THE LEARNING OBSTACLES ANALYSIS ON ADDITION AND SUBTRACTION MATERIALS IN ELEMENTARY SCHOOL

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Abstract

This study is back grounded by the findings of learning obstacles experienced by 1st grade students of elementary school in the topic of addition and subtraction. The focus of this study is to analyze learning obstacle occurred in the topic of addition and subtraction, which become basic in arranging a Hypothetical Learning Trajectory (HLT) which is suited with children characteristic. The method used in this study qualitative method with descriptive analysis. The subjects of this study are 2nd grade students of elementary school in some Elementary Schools in Bandung. The data was collected using Respondent Ability Test (RAT). The obstacles found on the subjects are categorised into the following three types: (1) ontogenic obstacles which occured psychologically due to the students’ age; (2) didactical obstacles which occured due to inaccuracy in the concept delivery; and (3) epistemological obstacles which occured due to lack of prior knowledge on the subjects. The result of study informs that learning obstacle experienced by students can be made to become reference for teacher in arranging the learning trajecory which is suited with students characteristic and in arranging a learning design, so the occurrence of learning obstacles can be minimized.

Keywords: addition, learning obstacles, subtraction

INTRODUCTION

In teaching learning process, each student probably will encounter the obstacles which can influence them to acquire the knowledge. The obstacles occurred in process of knowledge acquisition are called as learning obstacles. The learning obstacles experienced by students can be influenced by 2 factors, namely the factor which come from inside of students (internal factor) and factor which come from outside of student (external factor). The factors derived from inside of students (internal) among others are: intelligence, talent, interest, attention, motivation, maturity and readiness. As for factors derived from outside of students (external) among others are: curriculum, teaching method, teacher and student relation, and infrastructure (Slameto, 2010: 64).

Natawijaya (1991) said that students find difficulty in learning to achieve a competence as desired, among others are:

a) Students seldom pose the question because most of students do not know and do not understand the material being asked.

b) Students seldom give response because they had not capable to explain mathematical ideas;

c) Some students are able to solve mathematical problem, but less understand what is contained in that problem (not meaningful)’
d) Many students had not capable to make a conclusion from the material learned. Brousseau (2002) explained three factors which can cause the learning obstacles or difficulty experienced by students in learnin, namely:

1) **Ontogenical Learning Obstacle** is psychological learning difficulty, in which student find difficulty in learning because of mental readiness factor. In this case student is not ready to think because of age factor.

2) **Didactical Learning Obstacle** is learning difficulty experienced by students because of the mistake in presentation. In this case, the teaching material which is used by students in learning can invoke misconception. Didactical obstacles also can be occurred because of the mistake in learning process which is derived fro, learning system in school itself.

3) **Epistemological Learning Obstacle** is learning difficulty experienced by students because student understanding about a concept is not complete, only seen from its origin.

From result of initial observation in field, the learning obstacles are found. These obstacles occurred in the topic of addition and subtraction. Caron & Jacques (2001: 5) mentioned that “addition and subtraction are important parts of life and you don’t usually go through a day without needing to add or subtract something. Addition and subtraction are also the building blocks for more advance math.” Understanding the basic concept of natural number, particularly addition and subtraction very support the concept mastery in the next topic.

**RESEARCH OBJECTIVES**

The study is aimed to identify the occurrence of learning obstacles based on Respondent Ability Test (RAT) and interview with teachers and students in the topic of addition and subtraction for the numbers until 99. The finding in this study is expected to be beneficial as valuable information about level of mastery in topic of number addition and subtraction possessed by elementary school students in general. Besides, it can be made to become feedback to refine learning for mathematics teacher in 1st grade of elementary school.

**POPULATION AND SAMPLE**

The population in this study are 2nd grade students of Elementary School in one school in Bandung City. Total of 29 student become the sample in this study, consist of 13 boys and 16 girls. Sample are students who had been taught about the topic of addition and subtraction for the numbers until 99 in 1st grade.

**INSTRUMENT**

Two kind of instruments used in data collection is Respondent Ability Test (RAT) and interview. This RAT is arranged to identify the obstacles experienced by students when solving the problem in the topic of addition and subtraction for the numbers of 1 to 99. The interview is held to trace further the obstacles occurred related to students’ response to that RAT.

*Respondent Ability Test*

This test is designed to be implemented in 2nd grade, with assumption that they had learned the topic of addition and subtraction for the numbers 1 tof 99 when they were in 1st grade. This test consist of 6 items, with 50% of addition and50% of subtraction. The RAT problem given to students is shown in the following figure.
Let's have fun by solving the addition and subtraction as follow:

1) \[ 4 + 9 = \]
2) \[ 3 - 3 = \]
3) \[ 21 + 11 + 34 = \]
4) \[ 48 - 5 - 13 = \]
5) Doni has 43 marbles. He is given 19 marbles anymore by Rama.
   How many marbles that Doni has now?
6) Siska has 11 chocolates. 5 chocolates are given to Rini. How many chocolates Siska has which are remained?

Figure 1. The Problem of Respondent Ability Test

Interview

Interview is held toward some students who obtain the high, medium and low scores. This categorization is based on result obtained by students after after answering RAT problem. The form of interview in this study is unstructured interview. The interview is held to confirm the findings of students’ answer result.

