

# Mathematics Lesson Observation

## Introduction:

Observing this particular math lesson caused me to reflect on my own personal experiences as a student in elementary school learning math. I recall spending the majority of my time at my desk using worksheets and doing problems together as a class on the blackboard. Upon observing this modern-day math lesson, I was pleasantly surprised to witness the malleability of the classroom setting. Students are no longer required to spend the majority of their time at their desk. Students were also not required to use paper and pencil entirely to complete math problems as a class. Students are also allowed and encouraged to use different mathematical strategies to solve the same problem, compared to my personal experience as a student in which we were all required to do as the teacher said and use his/her strategy. This particular lesson is called a 'Eureka' Math Lesson, which follows a particular format created to make a more efficient learning experience. Observing this lesson was highly enlightening and informational as a prospective teacher.

**Strand:** Operations

**Topic:** Number Sense & Numeration

**Grade Level:** 3

## Educational Objectives:

'Eureka' Math lessons are comprised of four critical components: fluency practice, concept development (including the problem set), application problem, and student debrief (including the Exit Ticket).

- **Fluency Practice:** Lessons begin with this component as it strongly supports the development of fluency skills, which includes remaining up to date on previously learned skills, preparation for the current lesson being taught, as well as anticipation of the future subsequent lessons in this strand or unit.

- **Concept Development:** The majority of the lesson is often allotted to this component. This portion is often comprised of problems within a specific strand that develop gradually in complexity throughout the class. It is also accompanied by a series of problems called the 'problem set'. The majority of this time is spent completing the problems, allowing time for extra practice, as well as giving students time for discussion and reflection.
- **Application Problem:** This time is often allotted for students to practice their newfound skills and understandings in new ways. This component can also serve as a transitional period which will be completed in the next lesson and give students an idea of what they will be working on in the next class.
- **Student Debrief:** This component is allotted to the end of the class in which the teacher may engage in a whole class discussion. Students are encouraged to share their thinking and draw conclusions on how this affects their conceptual development. This also allows the teacher one final opportunity to make important points and offer students an additional opportunity for understanding before class ends.

## **Objectives**

- read, represent, compare, and order whole numbers to 100, and use concrete materials to represent fractions and money amounts to \$10;
- demonstrate an understanding of magnitude by counting forward and backwards by various numbers and from various starting points;
- solve problems involving the addition and subtraction of single- and multi-digit whole numbers, using a variety of strategies, and demonstrate an understanding of multiplication and division.

## **Materials Used:**

- Individual whiteboards
- Markers
- Smartboard
- Big whiteboard
- Worksheets

## Procedure:

- 1) The teacher began the class by asking all students to sit in their designated spots on the carpet along with a mini whiteboard and marker. The teacher began class with a short review of counting up and down by 4's and subsequently 5's.
- 2) After the review, the teacher had student turn to face the smart board which featured an Application Problem involving money. Students were given a short amount of time to analyze the word problem and use one of the math strategies they have been taught to solve the problem on their own personal white board. Once the timer went off, students turned their whiteboards around to face the teacher in order for the teacher to observe the various strategies used and conduct a short formative assessment before moving on.
- 3) The teacher then proceeds to a different Application Problem on the smart board and conducts choral reading of the problem with the class. Once finished reading, the teacher proceeds to write on the big white board several words: known & unknown. The students proceeded to raise their hands to give examples of the known information from the word problem. Once she has established the known and unknown information from the word problem, the teacher proceeds to draw a tape diagram and asks the students to tell her what units of measurement they are using. Once she has established the unit, they continue to draw a tape diagram, with each square representing a unit. The teacher then requests that students label the units with the correct information from the word problem. The students continued to label their own diagram on their whiteboard and were finally asked to express the word problem as a math equation. The students voluntarily shared their responses and the answer was reinforced by counting up by fours. They finally wrote a math sentence to express the answer. The teacher expressed the importance of using terminology from the question, which is called restating.
- 4) The teacher then conducts choral reading of the next problem with the students from the smart board. The problem is very similar to the previous problem, but contains a few additional details/changes. The teacher allows students 1 minute to discuss their thoughts with a shoulder partner. The teacher explains that this is a two-step problem and that the class will need to make additional changes to their previous tape diagram in order to solve the two-step problem. Once the necessary changes are made to the tape diagram, the teacher allows students to make suggestions as to how they will solve the problem. Students suggest skip-counting, like the previous attempt, but with an additional count because of the new information provided in the word problem. The teacher requests that students use their fingers when skip counting in order to demonstrate to her that they are

