

Mathematics Lesson Plan for Third Grade

Teacher: Mr. Kei OONO, Setagaya Elementary School attached to Tokyo Gakugei University

Research Theme: Mathematic Learning emphasizing importance of fostering children's 'idea of function'

1. Theme Let's make a big regular triangle with Polydron. (Studying on changes)

2. The ability desired to be fostered through this theme

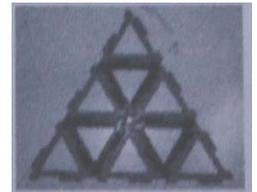
(1) Fostering 'idea of function'

The main mathematical idea in terms of studying on changes is 'idea of function' This idea is extremely important to create Mathematics and also to consider about events occurred in our daily lives. Then what is the 'idea of function'? In short, it is an idea for solving problems by paying attention to regularity of changes and correspondence in numerical quantity or diagram.

The following three points are important to foster the 'idea of function' in the lesson.

- ① Discover a relation: discover two figures which change correspondingly and consider its dependency relation.
- ② Find a rule(law): Clarify characteristics of two figures which change correspondingly as regard to the way of changes and correspondences.
- ③ Make good use of the rule : Solve a problem by utilizing the characteristics of changes and correspondences.

Today's lesson is learning to consider the way how the number of pieces of Polydron increases which constitute a regular triangle. Firstly, I make students to work with Polydron and let them notice the fact that the number of pieces of Polydron increases according to the increase of the number of the column. Then after having some data of the number of pieces of Polydron and of columns in several cases, students make a table based on the data so that they can realize characteristics of changes and regularity. Lastly, I raise a problem which asks the necessary number of pieces of Polydron for making a bigger regular triangle and make them to solve the problem by utilizing the rule that they discovered.



Through the problem-solving process like this, children are expected to discover the regularity of changes and corresponding characteristics found out by relation of two numerical figures and to enjoy being able to bring out unknown events.

(2) Fostering expressing ability

My aim of today's lesson is fostering children's expressing ability through the activity of making a table based on data and letting them experience its joy. For this purpose, I consider the following three points to be important.

The first point is 'the necessity of organizing data into a table', the second point is 'Setting a scene where the table can be utilized' and the third point is 'Experience of joy through a table-making activity'.

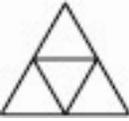
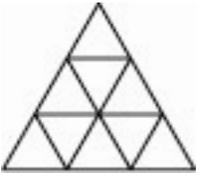
To explain more concretely, I try to stimulate children's motivation for 'sorting data regularly' or 'making a table with data' for instance, with a little ingenuity such as placing data irregularly on the black board or intentionally providing incomplete data. Also, I want children to recognize the necessity and utility of using a table by bringing out the necessity of discovering the regularity from children.

3. The plan of this lesson

(1) Objectives: By making a table, children discover joy of finding rules.

By using rules, they understand utility of finding rules.

(2)The plan of stream of today’s lesson

Main Learning Activities	Remarks on teaching																																				
<p>1. Problem presentation (Showing Polydron)</p> <p>Let’s make a bigger regular triangle. How many pieces of Polydron do we need?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>1 layer</p> </div> <div style="text-align: center;">  <p>2 layers</p> </div> <div style="text-align: center;">  <p>3 layers</p> </div> </div>																																					
<p>2.Problem-solving by oneself and presentation of the idea</p> <p>1 layer: 1 piece, 2 layers: 4 pieces, 3 layers:9 pieces, 4 layers:16 pieces, 5 layers:25 pieces, 6 layers:36pieces, 7 layers:49 pieces</p> <p>Child: ‘It is easier to see when we order the data according to the number of Polydron.</p> <p>Child: ‘There might be a rule of how the number of pieces increases if we sort data.</p> <p>3. Table-making and discovery of rules</p>	<p>○Handing in around 50 pieces of Polydron to each group of a few students and make them assemble a regular triangle actually and realize the way of changing.</p> <p>○At the time of presentation, making them present not according to the number of layer but at random so that their motivation for sorting data according to the number of data and for making a table can be encouraged.</p>																																				
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<p>Child: When I see the table from left to right, the number increases by 2.</p> <p>Child: If I use this regularity, I can find the answer for 10 layers too!</p> <p>4. Utilization of rules</p> <p>Teacher: So how many pieces do we need in case of 100 layers?</p> <p>ChildA: We can sum up like 1+3+5+7...till 100!</p> <p>ChildB: No, it’s too time-consuming.</p> <p>ChildC: When I see the table vertically, I found out that ‘the number of layers’ x ‘the number of layers’=’the number of pieces’</p> <p>ChildD: You’re right! Then in the case of 100 layers, 100x100=10000 pieces is the answer.</p>	<p>○Having children consider not only about rules but also utility of rules, which allows children to predict or forecast.</p> <p>○If children don’t realize the rule of (the number of layers) x (the number of layers) = (the number of pieces), I try to make them notice in the next step 4, utilization of rules.</p> <p>○When children try to find an answer for the number of pieces, I expect them to understand not only utility of making use of rules by simply using addition, but also its unreasonableness. This might lead to their realizing the rule of (the number of layers) x (the number of layers)=(the number of pieces).</p> <p>○In terms of the reason for the above-mentioned rule and the way of calculation of 1+3+5+7+..., I let them consider using a dot map if time allows.</p>																																				