METHODOLOGY

The method used in this study is qualitative method. This qualitative study is done because the researcher want to explore the phenomena which cannot be quantified and descriptive, such as process of work step, the formulation of recipe, variois definition of concept, characteristic of good and service and pictures (Satori & Komariah, 2014). In this study also, researcher want to understand a phenomena through holistic description and get in depth understanding from subject of study based on detail information, and learn about individual view about the phenomena occurred (Moleong, 2011; Creswell, 2012).

DISCUSSION

This study is began by administering Respondent Ability Test (RAT). This problem is given to 2nd grade students of Elementary School with total of 28 students. The result of students answer is corrected to see the errors occurred in each item of problem. The summary of Respondent Ability Test (RAT) can be seen in the table 1 below.

Table 1. The Summary of Respondent Ability Test (RAT)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Students’ Answer</th>
<th>Type of Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
<td>Wrong</td>
</tr>
<tr>
<td>4 + 9</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>3 - 3</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>5 + 11 + 34</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>12</td>
</tr>
</tbody>
</table>
48 – 5 – 13 = ...

Doni has 43 marbles
He is given 19 marbles anymore by Rama
How many marbles that doni has now

Siska has 11 chocolates
5 chocolates are given to Rini
How many Siska’s chocolates which are remained

The analysis result of students answer in solving Respondent Ability Test problem is seen as in table 2 below.

Table 2. The Analysis of Learning Obstacles

The Analysis of Students’ Answer for problem no. 1

Based on analysis of answer and interview, the information is obtained that students had been capable to translate the addition in place value of ones namely 9 + 7 as 16, then carry 1 tens which is put above the number of 4 (4 tens). But, the function of number of 1 (1 tens) which is carried above the number of 4 (4 tens) make students confused. There are students who think it as 7 + 4 + 1 become 12, so the final result finally become 126. There are also students who think that 7 + 9 become 16, then carrying 1 tens which is put above the number of 4 (4 tens). In fact, students do not understand the function of the number of 1 tens which is carried. Students then sum 7 + 4 become 11, so the final result of 49 + 7 become 116.

Analysis of Students’ answer for problem no. 2

Some students do error in determining the result of subtraction. Some students do not understand the meaning of subtraction operation sign (-), so they think it as addition. For example in problem 33-17 above, there are students who think that 3-7 become 3+7 so it become 10, then putting 1 tens above the number of 3 (3 tens), then summing 1+3+1 become 5, so the final result become 50. There are some students who define the subtraction number and the subtracted number inversely. For example such as 33-17, students subtract 7-3 in place value of ones and 3-1 in place value of tens, so the result become 24.

Analysis of Students’ Answer for problem no. 3

From the result of analys and interview, it is obtained the information that in problem 21+11+34, students only sum 21+11 so the result they write only 32. There are some students who think 21+11+34 as 2+1+1+1+34 so it become 39.
Analysis of Students’ Answer for problem no. 4

\[ \begin{align*}
48 - 5 - 13 & = 35 \\
48 - 5 - 13 & = 66
\end{align*} \]

The result of analysis and interview inform that there are many students who are confused with that subtraction problem. There are students who only subtract 48-5 so it become 43, then add it with 13 so it become 56. There are students who think 48-5=13 as 4+8=12, then subtract it with 5 so it become 7 and subtract it with 13 and 7 so the result become 6.

Analysis of students’ answer for problem no. 5

From the result of analysis and interview, it is revealed that students think 43+19 is by first subtracting 9-3 then subtract 4-1, so the result is 36. On the other side, another students answer the addition of 43+19 by first adding 3+9 become 12, then carrying 1 ten above the number of 4 (4 tens) so it become 142. Students then add 4+1 become 5 and pass the number of 4 again, so it become 142+54. Students juxtapose 15 with 54, then sum it so it become 682.

Analysis of students’ answer for problem no. 6

From the result of analysis and interview, it is revealed that students had knew that the word problem is subtraction. However, when subtract it, students think that 11-5 is 5-1 and the number of 1 in place value of tens Is passed down directly, so the result become 14. In another students, the sign of subtraction operation is understood as addition, so 11-5 = 16.

CONCLUSION AND SUGGESTION

Based on result analysis of students’ answer and the interview done, there are some learning obstacles occurred in the topic of addition and subtraction. These learning obstacles are categorized into three kinds, namely: epistemological learning obstacle, in which students had not able to relate the concept of addition and subtraction in one digit number into two digit numbers and into word problem type; ontogenical learning obstacle, in which students had not ready mentally to receive the topic of addition and subtraction two times in succession with two digit numbers; didactical learning obstacle, in which students only given the abstract concept in recognizing the place value of tens and ones.

Based on result of the findings above, then it is expected that learning obstacles which are occurred can become basic for teachers to arrange learning plot in the form of hypothetical learning trajectory (HLT) which is suited with students need from cognitive, affective and psychomotor aspects. Next, it needs to arrange a learning design which can minimize the occurrence of learning obstacles, in the form of ontogenical obstacle, epistemological obstacle, and didactical obstacle.
BIBLIOGRAPHY


