Mathematics lesson plan Grade 5

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theme	To improve representational and thinking skills through "Representation, Reading and Calculation of expressions"

1. Title of the lesson: The expression of proportionality

2. About the research theme

♦ "Expression" is mathematical language

According to new curriculum standard, improving language skill through subject and educational area are needed. If I choose "representation" as language skill to improve mathematics, I have to change my point of view and attitude toward representation. And then I also change my teaching approach. In lesson of expression, it is important that teachers enable children to represent relationship. In addition, these are also important to encourage children; interpretation of expression, explanation of own ideas by using representation, handling problem by mathematical expressions, and advancing ideas by expression. Moreover I try to improve their calculation skill although few people think it is needed.

♦ To improve representational and thinking skills through "Representation, Reading and Calculation of expressions"

"Expression" is a mathematical term and if children use it skillfully, they can improve representational and thinking skills naturally. In this topic, I suggest some teaching approaches to enable children to master mathematical expression well.

(1) The values of "Representation, Reading and Calculation of expressions"

Till now, representation has been stressed. For example if you work with word problems you have to make expressions and answers. But, for children, these "expressions" were tool to get answers. So the important thing is to give them an image that "expressions" are tool for representing ideas. Through "reading by expression", I think, children can get that image. There are other important things; giving them an image that expression has one meaning through

using ( ), re-integrating one expression, and making several expression for representing each process of thinking. These calculating approaches are needed for thinking about the meaning of expressions.

However calculations like these are difficult for children themselves. So teacher's role is important. Teacher should introduce calculation in lessons so that children can figure out their ways of thinking later, if everyone cannot understand. I think it is crucial that teachers engage in representation themselves.

(2) To make children realize the merit of "Representation, Reading and Calculation of expressions"

I'll try to give children following images in teaching expressions.

◯ To encourage them voluntary to do "Representation, Reading and Calculation of expressions"

◯ To encourage them feel good to do "Representation, Reading and Calculation of expressions"

For example, after learning the formula to calculate the area of trapezium
$\langle S = (\text{upperbase} + \text{lowerbase}) \times \text{height} \div 2 \rangle$, if you read this mathematical sentence again, you may interpret this formula as formula for the area of triangle whose base is upper base + lower base. And when upperbase = lowerbase it relates to the formula of the area of parallelogram, when upper base = 0 it relates to the formula of the area of triangle. Some children can think this formula relates with "sequence of numbers with common difference by Gauss" which they learned before. In this way, when children find out new things, they can feel the merit of representing.

(3) To value on the key word which tempts to do "Representation, Reading and Calculation of expressions"

In mathematics, teachers should encourage the key word from children which bases the logic like "But $\cdots$", "Then $\cdots$", and "If then $\cdots$." So I want to create a method for this.

3. Plan of today's lesson

(1) Objective of today's lesson

To encourage children to consider merits and pleasures of considering expression through reading mathematical sentence $\langle \square = (\triangle + 3) \times 4 \div 2 \rangle$ and relating with concrete examples.

(2) Lesson plan

Learning activity	Teacher's facilitation
1. Suggesting problem and considering. $\square = (\triangle + 3) \times 4 \div 2$ Let's think examples of this formula. ① If this represents formula of trapezium $\cdots$ upper base=$\triangle$, lower base=3, height=4 ② If $\triangle = 3 \cdots$ $\square = (3+3) \times 4 \div 2$ parallerogram ③ If $\triangle = 0 \cdots$ $\square = (0 + 3) \times 4 \div 2$ triangle ④ If this represents formula of triangle $\cdots$ base $= \triangle + 3$, height $= 4$	○ To make children take notes so that teacher can know what they relate with a mathematical sentence $\langle \square = (\triangle + 3) \times 4 \div 2 \rangle$ ○ Suggesting formula of trapezium and observing children's thinking way through using chart and figure ○ Suggesting $\triangle = 0, 3$ ○ Suggesting also formula of triangle ○ To make children think the relation between ① and ④
2. Looking at this mathematical sentence and thinking concrete examples other than area Let's think this formula. $\square = (1 + \triangle) \times \triangle \div 2$ e.g.) "sequence of numbers with common difference by Gauss"	○ Looking at $\square = (1 + \triangle) \times \triangle \div 2$ and making children think concrete examples other than area