counting the correct amount of times. The teacher also allows an alternative opportunity for students to suggest another way of solving the problem. By using the total established in the previous question, she demonstrates that it wasn't entirely necessary to skip count the entire total again, but to simply add the new total to the old total. This saves time and is generally more efficient when solving a two-step problem.

- 5) Once the word problems have been solved entirely, the teacher proceeds to ask the class to erase their boards in order to begin the Independent/Partner practice time. The teacher hands out worksheets to students and she asks them to attach their worksheets to clipboards and work independently or in partners for no more than 10 minutes. This time allows students to practice what they have learned and apply their newfound skills.
- 6) Once 10 minutes passed, the class completed the shorter word problems together on the board. However, unlike the beginning of the class which dedicated a large portion of time to labelling the diagrams, the class labelled the diagrams and units less. The teacher explained that they were streamlining the process and how it was not necessary to label everything when you have an understanding of how the diagram functions and what the units represent. The teacher explained that it was only necessary to label one of the units, since each unit represented the same thing.
- 7) The teacher concluded the class by praising the students and asking for their thoughts on the new process. Some students preferred labelling every unit as well as writing all of the knowns and unknowns in a chart prior to answering the question. Other students liked the new streamlined process which required less writing. The teacher asked students how they felt about completing one word problem and then a subsequent problem that built on the previous problem. Some students expressed that it was a little confusing at first, but most of the students agreed that it was making sense and the two-step problems were not as difficult as they originally thought.

## **Conceptual Development**

In grade 3, students are expected to represent and explain the relationship among numbers in practical senses. For instance, in this 'Eureka' Math Lesson, students were given a word problem which they were required to represent in units. However, instead of representing each unit as the literal object, which was a scarf in the word problem, they were required to represent the unit in terms of its numeric value, which was \$4. If the word problem had been worded differently, it may have been appropriate to identify the unit as the scarf. However, because the word problem was targeting the total value of the objects, it made more sense to represent the unit by its numeric value for this teacher. While the students had never done this before, or labelled their tape diagram in this

fashion, it was clear upon conclusion of the first word problem that they understood how important it was to represent the unit in a way that enabled solving the problem. Their comments during the debriefing portion of the lesson demonstrated metacognitive skills as they expressed their understanding of the units and correctly identifying the units when analyzing the word problem. While some students expressed their discomfort with this, they were still able to acknowledge the validity of how this led them to solving the problem.

The teacher also gradually increased the complexity of the word problems. She initially began with a one-step problem and subsequently added another word problem that built upon the previous question but was transformed into a two-step problem. This gradual increase in complexity helped to further develop the students' learning. The students were required to investigate and explain how these changes to the word problem occurred and the additional steps it would take to solve it. This demonstrated that the students were beginning to understand the conceptual aspect of counting and representing information in different forms.

### **Reflective Inquiry**

It appeared as though the students were very interested and invested in their learning during this particular lesson. Allowing students to sit on the carpet in their designated spots allowed them to remain closer to the teacher, the smartboard, the whiteboard, as well as each other. The teacher had the class review and count up by 4's and 5's together as a class, which served as an easy and fun review of the skills they will need in the current lesson. The teacher also allowed the students, on several occasions, to partner with each other to solve problems as well as discuss their ideas when comparing the one-step and two-step problems. This enabled the students to feel more comfortable and confident in sharing their ideas in the whole class discussions. The teacher often enabled communication with her students and perpetual feedback by asking questions and receiving several responses from her students.

Moreover, the teacher encouraged the use of various strategies to solve a single problem. After working with one strategy with the class on the whiteboard, she would invite another student to share a different strategy with the class. Once again, she would solve the same problem on the board using the new strategy. This enhanced the student belief system that multiple strategies may be used to solve the same problem and each strategy has its own merits. The teacher was able to observe the various strategies being used by asking students to turn

their individual whiteboards towards her so that she may conduct a quick formative assessment before moving on.

