

Charlie and the Chocolate Factory – The Multiplication Journey

(Primary 2 Multiplication Fluency) by WK Cheng



LEARNING TARGET

Develop multiplication fluency through informal curriculum in a whole year cross-subject programme with the theme taken from the book 'Charlie and the Chocolate Factory'.

RELATED THEME

Activity First – Students memorise the multiplication facts in lots of different fun and engaging ways. These include multiplication games, multiplication colouring tasks, multiplication apps, multiplication rap, etc.

CULTURALLY AND LINGUISTICALLY DIVERSE (CLD) LEARNERS

Elizabeth and Ying (2020) identify the difficulties some teachers faced, the most prominent of which is their perception of non-Chinese speaking (NCS) students as having a very low level of motivation to learn. NCS students often do not submit their homework and their parents generally do not pay attention to the school's requirements. Mathematics teachers in our project schools also found that NCS students have low motivation in doing mathematics exercise. As a result, many students face a problem of not meeting the numeral literacy competence when they reach upper primary. Because of this concern, there is an urgent need to boost Primary 2 students' multiplication fluency.

BACKGROUND

This programme was carried out in Catholic Mission School. It was a whole year cross-subject programme using the book 'Charlie and the Chocolate Factory' by Roald Dahl as the theme of the year. The programme helped students develop different virtues and positive values along the storyline of this book. Students were encouraged to participate in different activities following Charlie's journey. Photos 1-4 show how these virtues and positive values are posted on the notice boards at the school. Different subjects had also incorporated this theme into the curriculum. For mathematics, one major concern was students' abilities to recite multiplication facts in Primary 2. Teachers decided to set multiplication fluency as the goal in this programme.



Photo 1: Positive values



Photo 2: Religious ethics



Photo 3: Characters



Photo 4: Characters


WHAT IS 'CHARLIE AND THE CHOCOLATE FACTORY – THE MULTIPLICATION JOURNEY'?

In 'Charlie and the Chocolate Factory', Charlie went through a journey visiting Willy Wonka's Chocolate Factory. Students in this school were also invited to go through a learning journey. At the beginning of the programme, each student had to prepare a 'My Multiplication Portfolio' and put all the work in a clear folder (refer to the website for the guidelines shown in the portfolio). This is what Charlie went through in the Chocolate Factory – tackling different challenges in the Chocolate Factory after claiming his golden ticket and eventually became Willy Wonka's worthy heir. The programme was introduced in September. Each student had to set goals for themselves in each month from October to January. Parents were involved as checkers and signed to acknowledge students' achievements. For example, parents would sign for 'How fast can I recite the 8 times table?' in the portfolio (see Figure 1).

How fast can I recite 8 times table?

	time	Parents' signature
1		
2		
3		
4		
5		

Accuracy



What I think : ★ ★ ★ ★ ★

What my parent thinks : ★ ★ ★ ★ ★

Figure 1: Example task in the portfolio

Students were given different mission cards every week. Students could choose the levels of difficulty of the missions.

There were lots of different mission cards including multiplication colouring tasks, skip counting tasks, reciting multiplication tasks and playing multiplication games (refer to the website for a full set of missions.). Table 1 also shows some example mission cards.

<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Play a 2x2 multiplication board game with a classmate during recess.</p> <p>Classmate Name: _____</p> <table border="1" style="width: 100%; text-align: center; font-size: 0.8em;"> <tr><td>1</td><td>5</td><td>9</td><td>3</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>3</td><td>6</td><td>4</td><td>10</td><td>15</td><td>14</td><td>16</td><td>10</td><td>50</td></tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> </div>	1	5	9	3	7	8	9	10	3	6	4	10	15	14	16	10	50	<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Recite Multiplication of 2 to your parents and ask them to sign.</p> <p>Parent's signature: _____</p> <table border="1" style="width: 100%; text-align: center; font-size: 0.8em;"> <tr><td>1</td><td>5</td><td>9</td><td>3</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>3</td><td>6</td><td>4</td><td>10</td><td>15</td><td>14</td><td>16</td><td>10</td><td>50</td></tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> </div>	1	5	9	3	7	8	9	10	3	6	4	10	15	14	16	10	50
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<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Play a 6x6 multiplication board game with a classmate during recess.</p> <p>Classmate Name: _____</p> <table border="1" style="width: 100%; text-align: center; font-size: 0.8em;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>1</td><td>6</td><td>12</td><td>18</td><td>24</td><td>30</td><td>36</td><td>42</td><td>48</td><td>54</td><td>60</td></tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> </div>	1	2	3	4	5	6	7	8	9	10	1	6	12	18	24	30	36	42	48	54	60	<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Teach your classmate the following multiplications. $2 \times 8 = ?$ $2 \times 7 = ?$ $2 \times 9 = ?$</p> <p>Classmate's name: _____</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> </div>													
1	2	3	4	5	6	7	8	9	10																										
1	6	12	18	24	30	36	42	48	54	60																									
<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Play a 6 x 6 Bingo game with your classmate. The winner can get 5 smart stickers from your teacher.</p> <p>Classmate's name: _____</p>	<p>Name: _____</p> <p>Class: _____</p> <p>Mission: Read a multiplication story book and finish the worksheet. You can get 5 smart stickers.</p> <p>Classmate's name: _____</p> <div style="text-align: center; margin-top: 20px;"> </div>																																		

Table 1: Example mission cards

PROBLEMS FACED

It was a pity that many face-to-face lessons were suspended in 2020-2021 because of the pandemic. Lessons were therefore switched from face-to-face mode to online mode. It was difficult to assign different missions to students.

