

Depth in Fluency – In order to win a game, the speed in reciting multiplication facts is essential. This has motivated students to recite some multiplication facts that they may not have been quite familiar with before.

Exercise Counts – Students are doing lots of multiplication exercise when they play the game.

RATIONALE

Background

Tse and Hui (2012) reveal that non-Chinese speaking (NCS) students' learning motivation could be boosted by providing them with a friendly and engaging school environment. Having mathematics games in class and playing games with peers would provide a happy learning environment to NCS students.

From teachers' experiences, some Primary 3 and Primary 4 NCS students could not recall all the multiplication facts. Some of them could list a number of multiplication facts or recite the multiplication table, but it takes more time compared with Chinese-speaking students. For example, when calculating 7 x 6, they would write 7, 14, 21, 28, 35, 42, ... and count the number of 7s with their fingers in order to obtain the answer 7 x 6 = 42. With this mode of recalling multiplication facts, students do not meet the numeracy skills required to learn the mathematics topics in Primary 3 and Primary 4.

Also, teachers reveal that many NCS students might not have sufficient parental support in enhancing their multiplication fluency at home. They usually do not work as hard as Chinese-speaking students do. The implementation of using games to develop multiplication fluency could motivate students to recite the multiplication facts in a fun way.

How does this work?

In view of this, teachers introduced dice games to students in the lesson in mid-October. Detailed game rules can be found on the resource page. In the first week, students played Game 1 and they were given two soft normal dice and a multiplication table. They could bring them home and play the game at home. At school, teachers spent the last few minutes in each lesson to play the dice game with students together. In the second week, one soft normal dice was replaced with one 10-faced dice. That was when they moved on to Game 2. In the third week, students changed the dice and they had two 10-faced dice with them. Progression was made to Game 3 in the following week.

In early November, a pre-test and a post-test were given to the students. The same set of questions was used.

LEARNING AND TEACHING STRATEGIES

Tools given to students for self-assessment

1. Dice



2. Multiplication table

Name: _____ Class: _____

	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

請於五分鐘內，完成下列各題：

1. 3 x 6 = 18
2. 5 x 9 = 18
3. 6 x 4 = 24
4. 2 x 9 = 18
5. 5 x 7 = 35
6. 8 x 4 = 32
7. 3 x 6 = _____
8. 7 x 7 = _____
9. 6 x 6 = _____
10. 6 x 9 = _____
11. 3 x 7 = _____
12. 3 x 5 = _____
13. 5 x 4 = _____
14. 4 x 8 = _____
15. 2 x 8 = _____
16. 4 x 7 = _____
17. 9 x 9 = _____
18. 5 x 5 = _____
19. 4 x 9 = _____
20. 9 x 7 = _____
21. 6 x 6 = _____
22. 2 x 4 x 8 = _____
23. 2 x 5 = _____
24. 3 x 3 x 6 = _____
25. 8 x 8 = _____
26. 3 x 2 x 7 = _____
27. 3 x 3 = _____
28. 5 x 2 x 2 = _____
29. 7 x 6 = _____
30. 2 x 3 x 4 = _____

Figure 1: A student's pre-test results

Results

The average number of questions attempted increased from 15.1 in the pre-test to 19.4 in the post-test. The number of correct answers also increased from 12.9 to 15.9. Generally, most students could recall the multiplication facts much faster. Many students did not need to rely too much on writing down the facts anymore.

There was not much improvement for those successive multiplication questions though. It was probably because many students did not have enough time to answer those questions. Only a few students managed to recall all the multiplication facts when attempting the corresponding questions.

In general, teachers said that most students could recall the multiplication facts much faster. The games did not take up lots of lesson time so teachers found it manageable to infuse it in the curriculum. Teachers were also thrilled to see how some students had urged teachers to play the dice games before the end of their mathematics lessons.

ASSESSMENT TOOLS

- Pre-test and Post-test: The same set of 30 multiplication questions was given to students.

Feedback from teachers

Teacher A: It was really encouraging. I remembered that when I walked by the classroom in recess, some NCS students said, 'Miss A, can you come and play games with us?' It never happened before! It is evident that students' motivation in learning has been boosted.

REFERENCE

Tse, S. K., & Hui, S. Y. (2012). Supporting ethnic minority students learning the Chinese language in multilingual Hong Kong. *L1 Educational Studies in Language and Literature*, 12(Running Issue).