Mr. Tanaka's Post-Lesson Discussion Opening Statement

I am Tanaka here at University of Tsukuba Attached Elementary School. It is nice to meet you. Thank you for coming and observing my lesson.

Usually, the lessons on area are a part of quantities and measurement, but there could also be interesting side-benefits to learning about geometric shapes. In the lesson about geometric figures at the middle-school level, the concept of area is used as a tool in proofs. This is because the explanation using figures helps to cultivate and strengthen student's logical thinking. I think it would be a shame if the 4^{th} -grade area lessons covered only counting the number of units that fill in a space and finding area by developing formulae for rectangles or squares.

There are many interesting rules about equal-area figures if you look at the figures differently. For example, like in today's lesson about perimeter, there are many fascinating aspects. This is a study of investigating changes of one element when the other element is fixed. The elements to study could be reversed. You could fix the perimeter and investigate the areas. That could bring up interesting rules.

I first planned to use Pick's Theorem for today's lesson, that is, investigating areas with a given number of dots or investigating numbers in dots with a given area. But then, the point of the lesson would be investigating functional changes with given areas.

The objective of my lesson is to encourage students to investigate the changes of perimeters of shapes with a given area. Therefore, today's lesson is more about geometric figures rather than about area, and its objective is to encourage students to explain things logically.

In usual lessons that proceed with students' raising hands, speaking, and then responding to them, students tend not to listen carefully. So, I always let the entire class respond to one student's opinion. I let students discuss it with their friends next to them rather than just calling on one student to say his/her opinion in the class. By discussing with friends each time, all students are encouraged to speak more. Moreover, students are required to listen carefully in order to discuss.

I used to find several groups whose members simply did not have anything to say during discussions because they were not listening carefully. But as I have created some rhythm in the class by holding discussion time regularly. Students now know that after someone says something, they must exchange their opinions in groups of two, three or four. Consequently, they become careful listeners so they can discuss what was just said. If I just let a few students who raise their hands speak, then the rest of the class is inactive. But by having discussion time, everyone can have a chance to speak at least three or four times. This is one of my attempts to foster student's expressive ability. I think that providing more frequent opportunities to participate in class activities is the best way to develop expressive ability.

Now, I am talking about today's lesson materials. All the findings students made in the lesson are factors about perimeter change. As a matter of fact, when comparing areas of some shapes, students tend to believe the longer the perimeter is, the larger the area is. I did not discuss this in the lesson. Instead I focused on size of perimeters as the lesson content.

As students found out in the end of the lesson, there are some rules that become clearer when you draw dividing lines inside the shapes. They found out that all these shapes are composed of four squares. So, the maximum length of the perimeter would be 16 cm if they were all separated. However, we lose some portions of the length when we put these squares together. We might first figure out that there are three dividing lines inside, so subtracting 3 from 16 makes 13 for the perimeter. But as the students found out, each of these lines is actually composed of two sides of the squares when attached to each other. So it is 16 – 3 x 2.

It would be a good idea to encourage students to express as a math expression in the next step. I think it is important for them to learn how to summarize their thinking procedure by expressing it in a math expression. By doing so, they can explain why it is 10. In the case of this square, there are 4 lines inside. So the formula is 16 – 4 x 2, then the answer is 8.

The findings students obtained today were at first just intuitive. But, by explaining their findings logically, students have fun solving riddles. That was my aim.

This is all. Thank you very much.