In face of the face-to-face class suspension, teachers decided to design missions that could be done by students at home. Teachers posted the missions on Google Classroom, for example, 'Recite the multiplication of 5 to your siblings or parents and ask them to sign'. Students were then required to submit the signed mission cards through Google Forms. Another example is 'Rap a multiplication table and upload the video to the Google Classroom'. As speculated by the teachers, students' participation in this programme would have been stronger if it had been conducted face-to-face, but still quite a lot of students actively participated in the activity online.

PEER COMMUNICATION

This programme also provided room for students to interact with their peers. Take the mission 'Recite the multiplication of 3 to your classmate' as an example. In order to complete the mission, students had to do it in pairs with their peers. This has provided an opportunity for students to collaborate and communicate with one another in a relaxing and meaningful manner. For instance, when one student played the role of a checker with the multiplication table in hand, self-assessment and peer-assessment skills could be largely enhanced.

PEER LEARNING

Another type of mission card was to help peers recite the multiplication facts as shown in Figure 2 below. It helped create a setting that promotes peer learning. Some fast learners who could recall the 2 times table could help their classmates practise the 2 times table.

Name: _____

Class: _____

Mission.: Teach your classmate the following multiplications.

$2 \times 8 = ?$ $2 \times 7 = ?$ $2 \times 9 = ?$

Classmate 's name: _____





Figure 2: Example mission card

The promotion of peer learning can boost students' interest in learning mathematics and nurture positive attitudes towards mathematics. This is particularly crucial in contexts where student motivation was low.

An example mission is 'Play a multiplication board game with a classmate'. It turned out that students played some mathematical games during recess with their peers. They even asked for more games of different levels of difficulty. Another observation made by teachers was that students asked for mathematics homework proactively. They considered mathematics homework or missions as something fun and interesting. It was observed that students had developed the eagerness to complete their learning journey like Charlie did.

INFORMAL CURRICULUM

It was challenging to motivate students to learn during the pandemic. This programme supported students by providing clear guidelines and interesting missions and tasks so that students could keep track of their own learning progress (see Figure 3). Photos of students were shown on the Multiplication Journey notice board as shown in Figure 4. Students' photos would be moved to the next candy after they had completed a mission. Having made such progress, students would know where they had reached and what their peers' progress had been. This encouraged young learners to catch up with their peers in this competitive multiplication journey. It was observed that students participated as if they were in a competition, which they enjoyed a lot. When a student reached the finishing line of the multiplication journey, they would receive a golden ticket, like Charlie did in the story.



Figure 3: Students' self-assessing achievements record in the portfolio



Figure 4: Multiplication Journey notice board

PARENT-SCHOOL COLLABORATION

Elizabeth and Ying (2020) state that many NCS parents do not communicate with schools and they do not pay attention to the schools' requirements regarding homework submission. In this programme, teachers found that this was not the case. Many NCS parents actively participated by helping students recite the multiplication table and signed on their cards. Some parents helped their kids shoot video of them rapping the multiplication song. It was found that parents were willing to cooperate with the school when they knew what their roles were. This programme brought parents and students together. Some students said that they played multiplication games with parents or siblings at home.

HAPPY LEARNING ENVIRONMENT

The programme also brought students together. When completing some missions, students were eager to play multiplication games with their classmates. It was observed that students often stayed in the classroom during recess and played multiplication games together. Learning took place not only during mathematics lessons, but also beyond class hours and at home.

ASSESSMENT AS LEARNING

When designing the programme and mission cards, the rationales in Assessment as Learning from Earl (2003) were adopted. Students reflected on their own learning, including the strategies or different methods that they used. Teachers found that this was truly fruitful for students in this learning journey.

SELF-ASSESSMENT

In the portfolio booklet, students had to keep reflecting on their own learning. Students kept doing self-reflection throughout this multiplication journey. They started to develop awareness of the areas for improvement. There was also lots of room offered to facilitate peer collaboration when they tried to complete different missions. It helped enhance peer-assessment. Figure 5 shows the self-evaluation form attached in the portfolio which has provided opportunities to students to monitor and critically reflect on his or her learning.



Figure 5: Self-evaluation in the portfolio

DEVELOPING CREATIVITY AND AGENCY IN LEARNING

Near the end of the programme, students were encouraged to join the Multiplication Rap Challenge (refer to Figure 6). It was a chance to consolidate learning, which in turns let students show what they knew about multiplication and showcase it in a creative way.



Figure 6: Multiplication Rap Challenge poster

STUDENTS' ACHIEVEMENTS



Figure 7: Certificates were awarded to students

REFERENCES

Earl, L. M. (2003). *Assessment as learning: Using classroom assessment to maximize student learning*. Thousand Oaks, CA: Corwin Press.

Elizabeth, L. K. Y., & Ying, H. O. (2020). *A study on the challenges faced by mainstream schools in educating ethnic minorities in Hong Kong*. Retrieved from Hong Kong: Equal Opportunity Commission https://www.eoc.org.hk/eoc/upload/ResearchReport/researchreport_20200115_e.pdf.

OTHER RESOURCES

Characters in Charlie and the Chocolate Factory – Multiplication Journey