## **Connections**

Many connections were made during this lesson that served as beneficial to the students. It was clear that the students were comfortable counting up and down by 4's and 5's. However, that success took place in an isolated instance in which they were asked to simply count up and down by 4's and 5's. When it came time to apply these skills to the word problems, the students remained hesitant. At a certain point during the two-step question, the teacher asked students to volunteer strategies for counting the value of the scarves and hats. In this question, there were 4 scarves that were \$1 and 4 hats that were \$1. After counting the scarves and hats, they were still hesitant as to how much the total of each accessory would be. It did not initially occur to them that the number of hats and scarves and the value of hats and scarves were the same number. The teacher on numerous occasions urged her students to not only count using numbers in an isolated sense, but to see numbers as fluid tools that can be representational of a multitude of concepts.

In order to enhance this concept, the teacher could have taken more time to ask students to practice counting any object, representational of a unit, and determine its value. For instance, "There are 20 students in this classroom and each student has \$1 in their pocket. How much money is there in total?" Once the students were comfortable with this concept, the teacher could have built on this by saying, "There are 20 students in this classroom and each student has \$2 in their pocket. How much money is there in total?" However, instead of skip counting again, the students would be encouraged to use the information gained from the previous question, which indicated that there was \$20 in total, and simply add 20 or multiply by 2 to achieve the desired answer of 40.

These connections also would have been more impactful if students had access to manipulatives. While it was helpful for the students to draw the tape diagrams and their various strategies on their whiteboards, manipulatives would have further enhanced the lesson. In addition, the only form of diagram used to represent information was a tape diagram. While the tape diagram was helpful for students to visualize the units and organize information, other forms of diagrams could have been used to represent the information in the questions offer students alternative options in their learning.

## **Use of Technology**

The use of technology was very limited in this lesson. The only form of technology used was the smartboard, which featured the series of word problems the students were required to solve on their individual whiteboards. In order to enhance the lesson, these questions could have been featured elsewhere in the classroom such as the whiteboard, so that the teacher could use the smart board with the Doc Cam in order to demonstrate the use of manipulatives. There were several occasions in the lesson in which the teacher relied a great deal on the tape diagram, which she drew herself. She made no effort to colour code the various units, which could have been visually appealing and helpful to students. The use of a Doc Cam along with coloured manipulatives could have further demonstrated the differentiation between the types of units referenced in the word problem. The use of coloured blocks could have also been helpful. The students were attempting to understand the concept of changing units. If students have 4 scarves, each scarf could be considered a unit, but if students have 4 scarves and 4 hats, each group could be considered a unit. This could have been represented well using coloured blocks.

## **Conclusion**

While the format of the 'Eureka' Math Lesson was engaging and hands on, it lacked in certain areas required to classify it as a fully student-cantered lesson. Much of the lesson was spent listening to the teacher speak. While there were several occasions in which students were able to volunteer strategies or opportunities to communicate, they were often short-lived and transitioned immediately to the teacher speaking again for a long length of time. The teacher asked students to turn their whiteboards toward her at the beginning of the lesson to conduct a short formative assessment, but this was also an isolated instance and she never checked their boards again. It may have been helpful for students to have been given the opportunity to show their own personal answers on the big whiteboard in front of the class, so that other students could witness how another student completed their work and found their solution to the problem. It was also very clear that the lack of manipulatives put the students at a disadvantage. A Doc Cam, coloured blocks, as well as base ten

blocks could have been used on several occasions when explaining how units change depending on the scenario of the word problem.

However, the teacher was commendable in accessing prior knowledge at the beginning of the lesson. She also scaffolded the lesson from one-step problems to two-step problems in an efficient transition. The teacher encouraged multiple strategy uses and gave the students ample time to practice their newfound skills. The student debriefing at the end of the lesson was especially helpful for formative assessment as well as giving the opportunity for students to communicate their thoughts and feelings about these new concepts. The teacher was successful in creating a supportive learning community when engaging in advanced forms of mathematics.